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Temporal Adverbial Clauses in the Languages of the World: Clause-Linking Strategies

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in Linguistics

by

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Abstract

Temporal adverbial clauses in the languages of the world: Clause-linking strategies

by

Jesús Francisco Olguín Martínez

This dissertation advances our understanding of the cross-linguistic variation in the expression of temporal adverbial relations, the semantic polyfunctionality of temporal clause-linking devices, and the areality of temporal clauses in a variety sample of two hundred eighteen languages. The sample of the present study is based on the Genus-Macroarea method proposed by Miestamo (2005), in which the primary genetic stratification is made at the genus level, and the primary areal stratification at the level of macro-areas. I focus on five types of temporal adverbial clauses: (1) *when*-clauses, (2) *while*-clauses, (3) *after*-clauses, (4) *before*-clauses, and (5) *until*-clauses.

With respect to the expression of temporal adverbial relations, it has been claimed that they tend to be signaled by free adverbial subordinators, such as English 'after', 'before', 'until', 'since' (Harder 1996; Kortmann 1997). However, I demonstrate that languages may also resort to other formal means, such as 'and then' coordinating devices, verb-doubling constructions, and correlative constructions. Furthermore, I show that in many languages of the world, temporal clause-linking strategies may make use of open class categories, such as temporal nouns used as clause-linking devices and verbs used as clause-linking devices. These

temporal clause-linking strategies may be characterized as devices not (yet) fully grammaticalized.

Regarding the semantic polyfunctionality of clause-linking devices, most studies that have addressed this domain have only taken into account a particular type of device (e.g. Kortmann 1997) or two types of devices (e.g. Hetterle 2015). Accordingly, it is not clear whether other devices that have been traditionally disregarded (e.g. 'and then' devices) will show polyfunctionality patterns not attested before. The semantic polyfunctionality patterns attested in the present study align for the most part with those documented by Kortmann (1997) and Hetterle (2015). However, I show that there are polyfunctionality patterns not addressed in their studies (e.g. the overlap between 'while' and 'without') that can inform theories of clause-combining and semantic change. I demonstrate that these rare patterns can be explained by various conceptual factors.

As for the areality of temporal clauses, it has been proposed that rare linguistic patterns have high genetic stability and strong resistance to areal influence (Nichols 1992: 181). However, I show that even rare linguistic patterns may be diffused through language contact. Many temporal clause-linking devices that are cross-linguistically rare occur in areal clusters, suggesting that language contact has played an important role in their cross-linguistic distribution. In this dissertation, I develop a series of methodological steps for determining the directionality of spread of rare temporal clause-linking devices.

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1	first person
2	second person
3	third person
A	agent
ABL	ablative
ABS	absolutive
ACC	accusative
ACT	actor
ADD	additive
ADESS	adessive
ADJ	adjective
ADNZ	adnominalizer
ADP	adposition
ADV	adverbial
AFF	affirmative
AGM	augmented
AGR	agreement
ALL	allative
ANA	anaphora
ANIM	animate
ANT	anterior
ANTICAUS	anticausative
ANTIPASS	antipassive
AOR	aoristic
APPL	applicative
APPROX	approximate
ART	article
ASP	aspect
ASSERT	assertive
ASSOC	associative
ATTR	attributive
AUG	augment
AUGM	augmentative
AUTO	auto-benefactive-spontaneous
AUX	auxiliar
AV	actor voice
BEN	benefactive
BFR	buffer
BND	bound root
CAUS	causative
CF	counterfactual
CHANG	change
CHD	change of direction
CISL	cislocative

CL	classifier
CNJ	conjunct
COLL	collaborative
COMIT	comitative
COMP	complementizer
COMPL	completive
CONAT	conative
CONC	concord
CONCL	conclusive
COND	conditional
CONJ	conjunction
CONJUG	conjugation
CONN	connective
CONS	consecutive
CONST	construct
CONT	continuous
CONTEMP	contemporal
COP	copula
COR	core case
CORR	correlative
COS	change of state
COV	coverb
CUST	customary
CVB	converb
DAT	dative
DECL	declarative
DED	deductive
DEIC	deictic
DEIX	deixis
DEF	definite
DEM	demonstrative
DEP	dependent
DERIV	derivative
DES	desiderative
DET	determiner
DEVERB	deverbal
DIM	diminutive
DIR	directional
DISC	discourse linker
DIST	distal
DISTR	distributive
DJ	disjoint
DP	discourse particle
DS	different subject
DU	dual
DUR	durative
DYN	dynamic

EMOT	emotive
EMPH	emphatic
EP	epenthetic
ERG	ergative
ESS	essive
EVID	evidential
EVIT	evitative
EXCL	exclusive
EXIS	existential
F	feminine
FACT	factual
FI	final vowel
FIN	finite
FOC	focus
G	suffix or infix that occurs in several TAM-forms
GEN	genitive
GEND	gender
GIV	given
GO	goal
HAB	habitual
HES	hesitation
HITH	hither
HON	honorific
HORT	hortative
HS	hearsay
HUM	human
HYP	hypothetical
ID	identification
IDPH	ideophone
IMM	immediate
IMP	imperative
IMPERF	imperfect
INAN	inanimate
INCEP	inceptive
INCH	inchoative
INCL	inclusive
INCOMPL	incomplete
INCR	increment
IND	indicative
INDEF	indefinite
INDEP	independent
INEL	inelative case
INF	infinitive
INFER	inferential
INSTR	instrumental
INT	intensifier
INTR	intransitive

INV	inverse
IPFV	imperfective
IRR	irrelis
ITER	iterative
J	juncture
JUSS	jussive
KIN	kinship
LAT	lative
LGR	lengthened grade
LIG	ligature
LIM	limitative
LINK	linker
LOC	locative
LV	lengthened vowel
M	masculine
MAN	mood-aspect-negation
MASD	masdar
MEDL	medial
MID	middle
MIN	minimal
MOD	modal
MOM	moment
MV	medial verb
N	noun
NARR	narrative
NC	noun class
NEG	negative
NF	suffix of the non-final form of the hesternal and hodiernal past perfective
NMLZ	nominalizer
NOM	nominative
NTR	neuter
OBJ	object
OBL	oblique
OBLIG	obligatory
OBV	obviative
OP	operator
OPT	optative
OV	objective version
P	patient
PART	particle
PASS	passive
PERF	perfect
PERM	permanent
PERSIST	persistive
PFV	perfective
PL	plural
POL	polite

POSS	possessive
POT	potential
PP	pronominal prefix
PREC	precedentive
PREP	preposition
PREV	preverb
PRIOR	prioritive
PRN	pronominal suffix
PRO	pronoun
PROG	progressive
PROP	propositive
PROPR	proprietive
PROX	proximate
PRS	present
PRV	privative
PTCP	participle
PUNCT	punctual
PURP	purpose
Q	question
QC	quasi connective
QUOT	quotative
RDP	reduplication
REAL	realis
REC	reciprocal
REF	referential
REFL	reflexive
REL	relativizer
RELAT	relational
REM	remote
REP	reportative
RES	resumptive pronoun
S	southern
SBJ	subject
SCM	situation change marker
SE	sentence ender
SEP	separation
SEQ	sequential
SIM	simultaneity
SIT	situative
SPS	sequential impersonal passive
SPEC	specifying
SRESS	superessive case
SS	same subject
STAT	stative
SUB	subordinator
SUBJ	subjunctive
SV	subjective version

TA	tense aspect
TEL	telic
TERM	terminative
THEM	theme
TNS	tense
TOP	topic
TRANS	transitive
UV	undergoer voice
VBL	verbal
VEN	venitive
VIRT	virtual
VIS	visual
VOL	volitional
VS	verbal stem marker
W	witness

CHAPTER 1

Introduction

It has often been observed that all human languages have ways of locating situations in time (Comrie 1985: 7). Time is one of the most diverse conceptual domains of human thinking in that the situations that speakers can conceive of are so varied and can be related temporally to each other in multiple ways (Haspelmath 1997: 24). Temporal adverbial clause constructions belong to the group of constructions in which one clause can locate the situation expressed in another clause in time (Thompson et al. 2007: 243). Given the large spectrum of possible situations (*p* before/after/until *q*, etc.), temporal adverbial clause constructions represent the most semantically diverse class of adverbial clause constructions as well as the most challenging class for interpretation (Lin 2015: 162).

Two little understood areas of temporal adverbial clause constructions are the cross-linguistic variation in the expression of temporal adverbial relations and the semantic polyfunctionality of temporal clause-linking devices, i.e. the range of meanings within the domain of adverbial clauses that a particular device can have (see §1.4.1 for a more detailed discussion).

With respect to the cross-linguistic variation in the expression of temporal adverbial relations, it has been claimed that temporal adverbial clause constructions tend to be encoded by free adverbial subordinators, such as English 'after', 'before', 'until', 'since' (Harder 1996; Kortmann 1997). More recent typological studies have shown that languages employ a larger range of devices than the ones that have been traditionally described, such as temporal nouns (e.g. ***the day*** *she left, I was happy*), verbs meaning 'to finish' (lit. *I woke up,* ***it was finished****, I left* 'I woke up and then I left'), verb-doubling (lit. *I* ***ate ate****, I left* 'as soon as I ate, I left'),

quantifiers (lit. ***all*** *my leaving*, *my feeling sick* 'as soon as I left, I felt sick'), and serial verbs (e.g. ***go reach*** 'until'), among many others (see Hetterle 2015: 106; Mauri & Van der Auwera 2012; Olguín Martínez 2020; Wälchli 2018). Still missing, however, from the body of typological work produced in recent years is an attempt at exploring the expression of *when*-relations, *while*-relations, *after*-relations, *before*-relations, and *until*-relations in a single study. This type of research would allow for generalizations to be made across them (see Chapter 8). The interest in the cross-linguistic variation in the expression of temporal adverbial relations can be illustrated by the following research question: what is the range of strategies by which *when*-relations, *while*-relations, *after*-relations, *before*-relations, and *until*-relations tend to be expressed? (see §1.4.1).

Regarding the polyfunctionality patterns of temporal clause-linking devices, most studies have only taken into account a particular type of device (e.g. Kortmann 1997 only takes into account free adverbial subordinators) or two types of clause-linking devices (e.g. Hetterle 2015 only takes into account adverbial subordinators and converbs). Accordingly, it is not clear whether other clause-linking devices that have been traditionally disregarded (e.g. 'and then' devices) will show polyfunctionality patterns not attested in previous studies. The interest in this domain can be sketched out by the following research questions: do the semantic polyfunctionality patterns attested in the present study align with those documented by other typological studies? What are the functional factors that motivate the semantic affinities between different types of polyfunctionality patterns? (see §1.4.2).

Another little explored area related to the study of temporal clauses is their areality. Many clause-linking devices that are cross-linguistically rare occur in areal clusters, suggesting that language contact has played an important role in their cross-linguistic distribution, that is,

it is statistically unlikely that these languages have undergone such a rare developmental process independently of one another (Comrie 2007: 21; Comrie 2016: 374; Heine & Kuteva 2008: 69). Their areality is a puzzle because speakers seem to have replicated these devices with native material (i.e. pattern replication). The theoretical importance of exploring areal clusters of clause-linking devices has been highlighted by various typological studies. Schmidtke-Bode (2009: 202-203) mentions that a large-scale sample can do a great deal to help us gain a better understanding of the areal dynamics that lead a particular clause-linking device to spread in a particular area. Martowicz (2011: 327) notes that exploring areal clusters and the direction of spread is an area of research that would be worth pursuing in future studies, and large-scale samples can do a great deal to explore this domain. Likewise, Hetterle (2015: 269) points out that addressing areal patterns of clause-linking devices is a domain that deserves to be explored in future studies. Accordingly, exploring areality of temporal clauses seems to be a good next step. The interest in this domain can be illustrated by the following nested questions: do any types of clause-linking devices encoding temporal clauses show areal clusters? If so, how can we determine the directionality of spread of a clause-linking device (i.e. who passed it to whom) once an areal cluster has been identified? (see §1.4.3).

My goal in this dissertation is to advance our understanding of the cross-linguistic variation in the expression of temporal adverbial relations, the semantic polyfunctionality of temporal clause-linking devices, and the areality of temporal clauses. In particular, this study concentrates on strategies expressing: (1) *when*-relations, (2) *while*-relations, (3) *after*-relations, (4) *before*-relations, and (5) *until*-relations.[1] The variety sample used in this study is composed of two hundred eighteen languages and has been built based on the method proposed

[1] Other types of temporal adverbial clauses, such as *as long as*-clauses and *since*-clauses, do not play a role in the present study due to the scarcity of data in my sample.

by Miestamo (2005). This sample is composed of languages for which the available sources give sufficient information on the grammar of the five temporal adverbial clauses mentioned above (see Chapter 2 for a more detailed explanation of the sample used in this dissertation).

The structure of this chapter is sketched out as follows. I start by discussing the various types of complex sentence constructions that have been traditionally recognized in the literature (§1.1). In exploring them, I show that it is sometimes difficult to differentiate various types of constructions from one another. This introduction is important in that it will help the reader to observe that temporal adverbial clause constructions are formally and functionally similar to other types of constructions. This is followed by a discussion of adverbial clause constructions (§1.2). In particular, this section focuses on developing a comparative concept of adverbial clause constructions. §1.3 reviews the literature on the variety of strategies that languages employ for expressing temporal adverbial relations along with the polyfunctionality and areality of temporal clause-linking devices. §1.4 is foundational for the remaining chapters in that it highlights several unresolved issues of temporal clauses and formulates the research questions of this dissertation. Furthermore, some policies that have been adopted to overcome various methodological issues are discussed. §1.4.1 starts by introducing the framework of Olguín Martínez et al. (2018), adopted in this study to explore the range of strategies by which *when*-relations, *while*-relations, *after*-relations, *before*-relations, and *until*-relations are expressed. This is followed by a discussion of the relation between polyfunctionality patterns and clause-linking devices (§1.4.2). Finally, the chapter concludes by discussing the areality of clause-linking devices (§1.4.3).

1.1 The dynamics of complex-sentence systems

The term ‘complex sentence construction’ refers to a specific relationship between (at least) two situations (Croft 2001: 320-321; Gast & Diessel 2012: 4; Haspelmath 1995: 11; Lehmann 1988: 182; Longacre 1985: 255; among many others). The definition involves two important notions: (i) construction and (ii) situation.

First, ‘constructions’ are the basic units of grammar and are commonly defined as grammatical assemblies characterized by the combination of a specific form with a specific function or meaning. While the formal side comprises phonological, morphological, and syntactic features, the functional side subsumes semantic, pragmatic, and discourse-pragmatic features (Diessel 2004: 15). The term has been applied to specific clause types and phrases, such as imperatives, relative clauses, complex noun phrases, and ditransitive clauses, to name but a few. This term has also been employed for lexical expressions (e.g. Croft & Cruse 2004: §9). However, as argued by Diessel (2015: 298), there is no need to extend the notion of construction to lexical expressions. I concur with Diessel and I restrict the notion of construction to grammatical units, such as relative clauses, adverbial clauses, and complement clauses, using the notion of sign as a cover term for both lexemes (i.e. lexical signs) and constructions (i.e. grammatical signs). Constructions vary across a continuum of abstractness. In this regard, this notion can be applied to units associated with particular lexemes, e.g. idioms such as *kick the bucket*, prefabricated expressions such as *I don’t know*, and grammatical units defined over “slots”, which can be filled by certain types of expressions (Diessel 2015: 297).

Second, the term ‘situation’ is used in the present work as a cover term to refer to states, events, or processes (Comrie 1976: 13). In this regard, states are static in that they continue as

before unless changed, while events and processes are dynamic in that they require a continual input of energy if they are not to come to an end.

Complex sentence constructions have traditionally been classified into four types: complement clause constructions, relative clause constructions, coordinating clause constructions, and adverbial clause constructions (Croft 2001: 321). Note that these terms are reserved for the combination of one clause to another. With this in mind, the example 'I heard that Daniel died' is considered a complement clause construction and '…that Daniel died' is considered a complement clause. The term relative clause construction is reserved for examples, such as 'I visited Arya, who was ill' and the term relative clause is reserved for the dependent clause '…who was ill'. Regarding adverbial clause constructions, the example 'when she woke up, I was doing my homework' is characterized as an adverbial clause construction, while 'when she woke up…' is characterized as an adverbial clause. With respect to coordinating clause constructions, the example 'Mary is from Paris, and John is from Moscow' is treated as a coordinating clause construction and the conjuncts 'Mary is from Paris' and 'John is from Moscow' are treated as coordinate clauses. Having clarified these notions, I can now proceed to define these four types.

Complement clause constructions are constructions in which the predicate of one clause entails reference to another situation expressed in a second clause (Cristofaro 2003: 95). For example, the English predicate *want* denotes a mental activity inherently directed at, and hence entails reference to, another situation, as in (1) (Schmidtke-Bode 2014: 7). In this regard, "a predication comes to function as an argument of a predicate" (Noonan 2007: 52). Complement clauses can be classified depending on the type of complement-taking predicate. They may be classified as phasal predicates (e.g. *he began to chop the wood*), perception predicates (e.g.

I've heard that Frank left his wife), knowledge predicates (e.g. *I know how to fix a car*), and emotional predicates (e.g. *I am happy that he came*), to name but a few.

(1) *I want to go with you*.

A restrictive relative clause construction is a construction in which a clause narrows the potential reference of a referring expression by restricting the reference to those referents of which a particular proposition is true (Comrie & Kuteva 2005: 494). With this in mind, a relative clause functions as a nominal modifier by restricting the semantic domain covered by a syntactic constituent, typically a noun termed the 'head noun'. In the example in (2), the relative clause *who will come to see you tomorrow* modifies the noun 'the woman', and also narrows the potential reference of the head noun 'the woman' to just of whom the proposition *the woman will come to see you tomorrow* is true.

(2) *The woman who will come to see you tomorrow*…

Relative clauses can be classified according to the syntactic-semantic roles of the head noun into subject relative clauses (e.g. *the woman who is washing the clothes*), direct object relative clauses (e.g. *the boy that I saw*), and indirect object relative clauses (e.g. *I saw the woman to whom John gave the book*), among others (Keenan & Comrie 1977: 66).

A coordinating clause construction consists of two or more clauses in which they have the same status, that is, neither of the clauses is clearly more salient or important or neither is presented in the perspective of the other (Haspelmath 2004: 3; Mauri 2008: 1). Their coordinate

status may be indicated by coordinators like *and*, *or* and *but* (Haspelmath 2004: 4). Three different conceptual relations are usually discussed under the labels 'conjunction' as in (3), 'disjunction' as in (4), and 'adversativity' as in (5) (Mauri 2008: 1).

(3) *The bears were black and the dogs were gray*.

(4) *He will fish or he will hunt*.

(5) *I'm very thirsty but I don't like orange juice*.

An adverbial clause construction is a construction in which a clause modifies a verb phrase or main clause (Thompson et al. 2007: 238). Just as with adverbs, which are single words or phrases, adverbial clauses can be labelled and categorized with respect to their semantic roles (Thompson et al. 2007: 238). They may be classified into temporal as in (6), conditional as in (7), causal as in (8), concessive as in (9), and purpose as in (10), among others.[2]

(6) *When he entered the room, he saw his dog*.

(7) *If he gets the job, he will celebrate*.

(8) *Hasan got very angry because I gave the pencil to you*.

(9) *Although he is not hungry, he ate a lot.*

(10) *He went to the supermarket to buy tomatoes*.

[2] For a more detailed list of types of adverbial clauses, the reader is referred to Kortmann (1997), who addresses the form and function of adverbial subordinators, expressing as many as thirty-two adverbial relations in a sample of European languages.

The types of complex sentence constructions discussed above still form the cornerstones of most typological work on clause combining. However, it is sometimes difficult to draw clear lines between these types. Diessel (2001: 436) and Gast & Diessel (2012: 1-2) explain that this division should probably be regarded as a rough guideline rather than a rigid classification, given that many languages do not differentiate these types categorically. In what follows, I turn my attention to various types of overlaps that have been noted in the literature. This section cannot by any means cover exhaustively the whole range of overlaps among complex sentence constructions. Instead, special attention is paid to overlaps between adverbial clause constructions and other types of constructions. With this proviso, let us briefly discuss some of these overlaps.

1.1.1 Adverbial clause constructions and relative clause constructions

There are many languages in which certain semantic types of adverbial clause constructions take the form of relative clause constructions. For instance, Thompson et al. (2007: 245) point out that adverbial clause constructions expressing time (e.g. *We'll go when Tom gets here*), location (e.g. *I'll meet you where the statue used to be*), and manner (e.g. *She spoke as he had taught her to*) can commonly be paraphrased, in many languages, with a relative clause construction that appears with a generic head noun, such as 'time' (e.g. *We'll go at the time at which Tom gets here*), 'place' (*I'll meet you at the place at which the statue used to be*), and 'way/manner' (e.g. *She spoke in the way in which he had taught her to*), respectively. Languages may also use relative clause constructions with non-generic head nouns for expressing various types of adverbial relations, such as nouns meaning 'day' as in (11), 'year' as in (12), 'activity' as in (13), and 'cause' as in (14), among many others.

Araki (Austronesian/Oceanic)[3]

(11) *mo* *varia-a* *nunu*

3SG.REAL take-3SG shadow

'He took the photo

lo ***dani*** *no-m̈am* *ta* *mo* *pa* *m̈is* *m̈audu* *ro.*

LOC day POSS-1EXCL.PL dad 3SG.REAL SEQ still live PROG

the day our father was still alive.' (François 2002: 182)

Jalkunan (Mande/Western Mande)

(12) ***ɲɛ̄ɛ́*** *mì* *mā* *nɔ̀ŋɔ́* *dɛ̀kɛ́,* *mā* *wál* *mɛ̀ɛ̀=nɛ̄ʔ.*

year REL 1SG friend finish.PFV 1SG work do.PFV=NEG

'The year my friend passed away, I did not do any work.' (Heath 2017: 307)

Emai (Atlantic-Congo/Edoid)

(13) *é* *yé* ***ógúí*** *ẹ́nyọ́* *údàmí.*

3PL.SBJ move.to activity wine drinking

'They went to drink wine.' (Schaefer & Egbokhare 2017: 939)

[3] Within the parentheses is indicated the family and genus of the language. For instance, in the example in (11), the language Araki belongs to the Austronesian family, and to the Oceanic genus. For practical reasons, including the avoidance of inconsistencies arising from the conflation of alternative genealogical classifications, the classification of Dryer (2013a) is adopted here.

Emai (Atlantic-Congo/Edoid)

(14) ***ọ̀híọ́*** *khí* *ọ́lí* *ọ́mọ̀hè* *dẹ́* *ìmátó* *lí* *ọ̀gbọ̀n,*

cause IND the man buy car REL new

'Because the man is buying a new car,

ọ̀ *ọ́* *gbé.*

3SG.SBJ CONC dance

he is dancing' (Schaefer & Egbokhare 2017: 942)

From a diachronic perspective, various authors have argued that relative clause constructions encoded by generic and non-generic head nouns provide a common source for adverbial clause constructions. For instance, temporal adverbial clause constructions are frequently formed via the grammaticalization of a generic head noun of time. This has been attested in many languages not genetically related, such as Early Biblical Hebrew, Kikuyu, and Tamil, among others (Heine & Kuteva 2002: 98; Heine & Kuteva 2007: 246). Diessel (2019a: 106) notes that relative clause constructions encoded by a generic head noun of time provide a very frequent source for temporal adverbial subordinators. A well-known example comes from English, in which the subordinator 'while' developed from an adverbial phrase translatable as 'at the time that' consisting of an accusative distal demonstrative, an accusative noun meaning 'time', and a subordinating device meaning 'that' (Hopper & Traugott 2008: 90). Hetterle (2015: 90) shows that clause-linking devices derived from nouns meaning 'time', 'day', and 'duration/period' are very common cross-linguistically. She shows that most commonly

clause-linking devices derived from these nouns occur in constructions that express temporal adverbial relations, in particular *while*-relations.

Another example comes from headless relative clause constructions and concessive conditional constructions. Universal concessive conditional constructions (e.g. *whatever you are selling, I will buy it*) are difficult to keep apart from headless relative clause construction where the relativized constituent has a non-specific meaning (e.g. *I will buy whatever you are selling*) (Haspelmath & König 1998: 577).

Although the synchronic identities between adverbial clause constructions and relative clause constructions mentioned above are probably the most widely discussed in the literature, there may be more to the story. Relative clause constructions may also be similar to purpose clause constructions (Schmidtke-Bode 2009: 165). In the example in (15), the relative clause, in addition to modifying the noun 'the book', conveys the meaning of purpose. This construction is known in the literature as an 'infinitival purpose clause construction'. Interestingly, it has been shown recently that infinitival relative clause constructions seem to be attested in a number of typologically and geographically diverse languages (Shagal 2019: 34).

(15) *The book to read in the train* (Shagal 2019: 33).

1.1.2 Adverbial clause constructions and coordinating clause constructions

In many languages of the world, the division between adverbial clause constructions and coordinating clause constructions is not always clear-cut. Cristofaro (2003: 20-21) notes that coordinating clause constructions convey different adverbial semantic relations. The author

dubs this scenario the "mismatch problem". In a similar fashion, Bril (2010: 5) observes that some coordinating clause constructions may convey *while*-relations, *if*-relations, and *because*-relations, among others.

Conjunctive coordination or *and*-coordination tends to convey atemporal relations in that the location of combined situations along the time axis is simply not relevant to the combination itself, as in (16) (Mauri 2008: 85). Longacre (1985: 241) calls it "coupling" or "non-temporal underlying *and*-relation". Interestingly, there are conjunctive coordinating constructions that convey various types of adverbial meanings, such as *after*-relations as in (17), and *while*-relations as in (18), among others (Comrie 2008a: 6; Culicover & Jackendoff 1997: 195; Fabricius-Hansen & Ramm 2008: 7).

(16) *Doctors are rich and lawyers marry pretty girls* (Lakoff 1971: 129).

(17) *The police came into the room and everyone swallowed their cigarettes* (Lakoff 1971: 127).

(18) *He is dancing and clapping his hands* (Mauri 2008: 84).

In the examples in (17) and (18), the adverbial interpretation arises by implicature, usually due to contextual or common knowledge and/or iconicity of sequencing (Greenberg 1966; Haiman 1980). This phenomenon is known as "conjunction buttressing" (Levinson 2000: 122) and can be explained as pragmatic enrichment, which allows the hearer/reader to choose the strongest interpretation coherent with what is said.

Adversative coordination or *but*-coordination indicates 'semantic opposition' (e.g. *John is short but Mary is tall*). However, in many languages of the world, adversative clause-

linking devices may also convey 'denial-of-expectation', as in (19) (Malchukov 2004: 179-180).

(19) *Mary caught a cold, but went to school.*

In this context, adversative clause-linking devices convey concessive meanings (e.g. *Although Mary caught a cold, she went to school*). In English, *but*-clauses can denote 'semantic opposition' (e.g. *George is diligent, but Mary is lazy*) and 'denial-of-expectation' (e.g. *I have money, but I am sad*). However, only the denial-of-expectation *but* allows a paraphrase employing a concessive conjunction (cf. *Although I have money, I am sad*).

Disjunctive coordination or *or*-coordination signals an alternative relation between situations (e.g. *he will live or he will die*) (Mauri 2008: 22). In this type of construction, both situations need to have an equal possibility of occurrence. Interestingly, in many languages of the world, disjunctive coordination may also convey denied conditional meanings 'if not'.[4] In the example in (20), the disjunctive construction reinforces the probability of the only possible/desired situation. In (20), the unlikely situation of suicide is presented just to reinforce the wish of going to the party (Mauri 2008: 26).

(20) *I have to go to the party tonight or I'll kill myself.*

[4] Cross-linguistically, a conditional connective accompanied by a negative marker tends to grammaticalize into a disjunctive coordinating device (Mauri 2008: 183).

1.1.3 Adverbial clause constructions and complement clause constructions

Adverbial clause constructions may also show synchronic identity with various types of complement clause constructions. Perhaps the most widely discussed synchronic identity is that between purpose clause constructions and complement clause constructions. Schmidtke-Bode (2009: 157-158) shows that in 62 languages in his sample (62⁄80=77.5%), "at least one purpose clause construction shares some of its morphosyntactic properties with specific types of complement clause constructions, up to being completely identical with them." The overlap between purpose clause constructions and complement clause constructions only occurs with specific types of complement clause constructions. In particular, desiderative complement clause constructions (e.g. 'want') tend to show functional and formal resemblances to purpose clause constructions.[5] In Kolyma Yukaghir, purpose clause constructions and desiderative complement clause constructions are encoded by *-din*, as is shown in (21) and (22). This overlap stems from the fact that both purpose clause constructions and desiderative complement clause constructions involve a participant's will or desire to bring about a certain situation. Furthermore, the time reference in these types of complex sentence constructions is predetermined to be to the future, which entails that the realization of the desired situation is hypothetical at the moment of speech (Schmidtke-Bode 2009: 162).

[5] Schmidtke-Bode (2009: 162) shows that, less frequently, modal, perception-knowledge, and utterance complement clause constructions may also show functional and formal resemblances by purpose clause constructions.

Kolyma Yukaghir (Yukaghir/Yukaghir)

(21) *met-in* *tet* *čilge* *kej-k* *qaŋsā* *čiččī-**din***.

1SG-DAT 2SG.POSS branch give-2SG.IMP pipe clean-PURP

'Give me your branch, for me to clean the pipe.' (Maslova 2003:433)

Kolyma Yukaghir (Yukaghir/Yukaghir)

(22) *čumu* *lejdī-**din*** *erd'ie-j*.

all know-PURP want.INTR-3SG

'He wants to know everything.' (Maslova 2003:433)

Another example comes from causal clause constructions and complement clause constructions involving 'emotional predicates' (e.g. 'be happy/sad'). With respect to the latter, the emotional predicate entails reference to another situation, that is, the causal situation (Schmidtke-Bode 2014: 262). There are languages in which 'because' constructions can commonly be paraphrased with a complement clause construction involving 'emotional predicates', as can be observed in the English examples in (23) and (24).

(23) *I am happy that you came early*

(24 *I am happy because you came early*.

A large number of unrelated languages scattered throughout the world share a complex sentence construction that portrays an imagined ('do X as if it was caused by Y'), or counterfactual ('do X as if Y were true') situation (Darmon 2017: 372-373; Dixon 2009: 35;

Hetterle 2015: 54; Olguín Martínez 2021a), as is shown (25). This type of adverbial clause construction is known in the literature as a 'hypothetical manner construction' (Dixon 2009: 35), an "unreal circumstance clause construction" (Hengeveld 1998: 355), a "pretence clause construction" (Vanhove 2017: 206), a "modus essendi clause construction" (Roulon-Doko 2017: 226), a "counterfactual manner adverbial clause construction" (Heath 2014a; 2016), or a "hypothetical similarity clause construction" (Treis 2017: 125).

West Coast Bajau (Austronesian/Sama-Bajaw)

(25) *be-sinar-sinar* *no* *emas* *e*
DISTR-shine-RDP FOC gold DEM
'The gold shimmered

masam *keadaan* *kampung* *e* *tunu*.
as.if condition village DEM burn
as if the village were burning.' (Miller 2007: 418)

Interestingly, in many languages, it is difficult to draw clear lines between hypothetical manner clause constructions and complement clause constructions involving epistemic-judgement predicates (Olguín Martínez 2021a). By epistemic-judgement predicates is meant a type of complement clause belonging to the domain of propositional modality (Palmer 2001: 8), as in (26).

Ottawa (Algic/Algonquian)

(26) ***dibishkoo*** *miznaakide-g* ***izhinaagwad****-w*.

as.if be.printed-CNJ look-IND.OBJ

'It looked as if there were printing on it.' (Valentine 2009: 214)

This is a subject complement clause construction. Schmidtke-Bode (2014: 44) mentions that "the experiencer, or holder, of the propositional attitude is normally the speaker, and the proposition whose truth is evaluated is coded as a complementation pattern in a main clause." It has been found that complement clause constructions involving epistemic-judgement predicates have usually developed from hypothetical manner clause constructions. López-Couso & Méndez-Naya (2015: 193) show that this development is not restricted to English and other Indo-European languages, such as Spanish, Dutch and German, but can also be found in other languages (e.g. Caucasian languages). What this seems to indicate is that this connection cannot be considered a language specific phenomenon, but is rather a development common in many languages not genetically related. López-Couso & Méndez-Naya (2015:196) mention that this development is a case of secondary grammaticalization, that is, it refers to "increased grammaticalization of already grammatical items in specific contexts" (Hopper & Traugott 2008: 175).

When-clauses and *while*-clauses may be similar to complement clause constructions involving 'perception predicates', i.e. sensory mode typically visual ('see', 'watch') or auditory ('hear'). In the example in (27), the perceived situation is ongoing at the time the act of perception takes place (Cristofaro 2003: 41). Cross-linguistically, it is common that *when*-clauses and *while*-clauses involving 'perception predicates' gradually become arguments of

perception predicates and serve as complement clauses (Schmidtke-Bode 2014: 262). Therefore, it is likely that complement clause constructions are historically derivative of the looser adverbial clause construction (Schmidtke-Bode 2014: 263).

(27) *I saw him running in the park.*

The last overlap is between embedded interrogatives and alternative concessive conditional constructions. In many languages, it is difficult to draw clear lines between embedded interrogatives and alternative concessive conditionals (Haspelmath & König 1998: 578). A crucial difference between the two constructions is that embedded interrogatives are an argument of another clause and fill a functional slot within that clause. In the example in (28), the clause *whether he likes it or not* is the object of the verb *know*. On the other hand, in the example in (29), the clause *whether you go or not* is not an argument of another clause.

(28) *I don't know whether he likes it or not.*

(29) *Whether you go or not, I don't care.*

Language is not a static, but rather a dynamic system that is in a constant state of flux (Croft 2003: 283). Accordingly, this seems to explain why sometimes it is difficult to draw clear lines between the types of complex sentence constructions mentioned above. Taking into account this theoretical perspective opens the door to understanding the diachronic dynamics of complex-sentence systems. It goes without saying that this perspective can help us to understand why some types of temporal adverbial clause constructions are formally and

functionally similar to other types of complex sentence constructions, as is shown in detail further below. Having briefly explained the diachronic dynamics of complex-sentence systems, I now turn my attention to one particular type of complex sentence construction: adverbial clause constructions.

1.2 Adverbial clauses in typological perspective

As was mentioned above, just as with adverbs, which are single words or phrases, adverbial clauses can be labelled and categorized with respect to the semantic roles they play (Thompson et al. 2007: 238). Based on this, adverbial clauses may be classified into temporal, conditional, and concessive clauses, etc. This semantic characterization has played an important role in the description of individual languages. However, for cross-linguistic comparison, both formal and semantic criteria are important. Accordingly, a comparative concept of adverbial clause construction needs to be formulated for the purposes of the present research. Haspelmath (2010: 664) mentions that comparative concepts are concepts created by comparative linguists for cross-linguistic comparison. They are based on universal conceptual-semantic concepts and universal formal concepts.

Adverbial clause constructions have been traditionally considered complex sentence constructions encoded by an adverbial subordinator. This definition has been used for exploring adverbial clause constructions mainly in European languages. However, languages from different families of the world use a wide range of clause-linking strategies for expressing adverbial semantic relations. With this cross-linguistic picture in mind, this dissertation adopts the following comparative concept of adverbial clause construction (similar to the definition of adverbial clause constructions put forward by Schmidtke-Bode & Diessel to appear: 2).

(30) **Adverbial clause constructions**: An adverbial clause construction is a construction in which a non-argument clause explicitly or implicitly spells out some part of the ground for the situation of the figure clause without necessarily acting as a modifier.

There are four key components that can be highlighted from this definition: 'ground clause', 'figure clause', 'non-argument clause', and 'explicitly or implicitly'. In what follows, some comments on these components are fleshed out.

First, in this research, I adopt the terms figure and ground to analyze adverbial clause constructions. These terms have been employed for exploring locative relations (e.g. *the glass is on the table*). However, they can also be used for exploring temporal adverbial clauses, as is argued below. The question is: what are 'figure' and 'ground'?

Most natural language descriptions of spatial scenes designate the location of one thing with respect to other things. Thus, linguistic expressions of locative relations require distinguishing between figure (i.e. objects that are in the focus of attention) and ground (i.e. objects that are backgrounded in a spatial scene) (Levinson 2003: 37; Levinson & Wilkins 2006: 3). Simply put, the figure is the entity situated with respect to another entity, known as the ground (Levinson & Wilkins 2006: 3; Talmy 2000: 311). In the English example 'the glass is on the table', the figure is 'the glass' and 'on the table' is the ground. Nearly all descriptions of motion also involve reference to ground locations (e.g. *The bird flew up into a tree*). However, in what follows I shall confine myself to linguistic descriptions of static locative expressions.

Static locative relations can be divided into topological and frames of reference. The topological relation is the conceptually simplest spatial description in that it basically indicates a spatial coincidence of figure and ground (e.g. *the glass is on the table*) (Levinson & Wilkins 2006: 3). Frames of reference are concerned with some kind of coordinate system (Levinson 2003: 35). Three subtypes are distinguished: intrinsic frames of reference, relative frames of reference, and absolute frames of reference.[6] As is show below, intrinsic frames of references are relevant to the discussion of temporal adverbial clause constructions. Intrinsic frames of reference refer to those coordinate systems in which a facet of the ground is named to indicate that the figure lies on an axis extended from that facet, as in 'the statue is in front of the cathedral' (Levinson 2003: 41; Levinson & Wilkins 2006: 3). Languages may have formal ways for describing the same situation by using different adpositions. In English, 'in front of' and 'behind' can be used for describing the same situation, as is shown in (31) and (32). Note, however, that sometimes it is not possible to describe the same situation by using different adpositions, as in (33).

(31) *The cat is in front of the dog*.

(32) *The dog is behind the cat*.

(33) *The lake is at the edge of my mother's property*.

Although these are the most common ways of localizing referents in space, there may be more to the story. Some languages have locative constructions with double figure/ground.

[6] Relative frames of reference specify an angle by using the viewer's own bodily coordinates, as in 'the squirrel is to the left of the tree' (Levinson 2003: 43). Absolute frames of reference specify angles by using fixed bearings, as in 'the coast is north of the mountain ridge' (Levinson 2003: 45).

German has a reciprocal locative construction with a double figure/ground (Wiemer & Nedjalkov 2007: 485). In the example in (34), *Hans und Maria saßen nebeneinander* 'Hans and Mary sat next to each other', Hans is the figure and ground and Maria is the figure and ground, as well.

(34) *Hans und Maria saßen nebeneinander.*

There can also be more complicated locative expressions. The locative construction in (35) shows a situation where the table is first introduced, then used anaphorically as the ground. Note that the example in (36) is similar to that of (35). However, in (36), the locative relation is inferred as a default according to the principles of generalized conversational implicature (Levinson 2000).

(35) *This is a table. On it there is a bowl.*

(36) *This is a table.* (*On it*) *there is a bowl.*

These various ways of localizing referents in space are the closest analogue to localization in time. Accordingly, they can be employed for exploring temporal adverbial clauses (see Talmy 1978 for a similar analysis). Temporal adverbial clauses expressing *after*-relations and *before*-relations are like the examples in (31) and (32) encoded by *in front of*/*behind* in that *before*-clauses and *after*-clauses are inverses of each other. The examples in (37) and (38) describe the same situation, but in (37) Kim's arrival is the figure and Lee's departure is the ground, while in (38) it is the other way round.

(37) *Kim arrived **after** Lee left*.

(38) *Lee left **before** Kim arrived*.

After-relations may be expressed by means of 'and then' devices or asyndetic constructions. While the construction in (39) is similar to the example in (35) in that Lee's departure is first stated and then used as a ground, the construction in (40) is similar to the example in (36) in that the temporal relation arises by implicature, usually due to contextual or common knowledge and/or iconicity of sequencing (Greenberg 1966; Haiman 1980).

(39) *Lee left, **and then** Kim arrived*.

(40) *Lee left,* (*and then*) *Kim arrived*.

Until-clauses are like the example in (33) in that they indicate the terminal boundary or endpoint of the time interval during which the figure situation is true, as in (41).

(41) *She sat on her bed **until** the alarm rang*.

There are languages that have a construction which includes both, a *before*-clause and an *after*-clause. First, the Waray example in (42) conveys a *before*-relation in that the second clause *putawan iyatjinj* 'we went to Darwin' can be understood as a situation that occurred before the situation expressed in the first clause *perima iyatjinj* 'we went to Berrimah' (e.g. *we went to Berrimah before we went to Darwin*). Second, the Waray example in (42) also expresses an *after*-relation in that the second *putawan iyatjinj* 'we went to Darwin' can be

understood as a situation that occurred after the situation expressed in the first clause *perima iyatjinj* ‘we went to Berrimah’ (e.g. *after we went to Berrimah, we went to Darwin*). Accordingly, the first clause, in the example in (42), could be characterized as the figure or ground, and the second clause, in (42), can also be characterized as the figure or ground. These constructions are like the German reciprocal locative example in (34) in that they also have a double figure/ground.

Waray (Gunwinyguan)

(42)	*perima-**minj***	*i-yatjinj*	***katji-yang***	*putawan*	*i-yatjinj*.
	berrimah-first	1PL.SBJ-go	and-then	Darwin	1PL.SBJ-go

‘First we went to Berrimah, and then we went to Darwin.’ (Harvey 1986: 266)

Second, another component that can be highlighted in the definition in (30) is that of ‘non-argument clause’. Adverbial clauses are non-argument clauses in that they are not selected by an element of the figure clause (Schmidtke-Bode & Diessel to appear: 3). In the Konso example in (43), the ground clause encoded by *kamma* ‘after’ spells out part of the setting of the situation expressed in the figure clause. In this construction the non-argument clause acts as a modifier of an element in the figure clause. Regarding the notion modifier, it is important to stress that adverbial clauses modify the propositional meaning of an element of the figure clause, in which case they are considered modifiers. In this scenario, adverbial clauses are modifiers in that they restrict a situation to a specific setting (time, place and manner) or specific contingent circumstances (condition, cause, purpose, result, etc.).

Konso (Afro-Asiatic/Cushitic)

(43) *a=in* *tika* *kay-n-i* ***kamma***,
REL=1SG.SBJ house reach-PL-PFV after
'After we arrived home,

roopa *i=pay-t-i*.
rain 3SG=start-3SG-PFV
it started to rain.' (Oda-Orkaydo 2013: 239)

However, there are instances in which the non-argument clause may relate to the predicate or proposition expressed by another clause without being a modifier. Dependent clauses in clause-chaining constructions are non-argument clauses that do not function as modifiers of the final finite clause, as is shown in the Palula example in (44). In this scenario, there is a link of multiple interrelated sequences of clauses (Coupe 2007: 422). There is no modifier-modified relationship among the linked clauses. Instead, they advance the discourse towards its communicative destination (Coupe 2007: 424).

Palula (Indo-European/Indo-Aryan)

(44) *ghadeerá* *phed-**í*** *las* *čax* *katéeri* *ghin-**í***
elder.OBL arrive-CVB completely swiftly knife take-CVB
'The older (brother) came, took a knife,

se *taáǰ* *čhiníl-i*

DEF crown cut.PFV-F

and (cut off) the crown...' (Liljegren 2016: 357)

There are other instances in which non-argument clauses relate to the predicate of another clause without being modifiers. Adverbial clauses may just provide additional comment on the element in question without acting as modifiers of the propositional meaning of an element of the figure clause. In this function, adverbial clauses provide the speaker's attitude towards the propositional content expressed in the figure clause, as in (45a), or relate to the speech act (rather than the propositional content) expressed by the figure clause, as in (45b) (Schmidtke-Bode & Diessel to appear: 4; Tsunoda 2012: 383).

(45) a. *if I am honest, I would not do it again*.

b. *After leaving the house, should we close the door*?

A case in point is concessive clauses. Crevels (2000: 317) shows that concessive clauses can not only modify the propositional meaning of an element of the figure clause, e.g. *Although it's raining, we are going for a walk*, but also that they can relate to the speech act (rather than the propositional content) expressed by the figure clause, e.g. *Even though I am calling a bit late, what are your plans for this evening?* In this example, the concessive clause does not function as a modifier, but forms an obstacle to the speech act expressed in the figure clause, a possible paraphrase being: 'I know that I should have phoned you sooner, so I normally wouldn't phone you this late to ask you what you are doing this evening' (Crevels

2000: 317). Another case in point comes from causal clauses. Tsunoda (2012: 384) mentions that causal clauses may modify the propositional meaning of an element of the figure clause, e.g. *John stopped playing because it started raining*. However, there may be more to the story. Causal clauses may relate to the speech act expressed by another clause, e.g. *What time will you come home tonight, because John and Mary are coming for dinner*. In this example, the first clause expresses a speech act. This may be a command, request, or question (Tsunoda 2012: 385). Conditional clauses may also function as modifiers or non-modifiers. In the example 'if Mary goes, John will go', the conditional clause functions as a modifier of the propositional meaning of an element of the figure clause. On the other hand, in the example 'there are biscuits on the sideboard, if you want them', the conditional clause does not function as a modifier. Instead, the conditional clause provides the speaker's attitude towards the propositional content expressed in the figure clause (Sweetser 1990: 118). What these examples show is that adverbial clauses that function as non-modifiers do not restrict a situation to a specific setting or specific contingent circumstances. Rather, they provide the speaker's attitude towards the propositional content expressed in the figure clause or relate to the speech act expressed by the figure clause. Relative clauses may also be considered modifiers or non-modifiers. In this regard, while restrictive relative clauses are modifiers of a nominal element in that they restrict the referential potential of the noun phrase, non-restrictive relative clauses are non-modifiers in that they express supplementary information (Schmidtke-Bode & Diessel to appear: 4). The present study also takes into account the types of non-argument clauses shown above, in which there is no modifier-modified relationship with the other clause.

While there is general consensus that adverbial clauses are non-argument clauses, some types of adverbial clauses do contract a closer semantic relationship with the predicate of the figure clause than others, that is, some adverbial clauses elaborate more crucial aspects of the figure clause situation than others (Schmidtke-Bode & Diessel to appear: 31). Accordingly, the difference between arguments and non-arguments is gradient rather than categorical. An example comes from *when*-clauses and *while*-clauses, in which the predicate of the figure clause involves 'perception predicates', i.e. the sensory mode is typically visual ('see', 'watch') or auditory ('hear'). In Nyangumarta, *while*-relations are expressed by a construction in which the predicate of the figure clause involves a 'perception predicate', as in (46).

Nyangumarta (Pama-Nyungan)

(46)	*yija*	*manganya-lu*	*yirri-rni*	*kangkuru*	*wapaka-na-ja*.
	truly	echidna-ERG	see-NON.FUT	kangaroo	hop-NMLZ-ABL

'Truly the echidna saw the kangaroo while it hopped.' (Sharp 2004: 379)

At first glance, this construction looks as if it were a complement clause. However, a closer analysis reveals that this is a non-argument clause. In this regard, the figure clause predicate *yirri* 'see' entails reference to another situation; we would thus expect it to take a clause as its complement. Syntactically, however, the clause *wapakanaja* 'while it hopped' is adjoined to the figure clause predicate *yirri* 'see'. Therefore, *wapakanaja* 'while it hopped' is not a syntactic argument of *yirri* 'see'.

These types of constructions may gradually become arguments of perception predicates and serve as complement clauses (Schmidtke-Bode 2014: 262). It is more common cross-

linguistically that adjoined constructions become embedded structures (Hopper & Traugott 2008: 80-81). Therefore, it is likely that the complement is historically derivative of the looser adverbial construction (Schmidtke-Bode 2014: 263). The following examples support this claim. In Matsés, the clause encoded *-sho* 'while' is used in the direct-object position of the predicate *s-* 'see' (Fleck 2003: 1101), as in (47). Accordingly, *mimbi debiØ kuessho* 'while you hit Davy' functions as a genuine complement clause.

Matsés (Panoan)

(47)	*mimbi*	*Debi-Ø*	*kues-**sho***	***s**-oi-mbi*.
	2SG.ERG	Davy-ABS	hit-while	see-PST-1SG

'I saw while you hit Davy.' (Fleck 2003: 1101)

Another example is found in Choctaw. In this language, the *-na* 'when' clause serves as an argument of the predicate *pǐ́sa* 'see', as is shown in (48). This stems from the fact that complement clauses appear after the complement-taking predicate or inside the main clause, as in (48) (Broadwell 2006: 275).

Choctaw (Muskogean)

(48)	*Bonnie-at*	*bookóshi'-mã*	*issi'*	*ǎ́tta-**na***	***pǐ́sa**-tok*.
	Bonnie-NOM	creek-DEM.ACC	deer	be-DS	see-PST

'Bonnie saw when the deer was at the creek.' (Broadwell 2006: 275)

While the Nyangumarta example in (46) is taken into account in the present research, the Matsés and the Choctaw examples in (47) and (48) are not. In the present study, there may be individual cases where it may be difficult to decide whether something is an argument or a non-argument. However, based on an analysis of the languages of the sample, there is an abundance of clear cases on which the discussion of the present study is based.

The fourth component of the definition proposed in (30) is that of 'explicitly or implicitly'. This component is related to the type of clause-linking strategy encoding adverbial clauses. The notion 'explicitly or implicitly' facilitates cross-linguistic comparability in that it does not impose any a priori restrictions on the form of the temporal clause-linking strategy. Furthermore, it does not put any constraints on whether the strategy is an open or closed class category. Clause-linking strategies, including temporal clause-linking strategies, have been traditionally considered closed class categories (Schachter & Shopen 2007: 45). However, this vision has been challenged in that in many languages of the world, temporal clause-linking strategies may constitute open class categories. Given that language is not a static, but rather a dynamic system that is in a constant state of flux (Croft 2003: 283), it is expected that in many languages, temporal clause-linking strategies constitute open class categories, or devices not (yet) fully grammaticalized. For instance, Bourdin (2008: 40) has shown, based on a sample of sixty-four languages, that the grammaticalization of verbs meaning 'come' and 'go' into 'and then' coordinators is widespread in African languages, mainly in Bantu languages, Afro-Asiatic languages, and Nilo-Saharan languages. Interestingly, in many languages of the sample of the present study, verbs meaning 'to come' or 'to go' may express 'and then'. However, these lexical items are still verbs, and not grammaticalized forms. This stems from the fact that they may still appear with specific TAM values and/or they may be inflected for person

marking. It is a well-known fact that when a form undergoes grammaticalization from a lexical to a grammatical form, it tends to lose the morphological and syntactic properties that would identify it as a full member of a major grammatical category such as noun or verb (Hopper & Traugott 2008: 107). A case in point comes from the English conjunction 'while'. Historically, 'while' was a noun meaning a length of time; this meaning is still preserved in present-day English (e.g. *we stayed there for a while*). However, as a conjunction, 'while' has lost various properties that identify it as a noun (Hopper &Traugott 2008: 107). In this regard, when 'while' is used as a conjunction, it: (a) cannot take articles or quantifiers, (b) cannot be modified by adjectives or demonstratives, (c) cannot serve as a subject or as any other argument of the verb, (d) can only appear in the initial position in its clause, and (e) cannot subsequently be referred to by an anaphoric pronoun. With this in mind, if a lexical item (e.g. noun, verb) in language 'X' expresses a specific temporal adverbial relation and has not lost any morphosyntactic properties characteristic of verbs and nouns, it is considered, in the present study, an open class category, or a device not (yet) fully grammaticalized.

One important observation to be gleaned from the comparative concept adopted in this study is that it does not impose any constraint on the position of the clause-linking device. Across languages, clause-linking devices may appear in different positions. Hetterle (2015: 114) notes that, cross-linguistically, clause-linking devices may appear clause-initially, clause-finally, and clause-medially in the ground clause. Temporal clause-linking devices seem to align with this tendency in that they may appear in initial position as in (49), in medial position as in (50), and in final position as in (51).

Armenian (Indo-European/Armenian)

(49) ***henc'or*** *hasn-em* *tun-ĕ,* *k'ez* *k-zangahar-em.*

as.soon.as arrive-PRS.1SG house-the you.DAT FUT-phone-PRS.1SG

'As soon as I arrived at home, I will phone you.' (Dum-Tragut 2009: 434)

Mandarin (Sino-Tibetan/Chinese)

(50) *lǎoshī* ***yī*** *zǒujìn* *jiàoshì,*

teacher once walk.into classroom

'As soon as the teacher came into the classroom,

jiù *náchū* *diǎnmíngbù* *diǎnmíng.*

then take.out register call.roll

(s)he took out the register to do the roll-call.' (Po-Ching & Rimmington 2004: 239)

Kharia (Austro-Asiatic/Munda)

(51) *uḍ=na* ***loʔḍho,*** *maha* *daru* *tuta=te=ga* *del=ki.*

drink=INF after big tree bottom=OBL=FOC come.=MID.PST

'After drinking (the water), he came to the bottom of that big tree.' (Peterson 2011: 391)

Although these are the positions most commonly attested cross-linguistically, there are languages in which the clauses encoding the figure and ground situations may both appear with clause-linking devices, as is shown in the Trique example in (52), where both clauses are

encoded by the universal quantifier *nuh* 'all'. Another possibility is attested in Martuthunira, as in (53). In this language, the device *-rrawaara* appears in the figure clause. With this variation in mind, the fact that the comparative concept does not put any constraint on the position of the temporal clause-linking device has enabled me to take into account a large range of devices.

Copala Trique (Oto-Manguean/Mixtecan)

(52) ***nuh*** *kahnah* *zoh*, ***nuh*** *kahanx* *nika* *zoh* *a*.
all COMPL.come 3SG.SBJ all COMPL.go spouse 3SG.POSS DECL
'As soon as he came, his wife went away.' (Hollenbach 1992: 394)

Martuthunira (Pama-Nyungan)

(53) *ngunhaa* *punga* *pangkira-rri-lha*, *parntayarri-**rrawaara***.
that.NOM guts bulging-INV-PST explode-SEQ
'After his guts swelled up, they exploded.' (Dench 1995: 249)

Having explained in detail the comparative concept adopted in the present study, I can now proceed to review the literature on the typological diversity of temporal clause-linking devices, along with their polyfunctionality patterns and their areality.

1.3 Temporal adverbial clauses: Previous research

Much of the theoretical interest surrounding temporal adverbial clauses has been concerned with the order of the temporal adverbial clause with respect to its main clause (Diessel 2001,

2005; Hetterle 2015: §3.6.1), the discourse functions of temporal adverbial clauses (Wash 2001), and the range of TAM markers that appear in the temporal adverbial clause (Hetterle 2015: §3.2), among others.

As was briefly mentioned above, the present research attempts to contribute to a better understanding of the cross-linguistic variation in the expression of temporal adverbial relations, the polyfunctionality of temporal clause-linking devices, and the areality of temporal clause-linking strategies. In the discussion that follows in this section, I provide an overview of the typological findings that have emerged from these three areas so far.

1.3.1 'Non-specific' temporal clauses: *When*-clauses

'Non-specific' temporal clauses (a.k.a. *when*-clauses) are not specific in that the exact extent of the temporal meaning is unspecified and subject to variation (Cristofaro 2012; Diessel 2008: 470; Guerrero 2021; Hetterle 2015: 47). The temporal meaning can only be recovered from the discourse context (Cristofaro 2003: 159). In this regard, *when*-clauses can convey any reference time, that is, *when*-clauses denote situations that can occur prior (e.g. *We shall make up our mind when the IMF has reported*), posterior (e.g. *They had already made breaches in the defensive wall of sand [...] when the order came*), or simultaneous (e.g. *I did cook occasionally, when they were out*) to the one expressed in the figure clause (Diessel 2008: 470; Guerrero 2021). *When*-clauses can also convey any time interval (e.g. short or long). In the example 'when the Nazis came to power, Georg Grosz left Germany', there might be an interval of some days, or even months or years between the two situations (Cristofaro 2003: 159). On the other hand, in the example 'when he entered the room, she went out', it is

normally assumed that the two situations are separated by a very short time interval (Cristofaro 2003: 159).

When-clauses may be encoded by various types of clause-linking strategies. Cristofaro (2012) mentions that languages tend to employ converbs, as in the Nivkh example in (54) and free adverbial subordinators, as in the Huasteca Nahuatl example in (55). With respect to converbs, it has been shown that comitative, instrumental, and locative case markers are commonly used for expressing *when*-relations (Aikhenvald 2008: 565; Dixon 2009: 13; van Gijn 2019: 2019).

Nivkh (Isolate)

(54) *ymk* *čo* *hak-**vul***, *p-ajmnař-kiř* *rořˇ* *kerai-d*.
mother fish cut-CVB REFL-husband-INSTR together talk-FIN
'When mother was cutting fish, she talked with her husband.' (Gruzdeva 1998: 50)

Huasteca Nahuatl (Uto-Aztecan/Aztecan)

(55) ***kemah*** *okichpi* *mo-mach-ti-ki*,
when boy REFL-study-CAUS-PFV
'When the boy studied,

ki-chihua-ki *teki-tl*.
3SG.OBJ-do-PFV work-ABS
he did his homework.' (Olguín Martínez & Estrada-Fernández 2019: 11)

Another device by which *when*-relations may be expressed is that of temporal nouns (Dixon 2009: 12; Olguín Martínez 2020: 3), as in (56) and (57).

Kisi (Atlantic-Congo/Mel)

(56) *ŋ̀* *cò* *cììkìáŋ* ***lɔ́ɔ́*** *ŋ̀* *cò* *hùnɔ́ɔ́-ó.*

1PL.SBJ AUX meet time 2SG.SBJ AUX come-REL

'We will see you at the time you come.' (Childs 1995: 287)

Jalkunan (Mande/Western Mande)

(57) ***ɲɛ̄ɛ́*** *mì* *mā* *nɔ̀ŋɔ́* *dɛ̀kɛ́,* *mā* *wál* *mɛ̀ɛ̀=nɛ̄ɾ.*

year REL 1SG friend finish.PFV 1SG work do.PFV=NEG

'The year my friend passed away, I did not do any work.' (Heath 2017: 307)

The devices discussed so far may be polyfunctional. It has often been suggested that clause-linking devices encoding *when*-clauses can also be used for expressing conditional meanings, in particular generic/habitual conditional meanings (e.g. *When flowers are kept in the heat, they quickly wither away= If flowers are kept in the heat, they quickly wither away*; Comrie 1986: 82; Cristofaro 2003: 161; Thompson et al. 2007: 257-258). The use of the same clause-linking device for expressing *when*-relations and *if*-relations is pervasive in languages from different areas of the world, such as African languages (Nicolle 2016: 10) and Austronesian languages (Jonsson 2012: 93), among others. Other relations that clause-linking devices encoding *when*-clauses may also come to express are *while*-relations, *because*-relations, and *after*-relations (Hetterle 2015: 219; Kortmann 1997: 181; Martowicz 2011: 204).

The fact that some of devices discussed above may have spread through language contact has not gone unnoticed. Kortmann (1997: 251) mentions *when*-clauses marked by temporal nouns are a distinctive feature of Basque and the Celtic languages. He notes that it is further typical of languages from the Eastern and Western periphery of Europe. Accordingly, he points out that language contact may have played a role in the spread of this clause-linking device. Austronesian languages also seem to have a similar construction that appears with a temporal noun meaning 'time' due to language contact (Jonsson 2012: 179).

1.3.2 Simultaneous duration: *While*-clauses

Temporal clauses of simultaneous duration (a.k.a. *while*-clauses) express situations of co-occurrence or concomitance; i.e. situations taking place at the same time as the situation expressed in the figure clause (Dixon 2009: 10; Hetterle 2015: 47), as in (58).

Bariai (Austronesian/Oceanic)

(58) *Mande i-ki-kisi* ***be*** *Sigini i-to-totoi*.
Mande 3SG.SBJ-RDP-hold while Sigini 3SG.SBJ-RDP-butcher
'Mande was holding it while Sigini was butchering it.' (Gallagher & Baehr 2005: 151)

It has been noted that, cross-linguistically, there are two common ways for indicating a *while*-relation between clauses: either a marker explicitly signaling the *while*-relation is used, as in (58), or a tense-aspect marker, such as a continuative, durative, or imperfective aspect marker is used (Thompson et al. 2007: 254), as in (59). It is also not uncommon for languages to employ temporal nouns in the expression of *while*-relations (Olguín Martínez 2020: 23), as

in (60), and (61). Interestingly, *while*-clauses may also be formed with spatial nouns meaning 'length'. This seems to be a singularity of European languages spoken in the Western and Northern periphery (e.g. Irish *fhad is* 'while, lit. length and'; Basque *bitartean* 'while, lit. length'; Kortmann 1997: 251).

Wolof (Atlantic-Congo/Wolof)

(59) *maa* ***ngiy*** *génn, yaa* ***ngiy*** *dugg.*

1SG.PRS IPFV exit 2SG.PRS IPFV enter

'I am going out while you are coming in.' (Robert 2010: 481)

Hatam (West Papuan)

(60) ***mpe*** *di-no* *di-bong* *leu* *su,*

time REL-3SG 1SG.SBJ-sleep from already

'While I slept,

lene *tungwa* *gom* *kwei* *nggimang* *dit-de* *radio.*

then human one come steal 1SG-POSS steal

someone came and stole my radio.' (Reesink 1999: 130)

Makasae (Timor-Alor-Pantar/Makasae-Fataluku-Oirata)

(61) ***watu*** *a'a* *ani* *sirbisu* *ere,* *gi* na'u *au* *mi-mi.*

time REL 1SG.SBJ work DEM 3SG.SBJ just COMPL sit.SG-RDP

'He just sits about while I am working.' (Huber 2008: 112)

While-clauses often develop a concessive meaning (Kortmann 1997: 181). Hetterle (2015: 220) mentions that *while*-clauses may also develop other adverbial meanings, such as conditional, cause/reason, and *after*-meanings.

While there are various studies that have addressed the expression of *while*-relations in specific language families (e.g. Güldemann 1998 on Bantu languages; Muravyev 2018 on Uralic languages), the areality of *while*-strategies has never been subject to a close typological scrutiny. One exception to this is that of temporal nouns expressing 'while', which seem to have diffused through language contact in many Papuan languages not genetically related (Foley 1986: 202).

1.3.3 Temporal subsequence: *After*-clauses

Temporally subsequent constructions (a.k.a. *after*-clauses) consist of a sequence of two clauses in which the situation of the figure clause happens after the situation expressed in the ground clause (Olguín Martínez et al. 2018), as is illustrated in the Kharia example in (62), where the relation is expressed by the free adverbial subordinator *loʔɖho* 'after'.

Kharia (Austro-Asiatic/Munda)

(62) *uɖ=na* ***loʔɖho***, *maha* *daru* *tuta=te=ga* *del=ki*.
drink=INF after big tree bottom=OBL=FOC come=MID.PST
'After drinking (the water), he came to the bottom of that big tree.' (Peterson 2011: 391)

Olguín Martínez et al. (2018) show that temporal subsequence tends to be conveyed by adverbial subordinators as in (63), verbal forms as in (64), and 'and then' devices as in (65) (see §1.4.1 for a more detailed definition of these strategies).

Ilocano (Austronesian/Northern Luzon)

(63) ***kalpasan*** ti *pan-ag-awid=ko*, *na-dillaw=ko* *ag-r-sangit*.
after ART NMLZ-INTR-go.home=1SG.SBJ PFV-notice=1SG.SBJ INTR-CONT-cry
'After I went home, I noticed she was crying.' (Galvez Rubino 1997: 473)

Udihe (Altaic/Tungusic)

(64) *in'ei-we* *tindaŋi-ge-**si***, *ŋene:-ti* *caixi*.
dog-ACC let-PERF-PFV.CVB.SS go.PST-3PL.SBJ further
'After they loosened the dogs, they went further.' (Nikolaeva & Tolskaya 2001: 740)

Epena Pedee (Choco)

(65) *perõrá-pa* *imama* *wárra* *pee-t^{h}aa-hí*,
spotted.cavy-ERG tiger son kill-OBJ-PST
'A spotted cavy killed a tiger's child,

maap^{h}éda *unu-hu-dá* *ewári* *ába* *mée*.
and.then find-PST-PL day one jungle
and then one day they met in the jungle.' (Harms 1994: 145)

The devices discussed above may be polyfunctional. Kortmann (1997: 181), Martowicz (2011: 108), and Hetterle (2015: 221) show that clause-linking devices expressing *after*-relations may also signal *when*-relations, *while*-relations, *if*-relations, and *because*-relations.

Regarding the areality of the clause-linking devices shown above, Olguín Martínez et al. (2018) point out that some strategies for expressing temporal subsequence display some geographical skewing in their sample. For instance, verbs meaning 'to finish' as clause-linking devices seem to be attested for the most part in Papunesian languages. On the other hand, temporal adverb(ial)s meaning 'first' are attested for the most part in Australian languages (e.g. Dijingili, Marrithiyel, Ngankikurungkurr, and Waray). They mention that future work may explore the possibility that areal factors are involved in shaping this type of complex sentence structure.

1.3.4 Temporal precedence: *Before*-clauses

Temporal clauses expressing precedence (a.k.a. *before*-clauses) consist of a sequence of two clauses in which the situation of the figure clause happens before the situation expressed in the ground clause (Kortmann 1997: 84-85). That is, they involve situations that have not yet been realized when the figure clause situation takes place (Hetterle 2015: 48; Thompson et al. 2007: 247), as in (66).

Lezgian (Nakh-Daghestanian/Lezgic)

(66)	*hele*	*mese-laj*	*ǫaraǧ*	*t-awu-**nmaz**,*
	still	bed-SREL	get.up	NEG-do-before

'Before I got up,

zi	*rik'e-l*	*q'aq'an*	*dağ-lar*	*xta-na-j*.
1SG.GEN	heart-SRESS	high	mountain-PL	return-AOR-PST

'I remembered the tall mountains.' (Haspelmath 1993: 385)

Before-clauses tend to be encoded by subordinating devices, as is illustrated in the Lezgian example in (66), where temporal precedence is expressed by *-nmaz*. Interestingly, it has been shown that even when languages have a clause-linking device for expressing temporal precedence, negative markers may play an important role in this type of complex sentence construction (see Chapter 6 for a more detailed discussion of this interaction).

In many languages lacking a clause-linking device for encoding *before*-clauses, the semantic relation may be expressed by temporal adverb(ial)s meaning 'not yet', as in (67). Veselinova (2015) mentions that 'not yet' expressions typically indicate not only the non-occurrence of an expected situation, but also an anticipation about its imminent realization. She notes that 'not yet' expressions occur in most areas of the world. However, they are rather rare in Indo-European and in European languages (see Wälchli 2018: 193 for a similar claim).

Buru (Austronesian/Central Malayo-Polynesian)

(67)	*da*	*mata*	***mohede***,
	3SG.SBJ	die	not.yet

'Before he died,

da	*stori*	*gam*	*naa*.
3SG.SBJ	speak	like	this

this is what he said.' (Grimes 1991: 421)

Cross-linguistically, clause-linking devices expressing 'before' usually come to be used for expressing other adverbial relations, such as *while*-relations and *in order to*-relations (Hetterle (2015: 221). Kortmann (1997: 181) shows a different picture in that clause-linking devices encoding *before*-clauses also tend to encode preferential clauses (i.e. *rather than*-clauses) and *until*-clauses. Note, however, that his results are based on a sample of European languages.

With respect to the areality of the clause-linking devices shown above, to the best of my knowledge, there is only one study that has explored the usage of temporal adverb(ial)s meaning 'not yet' in specific language families. Van der Auwera & Veselinova (2018) show, based on a sample of 100 Bantu languages, that 'not yet' markers are abundant in the central-eastern parts of the Bantu territory but are not so common in the north-west areas. They show that they frequently express *before*-relations. They also note that they may be used for indicating surprise/counter-expectation, emphatic negation, and questions and near future.

1.3.5 Terminal boundary: *Until*-clauses

Temporal clauses expressing terminal boundary (a.k.a. *until*-clauses) mark the endpoint of situations expressed in the figure clause (Hetterle 2015: 48; Kortmann 1997: 85), as in (68).

Ternate (West Papuan)

(68)	*mina*	*rongge*	***sido***	*mina*	*dopolo*	*mai*	*cum.*
	3SG.SBJ.F	dance	until	3SG.SBJ.F	head	even	sting

'She danced until she had a headache.' (Hayami-Allen 2001: 202)

Until-clauses tend to be encoded by free adverbial subordinators, as in the Ternate example in (68), where the terminal boundary relation is expressed by *sido* 'until'. However, studies that have addressed this type of temporal clause in specific language families have shown that there may be more to the story. In Austronesian languages, a substantial portion of terminal boundary relation strategies are clearly derived from verbs (typically meaning 'go', 'reach', 'arrive', 'be sufficient'), which have grammaticalized to a greater or lesser extent (Jonsson 2012: 100). This is illustrated in the Big Nambas example in (69), where the *until*-clause is encoded by the verb *va* 'go'.

Big Nambas (Austronesian/Oceanic)

(69)	*a-v-rp-i*	*da-**va***	ti	*i-valau.*
	3PL.SBJ.REAL-PL-hit-3SG.OBJ	TA-go	that	3SG.SBJ.REAL-cry

'They hit him until he cried.' (Fox 1979: 87)

Cross-linguistically, *until*-linking devices may be polyfunctional in that they come to be used for expressing *as a result*-relations, *while*-relations, *before*-relations, and *if*-relations (Hetterle 2015: 223). Interestingly, Kortmann (1997: 178) shows a different scenario in European languages. He notes that *until*-linking devices are polyfunctional with *as long as*-

relations. He explains that this link stems from the fact that the two relations can to some extent be viewed as complements of each other. For *as long as*-relations, the ground situation opens up a time interval for the whole of which the situation of the figure clause is true. On the other hand, *until*-relations introduce the endpoint of the time interval at which the situation of the figure clause is true. This polyfunctionality has also been noted by Wälchli (2018: 190). He mentions that the same device used in the expression of *until*-relations is also used in *as long as*-relations. This is attested in almost all modern Slavic languages, Hindi, Maithili, Hungarian, and Mordvin. Given that the sources of the present study do not usually include information regarding the encoding of *as long as*-clauses, it remains an open task to explore whether this polyfunctionality pattern is pervasive cross-linguistically.

Regarding the areality of *until*-clauses, snapshots from different studies indicate that language contact may have played a role in their distribution. For instance, Nefedov (2015: 196) mentions that Ket (Yeniseian) conveys 'until' by means of the subordinator *aska* 'while' and the negative particle *bə̄n* (i.e. 'while ... not' = 'until'). He notes that this pattern seems to have been copied from the Russian construction *poka … ne* 'while … not'. While this kind of contact effects have been reported for some languages, the phenomenon has not yet been subject to closer typological scrutiny.

1.4 Unresolved issues of temporal clause-linking strategies: Research questions

The overview of the current state of scholarship on temporal adverbial clauses in the previous section has drawn attention to the range, the semantic polyfunctionality, and the areality of temporal clause-linking strategies, but also highlights several unresolved issues. This section introduces these unresolved issues and formulates the research questions of this dissertation.

1.4.1 Temporal clause-linking strategies

As was shown in §1.3, most studies have focused on: (1) specific temporal clause-linking strategies (e.g. generic head nouns meaning 'time'; Olguín Martínez 2020) or (2) the range of strategies by which specific types of temporal adverbial clauses may be encoded (e.g. *After*-clauses; Olguín Martínez et al. 2018). Although these studies have advanced our understanding on this domain, still missing from the body of typological work is an attempt at exploring the formal expression of *when*-relations, *while*-relations, *after*-relations, *before*-relations, and *until*-relations in a single study. The first research question is concerned with this domain. In particular, this study seeks to answer the following question. **Research question 1**: what is the range of strategies by which *when*-relations, *while*-relations, *after*-relations, *before*-relations, and *until*-relations tend to be expressed?

To tackle this question, the present study adopts the continuum shown by Figure 1, inspired by the work of Olguín Martínez et al. (2018). Their analysis is based exclusively on cross-linguistic data of *after*-clauses. However, this framework can be employed for understanding how other types of semantic relations in clause combining are encoded cross-linguistically.

Figure 1. Marking of temporal adverbial relations (Olguín Martínez et al. 2018)

More explicit

Monofunctional restricted device(s)

Polyfunctional restricted device(s)

Strategies without restricted devices

Less explicit

The main theoretical thrust of this framework is that the range of strategies can be explored by being placed along a semantic explicitness cline, roughly involving: (i) strategies without restricted devices; (ii) polyfunctional restricted devices; and (iii) monofunctional restricted devices. In this framework whether a device is semantic mono/polyfunctional plays an important role. Based on this, strategies without restricted devices, such as asyndetic constructions, general coordinating devices, and general deranking devices are considered the least explicit strategies. On the other hand, monofunctional restricted devices are the most explicit strategy. Polyfunctional restricted devices occupy the intermediate position in this continuum.

In Figure 1, the notion 'restricted device' refers to a device that explicitly indicates the semantic relation of the ground clause to the situation expressed in the figure clause (Aikhenvald 2009: 389; Hellwig 2009: 322; Hill 2016: 123; Matić 2016: 344; Reintges 2010: 213; Schmalz 2016: 307; van Gijn 2011: 181; Verstraete 2010: 466). This is a cover term used for describing various types of formal devices (see §1.4.1.2), which perform semantically restricted linkage functions. Accordingly, they may be monofunctional or polyfunctional. The example in (70) occurs with the restricted device *after*. This device is monofunctional in that it is only used for conveying temporal subsequence. For a typical case of a restricted device that is polyfunctional, consider the temporal and causal meanings of 'since'. When both clauses refer to situations, especially situations in the past, the reading is typically temporal, as in (71a). When one clause refers to a non-past situation, the reading is typically causal, as in (71b). The causal meaning is conventional (Hopper &Traugott 2008: 80-81). It has been noted that one of the most important elements in an adverbial clause construction is restricted devices. Harder (1996) mentions that of all grammatical elements in an adverbial clause construction, restricted

devices are the most necessary element to get the message across; “you can do fairly well without articles and tense and auxiliaries, but if you mess up the clause-linkers you really leave your listener in the dark.”

(70) *After we read your novel, we felt greatly inspired.*

(71) a. *I have done quite a bit of writing since we last got together* (temporal).

b. *Since I have a final exam tomorrow, I won’t be able to go out tonight* (causal).

The policies adopted in this study to address the mono/polyfunctionality of restricted devices are as follows. Most authors of the sources taken into account in the present study explicitly mention information related to the mono/polyfunctionality of restricted devices. Therefore, this study heavily relies on their explanations. For some grammars, when the authors mention that a restricted device is polyfunctional, they also provide morphosyntactic evidence that the polyfunctionality of a restricted device is due to conventionalized implicatures and not to pragmatic inferences not (yet) conventionalized (see Kortmann 1997: 91). By pragmatic inferences not (yet) conventionalized is meant the following. The example in (70) may implicate: *because we read your novel we felt greatly inspired*. However, Hopper &Traugott (2008: 81) point out that this causal reading is due to a pragmatic inference not (yet) conventionalized. Hetterle (2015: 205) shows that polyfunctional linking devices are subject to specific morphosyntactic constraints. For instance, the English restricted device ‘since’ is polyfunctional in that it can be used for expressing *after*-relations as in (71a) and *because*-relations as in (71b). However, constructions including the temporal and causal ‘since’ are

subject to distinct syntactic constraints (e.g. the temporal reading is only possible when the adverbial clause is in a past tense, but any tense form can appear with the causal reading; Hopper & Traugott 2008: 80-81). When the authors of the sources do not explicitly mention whether a restricted device is monofunctional or polyfunctional, I analyze the encoding of other types of adverbial clauses provided in the source. I am aware that this methodological decision is not without problems. This stems from the fact it is not entirely clear whether the polyfunctionality of a restricted device is due to conventionalized implicatures or pragmatic inferences not (yet) conventionalized. These problematic cases are rather few and do not detract from the validity of the overall conclusions.

Polyfunctionality should not be confused with macrofunctionality. While polyfunctionality is concerned with a single form with distinct but related meanings, macrofunctionality assumes a form involving a single holistic function with no meaningful internal divisions into distinct subfunctions, that is, the form is characterized as semantically vague with respect to any partitioning of its single unified meaning into sub-meanings (Gil 2004: 372-373). In this particular scenario, the form may occur in utterances in which speakers and hearers do not care which of the functions is being expressed (Gil 2004: 372-373). As is shown below, general deranking devices are macrofunctional in that they do not have a specific meaning and are semantically vague (see §4.1.1.).

The general spirit of this section is to define the strategies shown in Figure 1. In particular, I seek to consolidate and expand the framework in Figure 1 by exploring some methodological problems not addressed in detailed in Olguín Martínez et al. (2018). As far as possible an attempt has been made to find consistent and principled solutions to methodological problems, although a number of difficult cases remain.

Before I introduce this framework, one general remark is in order here. Languages may have more than one strategy for conveying a particular type of temporal relation. In such cases, I have determined for each language which strategy or strategies are primary, i.e. which strategy or strategies are used significantly more frequently than the others, and I focus only on those strategies for that language. In order to determine the primary strategy or strategies of the languages of the sample, I rely heavily on the authors of the sources, mainly because in general I have no reason to doubt these sources. The authors of the sources usually provide various types of evidence to determine the primary strategy.

The most common way of determining a primary strategy by the authors of the sources seems to be that of 'general observations'. That is, they explicitly mention that 'X' strategy is more common than others without providing any statistical frequencies. Evans (2003: 654) shows that temporal subsequence in Bininj Gun-Wok (Gunwinyguan) may be conveyed explicitly (i.e. by means of various types of sequential coordinating devices, *wanjh* 'and then', *kaluk* 'and then', *yerre* 'and then') or by means of asyndesis. However, he mentions that the most common strategy in Bininj Gun-Wok is simply to place verbs in the order of occurrence with no explicit marking of the temporal subsequence relation. Another example comes from Abau (Sepik/Upper Sepik). In this language, *when*-clauses may be encoded by the free adverbial subordinator *menkin* 'when' or a construction appearing with *enekwei* 'time' (Lock 2011: 216). However, constructions appearing with *enekwei* 'time' are used less frequently than the subordinator *menkin* 'when'.

There are some sources for which the primary strategy has been determined by using corpora. Accordingly, they provide fine-grained statistical frequencies about the primary strategy employed in a language. Hemmilä & Luoma (1987: 222) show, based on a corpus of

35 texts containing over 28,000 words, that in Urim (Torricelli), the sequential coordinating devices *atom* 'and then' and *pa* 'and then' occur more frequently than asyndetic constructions for conveying temporal subsequence. Therefore, they are the primary strategies for encoding *after*-clauses.

Sometimes the authors of the sources introduce the range of strategies by which a particular temporal relation may be expressed. However, they do not specify the strategy or strategies used significantly more frequently than the others. In this scenario, the policy adopted in this study has been to consider all these strategies as primary. While this is not the ideal solution, such problematic cases are rather few and do not detract from the validity of the overall conclusions.

1.4.1.1 Strategies without restricted devices

Strategies without restricted devices are those strategies that are semantically non-specific, such as 'asyndetic constructions', 'general coordinating devices', and 'general deranking devices'.

Asyndetic construction refers to two clauses without any structural element linking them (Olguín Martínez 2018 et al.). I am concerned here exclusively with examples where a temporal relation arises by implicature, usually due to contextual or common knowledge and/or iconicity of sequencing (Greenberg 1966; Haiman 1980). For instance, the temporal subsequence relation is inferred due to iconicity of sequencing in the Araki example in (72).

Araki (Austronesian/Oceanic)

(72) *mo* *varia-a* *levu* *di,*

3PL.SBJ.REAL hold-3SG.OBJ breadfruit ANA

'They take the breadfruit,

mo *huden-i-a* *lo* *vipue.*

3PL.SBJ.REAL put.in-TRANS-3SG.OBJ LOC bamboo

put it in a bamboo.' (François 2002: 190)

In some cases, the link between the two clauses may be conveyed by intonation. It has been noted that intonation plays an important role in otherwise asyndetic constructions in languages from different areas of the world.[7] In the Neverver example in (73), two clauses can be linked with an intonation rise on the final syllable of the initial and falling intonation at the end of the second clause. This conveys temporal subsequence. Barbour (2012: 416) mentions that intonation plays a key role in this type of construction in that it signals that the hearer should infer a relationship of temporal subsequence between clauses. Because of this important role, she labels this function "prosodic conjunction". Interestingly, if the first clause of this construction involves level/falling intonation, the semantic relation conveyed is that of 'although'. For the most part the sources of the sample do not provide this sort of information. Accordingly, this research can make only a modest contribution to the understanding of this domain.

[7] This seems to be the case in many Australian languages, in which prosodic features, such as the "comma intonation", are characteristic of asyndetic constructions conveying *after*-relations and *while*-relations (McGregor 1988:38; McGregor 1994:35; McGregor 2011: 652).

Neverver (Austronesian/Oceanic)

(73) *nat-tav* *nibet,* *nat-khan*.
1PL.EXCL.SBJ.REAL-spear breadfruit 1PL.EXCL.SBJ.REAL-eat
'We speared breadfruit and then ate it.' (Barbour 2012: 417)

One important methodological challenge should be mentioned here. It is sometimes difficult to draw a clear line between asyndetic constructions and serial verb constructions, i.e. a sequence of verbs which act together as a single predicate, without any overt marker of coordination, subordination, or syntactic dependency of any other sort (Bril 2004: 3). Bril (2004: 27) mentions that contiguous verbs often generate some syntactic and semantic ambiguity between asyndetic constructions and serial verb constructions. One example illustrating this methodological issue comes from Pileni. In this language, contiguous verbs may be interpreted as a serial verb construction or an asyndetic construction with a *while*-reading, as in (74) (Næss 2004: 233).

Pileni (Austronesian/Oceanic)

(74) *na* *ua* *no* *hehega* *ko* *matu* *tuohine* *na*.
3SG.SBJ TA paddle search TOP 1PL.EXCL.POSS sister DEM
'He paddled while searching for our sister.' (Næss 2004: 233)

The criterion adopted in this study in order to differentiate asyndetic constructions from serial verb constructions is as follows. Serial verb constructions: (1) show intonational properties that are the same as those of a monoverbal clause (i.e. they constitute one single

prosodic entity, without pause), (2) have just one TAM value, and (3) may also share core and other arguments (Aikhenvald 2006: 1). On the other hand, asyndetic constructions tend to (1) show intonational properties that are the same as those of a biclausal constructions, (2) have clauses that may not share the same TAM value, and (3) have clauses that may not share core and other arguments. These criteria have enabled me to differentiate asyndetic constructions from serial verb constructions in the present study, in particular in those instances in which the authors of the sources provide a different analysis. In some sources of the sample, temporal adverbial relations (e.g. *after*-relations, *while*-relations) are conveyed by means of "allegedly" serial verb constructions. The authors of these sources explain that these instances are serial verb constructions on the grounds that clauses together represent a unitary concept; the second clause provides no new information, but is part of the meaning of the first clause (Crowley 2002: 41). Intriguingly, they mention that the verbs of the serial verb construction may show different intonation contours. Furthermore, they may occur with different subject marking and different TAM values (see Crowley 2002). These are not prototypical characteristics of serial verb constructions (Bril 2004: 3). Accordingly, the policy adopted in this study is to consider these instances as asyndetic constructions (see François 2002 for an analysis consistent with the one adopted in the present work).

Another problematic scenario is found in languages in which the temporal relation is conveyed by means of asyndetic constructions that occur with specific TAM values. In this scenario, the combination of TAM values conventionally serve as pragmatic triggers of the temporal interpretation. For instance, in Koyra Chiini, an asyndetic construction involving two paired subjunctive clauses means 'no sooner X than Y' (Heath 1999a: 426), as can be observed in the example in (75). The policy adopted in this study is to consider these instances as

semantically specific in that they are conventionalized ways of expressing temporal adverbial relations. The evidence that these constructions are conventionalized comes from the fact that when they occur with other types of TAM values the interpretation is different. In Koyra Chiini, when the first clause, in an asyndetic construction, appears in the imperfective and the second clause in the negative imperfective, the interpretation is that of a *without*-clause (Heath 1999a: 271), as in (76).

Koyra Chiini (Songhay)

(75) *ngi* *ta* ***ma*** *too*, *i* ***ma*** *guna*
3PL.SBJ TOP SUBJ reach 3PL.SBJ SUBJ look
'As soon as they arrived, they looked.' (Heath 1999a: 426)

Koyra Chiini (Songhay)

(76) *no-**o*** *bisa* *a* *ga* *ni* ***sii*** *bey*.
2SG.SBJ-IPFV pass 3SG.SBJ by 2SG.SBJ IPFV.NEG know
'You are passing by it without knowing.' (Heath 1999a: 271)

The last problematic scenario of asyndetic constructions is concerned with those languages in which one of the verbs of the asyndetic construction is reduplicated for expressing a specific temporal adverbial relation. In Raji, reduplication signals *while*-relations (Rastogi 2012: 41), as in (77). The question is: should these instances be considered asyndetic constructions? The policy adopted in this study is to consider verb reduplication a restricted device as long as it is exclusively used for indicating a specific type of temporal adverbial

relation. Note, however, that this excludes languages in which verb reduplication is used for marking imperfective aspect. In Hoava, *while*-relations are conveyed by means of an asyndetic construction in which one of the verbs is reduplicated, as can be seen in (78), where the verb *dola* 'stare' is partially reduplicated. In Hoava, verb reduplication marks imperfective aspect (Davis 2003: 31). With this in mind, it is the imperfective aspect that serves as the pragmatic trigger of the *while*-relation in (78). Recall that it is common cross-linguistically for continuative, durative, or imperfective aspect marker to convey *while*-relations (Thompson et al. 2007: 254).

Raji (Sino-Tibetan/Raji-Raute)

(77) *əi* *ləgya* ***ja-ja***, *rukka*
3SG.SBJ bread eat-RDP go
'While eating bread, he went.' (Rastogi 2012: 88)

Hoava (Austronesian/Oceanic)

(78) *ko* *qa* *Sou* ***do=dola*** *la* *pa* *mati*.
stay stayed Heron RDP=stare go PREP beach
'Heron stayed while staring at the beach.' (Davis 2003: 285)

Verb reduplication is similar to verb-doubling, a phenomenon attested in Creole languages (Michaelis et al. 2013) and West African languages (Fiedler 2014; Lefebvre & Brousseau 2002), as in (79). This strategy tends to encode *as soon as*-clauses and is considered in the present study a type of restricted device (see Chapter 5). At first glance, verb

reduplication and verb-doubling are the same phenomenon. In this regard, verb reduplication may be full, i.e. reduplication of entire words, or partial, i.e. the copying of some substring of the word. In a similar fashion, verb-doubling may appear either as an exact copy of the verb, or as a partial copy of it (Lefebvre & Brousseau 2002: 504). However, there are some differences that should be taken into account. First, in verb reduplication, the reduplicant (the copy created in reduplication) must appear adjacent to the base (Gordon 2016: 270). In verb-doubling, the verbs do not have to appear adjacent to one another, as in (79) and (80). Second, while there do not seem to be any constraints on the range of verbs that may be reduplicated by verb reduplication, there seems to be a constraint on type of predicate that allows verb-doubling. That is, in all languages of the sample that express temporal adverbial relations by verb-doubling, the verbs have to be stage-level predicates (e.g. verbs denoting a temporary property; Lefebvre & Ritter 1993; Lefebvre & Brousseau 2002: 509). In particular, motion verbs seem to be preferred in this type of construction.

Fongbe (Atlantic-Congo/Kwa)

(79) ***wá*** *Kɔ̀kú* ***wá***, *Àsíbá* *yì*.
arrive Koku arrive Asiba leave
'As soon as Koku arrived, Asiba left.' (Lefebvre & Brousseau 2002: 172)

Berbice Dutch

(80) *di* ***drai*** *wat* *ju* ***drai***-*tɛ*,
the turn REL 2SG.SBJ turn-PFV
'As soon as you turn around,

o *ku-tɛ* *ju*.

3SG.SBJ catch-PFV 2SG.SBJ

it catches you.' (Michaelis et al. 2013)

Another type of strategy is that of general coordinating devices. These devices may be the primary way for conveying different temporal adverbial relations (Bril 2010: 5; Cristofaro 2003: 20-21). General coordinating devices are free and bound linkers, such as 'and' (Haspelmath 2004), that occur in a biclausal construction. I focus only on coordinating constructions from which a temporal adverbial relation is inferred due to iconicity of sequencing and/or contextual factors (including world knowledge). For instance, the linkage in the Awa Pit example in (81) involves only the general coordinating linker *kit* and the temporal subsequence relation is inferred due to iconicity of sequencing.

Awa Pit (Barbacoan)

(81) *mana=na* *tazh* ***kit*** *ii-ma-ti*.

Maria=TOP fall and die-COMPL-TERM

'After Maria fell over, she died.' (Curnow 1997: 309)

Before I proceed, one remark on bound and free general coordinating devices is in order. Bound general coordinating devices may be phonologically attached to one of the clauses, either as a proclitic or as an enclitic (or even as a prefix/suffix—the difference between clisis and affixation is not relevant in the present context; Haspelmath 2004: 7). Free general

coordinating devices may be prosodically related at the end of the first clause, as in (82), or at the beginning of the second clause, as in (83).

Iaai (Austronesian/Oceanic)

(82) *a* *thang* *töö* ***m***, *iny* *keec* *cut*.
3SG.PFV undo rope and 1SG.SBJ run.away far
'He undid the rope and I ran away.' (Ozanne-Rivierre 1984: 84)

Iaai (Austronesian/Oceanic)

(83) *umwe* *ölö* *hnyi* *hon* *uöö*, ***me*** *u* *kölu* *but*.
2SG.PRS climb on TOP tree and 2SG.SBJ fall far
'You climb on the tree and fall.' (Ozanne-Rivierre 1984: 84)

General coordinating devices convey various types of adverbial semantic relations. For example, in Canela-Krahô, *ne* 'and' occurs not only in biclausal constructions from which a temporal subsequence relation may be inferred due to iconicity of sequencing (84), but also in biclausal constructions from which other relations may be inferred, such as purpose and concessive relations, as in (85) and (86).

Canela-Krahô (Macro-Ge/Ge-Kaingang)

(84) *i-te* *po* *curan*, ***ne*** *ih-krẽr*.
1SG.SBJ-PST deer kill and 3SG.OBJ-eat
'After killing the deer, I ate it.' (Popjes & Popjes 1986: 150)

Canela-Krahô (Macro-Ge/Ge-Kaingang)

(85) *wa* *ha* *ikre* *wỳr* *tẽ* ***ne*** *amji* *cakrê.*

1SG.SBJ FUT house to go and REFL scratch

'I will go home to scratch myself.' (Popjes & Popjes 1986: 141)

Canela-Krahô (Macro-Ge/Ge-Kaingang)

(86) *i-picahur* ***ne*** *nee* *i-cator* *nare*.

1SG.SBJ-ran and NEG 1SG.SBJ-arrive NEG

'Although I ran, I didn't arrive.' (Popjes & Popjes 1986: 149)

One important methodological challenge should be mentioned here. Some sources of the sample provide descriptions of clause-linking devices glossed as 'and'. At first glance, these devices look like general coordinating devices. However, a closer analysis reveals that they are 'and then' coordinating devices (see §1.4.1.2) in that they are used exclusively for expressing 'and then'. A case in point comes from Daga. This language has a clause-linking device with the form *si* glossed as 'and' in all the examples provided in the source consulted, as in (87). However, Murane (1974: 170) mentions that this device only signals *and then*-relations. Accordingly, *si* 'and' is not considered a general coordinating device. Rather, it is considered a sequential coordinating device. Haspelmath (2004: 8) notes that general coordinating devices are often translated as 'and' or '(and) then' because it is difficult to know to what extent the temporal relation is part of the meaning of the device or to what extent it derives from the context. The policy adopted in this study is that general coordinating devices

that have acquired a specific temporal meaning (e.g. temporal subsequence) are considered 'and then' coordinating devices.

Daga (Dagan)

(87) *sinasin* *ben* *wat* *wan-in*
cockatoo decoration get give-3SG.SBJ
'He (the crow) decorated the cockatoo,

si *wao* *anega* *wa-n-i*…
and crow thus say-3SG.SBJ-MV
and the crow said….' (Murane 1974: 177)

General deranking devices are verb forms not appearing in independent declarative clauses (Cristofaro 2003: ch 3) and which allow for a range of possible interpretations (Olguín Martínez et al. 2018). Such a device does not have a specific meaning and therefore it is semantically vague (König 1995: 73). The fact that these devices are semantically vague is supported in that their interpretation may be determined by the surrounding contextual background (König 1995: 61). In the English examples in (88), (89), and (90), there are various factors involved. In (88), the relevant factor for the construction to be interpreted as a *while*-clause or *when*-clause is the factual context provided by the figure clause. In (89), the relevant factor for the construction to be interpreted as a *when*-clause or *while*-clause is the frequency adverb(ial). In (90), the relevant factor for the construction to be interpreted as a counterfactual conditional is the modal verb.

(88) *Walking home, John saw Mary*.

(89) *Walking home, John often watches for eagles*.

(90) *Walking home, John would have seen the new billboards*. (Stump 1985: 66; cf. König 1995: 61)

In the grammars of the sample, general deranking devices are discussed under different labels, such as "contextual converbs" (Nedjalkov 1995: 106), "general mood forms", "contextual adverbial participles", and "clausal nominalizers". All general deranking devices are macrofunctional by definition.

1.4.1.2 Monofunctional and polyfunctional restricted devices

Restricted devices explicitly signal the semantic relation of the ground clause to the situation expressed in the figure clause (Olguín Martínez et al. 2018). In the present study, various types of restricted devices are taken into account.

Restricted adverbial subordinators are morphemes that may appear in different positions at the clause over which they operate (i.e. they may appear at the beginning of the ground clause) and do not fulfil a syntactic function (e.g. subject, object) in the clause over which they operate (Kortmann 1997: 72). Clauses in constructions encoded by restricted adverbial subordinators may be presented in a different order without changing the meaning expressed by the complex sentence construction (Mauri 2008: 84). For the most part, restricted adverbial subordinators are associated with free subordinating items, as in the Bangime example in (91). However, there are languages in which restricted adverbial subordinators may be bound morphemes, as in the Berik example in (92). The greatest obstacle in defining

restricted adverbial subordinators has been to define what a subordinate clause is (Kortmann 1997: 57). However, since subordination is a multidimensional phenomenon (Lehmann 1988) described by a set of independent formal parameters (e.g. grammatically signaled incorporation of one of the clauses; intonational linking; scopal behavior), there are instances in which the restricted adverbial subordinator clearly operates in a subordinate clause and presumably intermediate cases, perhaps undecidable. There are a couple of languages in the sample that have non-prototypical restricted adverbial subordinators in that they do not assume a fixed position with respect to the ground clause (i.e. Crow, Mandarin). In Mandarin, restricted adverbial subordinators must occur in second position after the topic in a ground clause. However, when the topic is absent, they must occur clause-initially (Li & Thompson 1981: 639). These instances are also taken into account in the present study.

Bangime (Isolate)

(91) *ŋ̀* *déŋgò* ***hà*** *Séédù* *à* *∅* *twáá* *gāndà*.
1SG.SBJ wait.PFV until *Séédù* COMPL 3SG.SBJ arrive.PFV place
'I waited until Seydou arrived.' (Heath & Hantgan 2018: 498)

Berik (Tor-Orya)

(92) *suster* *forte=**ram***, *Daud* *saptena*.
sister come=after David hit
'After sister came, she hit David.' (Westrum 1988: 177)

A restricted deranking device is a special verb form that does not appear in independent declarative clauses (Cristofaro 2003: ch 3) and indicates a semantic relation holding between clauses (Olguín Martínez et al. 2018), as is illustrated in the Kusunda example in (93). The order of the clauses in constructions encoded by restricted deranking devices may be presented in a different order without changing the meaning expressed by the complex sentence construction (Mauri 2008: 84).

Kusunda (Isolate)

(93) *am-**de*** *u-g-i*.
eat-CVB come-3SG.SBJ-PST
'He came before eating.' (Watters 2006: 128)

Although restricted deranking devices and bound adverbial subordinators may look similar at first glance, there are some clear-cut differences between them. While restricted deranking devices are part of the inflectional paradigm of verbs and thus in paradigmatic contrast to other inflectional morphemes, bound adverbial subordinators are not. What this means is that restricted deranking devices cannot be analyzed as a verb plus a subordinating affix (Haspelmath 1995: 4). Another important difference between these devices has to do with their lexical autonomy. Restricted deranking devices never have the degree of autonomy associated with the status of lexemes (Haspelmath 1995: 4), but bound adverbial subordinators do. Restricted deranking devices have been given several different names in various linguistic traditions. For instance, they have been called "specialized converbs" in Altaic languages (Haspelmath 1995: 23); "specialized dependent moods" in Eskimo-Aleut languages (Miyaoka

2012: 115); “situative tense markers”; and ‘consecutive markers’ in Bantu and Chadic languages (Creissels et al. 2008: 140).

‘And then’ coordinating devices are another type of restricted device. These are coordinating morphemes that are specifically used for encoding the temporally subsequent construction (Dixon 2009: 9), as can be seen in the Gooniyandi example in (94). Clauses linked by ‘and then’ coordinating devices always follow an iconic order in that the situation of the figure clause happens after the situation expressed in the ground clause. Accordingly, languages having ‘and then’ coordinating devices do not allow the order of clauses to be changed (Olguín Martínez et al. 2018). These devices may become discourse markers in many languages (Brody 2011: 10), that is, morphemes that link clauses inter-sententially and which are important in discourse structuring and narrative sequencing. The internal structure of clauses linked by sequential coordinating devices tends to show no evidence of subordinative status (Olguín Martínez et al. 2018).

Gooniyandi (Bunuban)

(94) *yoowooloo* *garndiwangooddoo-ngga* *gardboowooddarni*,
men many-ERG they.fought.together
‘Many men fought together,

niyi-nhingi *nardawooddarni* *thiddi-nhingi-ngga*.
that-ABL (and then) they.cried.together fight-ABL-ERG
and then they cried together afterwards.’ (McGregor 1990: 428)

Languages may also use different verbs for expressing temporal adverbial relations, such as verbs meaning ‘to finish’, as in the Kove example in (95), and verbs meaning ‘to go’, as in the Big Nambas example in (96). Recall that in order for a device to be considered a verb, the general policy adopted in this study is that it has to appear with morphosyntactic properties prototypically found in verbs. In (95), *moho* ‘finish’ can still appear with other types of person markers, while *va* ‘go’ in (96) can still appear with different types of TAM values.

Kove (Austronesian/Oceanic)

(95) *tani* *haning* ***i-moho***, *ne* *ta-la*.
1PL.INCL.SBJ food 3SG.SBJ-finish PART 1PL.INCL.SBJ-go
‘After eating, let’s go.’ (Sato 2013: 418)

Big Nambas (Austronesian/Oceanic)

(96) *a-v-rp-i* *da-**va*** ti *i-valau*.
3PL.SBJ.REAL-PL-hit-3SG.OBJ TA-go that 3SG.SBJ.REAL-cry
‘They hit him until he cried.’ (Fox 1979: 87)

Nouns may also play a role in the encoding of temporal adverbial clauses cross-linguistically. These nouns may be temporally specific, as in (97) or generic, as in (98) (Olguín Martínez 2020). One methodological limitation of this research is the following. Sometimes it is far from clear whether some nouns have been bleached sufficiently to count as a kind of restricted adverbial subordinator, in particular the generic temporal noun *č’awuz* ‘time’ in

Lezgian (Haspelmath 1993: 388) and the generic temporal noun *zaman* ‘time’ in Turkish (Göksel & Kerslake 2005: 38).

Jalkunan (Mande/Western Mande)

(97) ***ɲɛ̄ɛ́*** *mì* *mā* *nɔ̀ŋɔ́* *dɛ̀kɛ́,* *mā* *wál* *mɛ̀ɛ̀=nɛ̄ʔ.*

year REL 1SG friend finish.PFV 1SG work do.PFV=NEG

‘The year my friend passed away, I did not do any work.’ (Heath 2017: 307)

Supyire (Atlantic-Congo/Gur)

(98) *u* *a* *kwùùlò* ***tèni*** *ǹdé-mù* *ì* *gé,*

3SG.SBJ PERF shout time.DEF DEM-REL at REL

‘At the time he shouted,

kà *pi* *í* *wá* *na* *u* *cyàhà-n.*

and 3PL.SBJ NARR be.there PROG him laugh-IPFV

they laughed at him.’ (Carlson 1994: 551)

Languages may also use different temporal adverb(ial)s, such as ‘first’ as in (99), ‘already’ as in (100), and ‘not yet’ as in (101), for expressing various types of temporal adverbial relations. Cross linguistically, temporal adverb(ial)s (i) usually can be moved within the clause and (ii) can also be used in simple sentences (Kortmann 1997: 63).

Marrithiyel (Western Daly/Bringen)

(99) *yigin-**na*** *ngidin-a,* *nanj* *wanthi*.

1SG.SBJ-first 1SG.SBJ.see-PST 2SG.SBJ afterwards

'I saw it first, you (saw it) afterwards (before you saw it, I saw it).' (Green 1989: 195)

Thai (Tai-Kadai/Kam-Tai)

(100) *prachu* *sèt* ***lέεw***,

meeting finish already

'(After) the meeting is over,

khôy *pay* *sɯ́ɯ* *khɔ̂ɔŋ* *dii* *máy*.

softly go buy thing good Q

shall we go shopping?' (Iwasaki & Ingkaphirom 2005: 277; cf. Olsson 2013: 39)

Worrorra (Worrorran)

(101) ***waliwa*** *nyaa* *ba-nga=wa-yinya-ngarri*,

not.yet born CF-1SG.SBJ=fall-PST-REL

'Before I was born,

karra-aa-nya *nga-n-Ø=wangurru-rla-eerri* *marnduma-rnanya*.

mother-DAT-3SG 1SG-INV-3SG=carry-PST-PROG stomach-LOC

my mother carried me in her womb.' (Clendon 2014: 388)

Recall that verb reduplication and verb-doubling are also considered specific types of restricted devices. Furthermore, asyndetic constructions that occur with specific TAM values are considered semantically specific as long as they serve as conventionalized ways of expressing temporal adverbial relations (see §1.4.1.1).

Once the range of strategies by which *when*-relations (Chapter 3), *while*-relations (Chapter 4), *after*-relations (Chapter 5), *before*-relations (Chapter 6), and *until*-relations (Chapter 7) are explored by adopting the framework of Olguín Martínez (2018) introduced above, the following nested research questions are addressed in the present study. **Research question 2**: are restricted devices more common than strategies without restricted devices in the encoding of particular types of temporal adverbial clauses? **Research question 3**: which type of temporal adverbial clause tends to be encoded more frequently by monofunctional devices? (Chapter 8).

1.4.2 Semantic polyfunctionality of restricted devices

The main assumption is that polyfunctionality patterns in synchronic data reflect paths of semantic development diachronically (Kortmann 1997: 96). It has been claimed that the direction of development from spatial via temporal to conditional, causal, concessive, purpose, result, follows the general pattern of semantic development from a concrete to a more abstract meaning. In this regard, space is stable and concrete, time is always ongoing and less concrete than space, and conditional, causal, concessive, purpose, result represent the way situations affect each other (Jonsson 2012: 126). Specifically, markers of spatial sameness 'at' tend to develop into clause-linking strategies encoding *when*-clauses and *while*-clauses, which in turn tend to develop into conditional, temporal subsequent, causal, and concessive clause-linking

devices. Markers of spatial source ‘from’ tend to develop into clause-linking devices expressing *after*-relations, which in turn tend to develop into conditional and causal clause-linking devices. Markers of spatial goal ‘to’ tend to develop into clause-linking devices encoding *until*-clauses, which in turn tend to develop into clause-linking devices encoding purpose clauses, result clauses, *while*-clauses, *before*-clauses, and conditional clauses (Jonsson 2012: 126).

What these results indicate is that there are consistent and regular patterns for such developments. However, most studies that have addressed the semantic polyfunctionality of restricted devices have only taken into account a particular type of restricted device (e.g. Kortmann 1997 only takes into account free adverbial subordinators) or two types of restricted devices (e.g. Hetterle 2015 only takes into account restricted adverbial subordinators and restricted deranking devices). Accordingly, it is not clear whether other restricted devices that have been traditionally disregarded will show polyfunctionality patterns not attested in previous studies. Given that the present investigation takes into account not only restricted adverbial subordinators and restricted deranking devices, but also other types of restricted devices (e.g. nouns used as clause-linking devices, ‘and then’ devices), it seems reasonable to explore this domain by addressing the following nested questions. **Research question 4**: do the semantic polyfunctionality patterns attested in the present study align with those documented by other typological studies? **Research question 5**: what are the conceptual factors that motivate the semantic affinities among different types of polyfunctionality patterns of restricted devices? (Chapter 9).

1.4.3 Temporal clause-linking strategies and areality

This dissertation also addresses the areality of temporal clause-linking strategies and the role that language contact has played in this domain. As was mentioned in §1.3, the areality of temporal clause-linking strategies has not yet been subject to closer typological scrutiny. However, various snapshots have shown that areal factors have shaped the distribution of temporal clause-linking strategies. The work of Dryer (1989) has made it clear that hardly any typological variable is evenly distributed in the world, and that most distributions are subject to skewings shaped by language contact (Bickel 2007). Because of this, linguistic typology has begun to be interested not only in the cross-linguistic diversity in the encoding of specific phenomena, but also in the development of theories that explain why areal clusters are the way they are. This involves targeting areal clusters and explaining them based on models of population movements and language contact (Bickel 2007).

The sixth research question of the present dissertation is concerned with this domain. In particular, this study seeks to answer the following nested questions: do any types of temporal clause-linking devices show areal clusters? If so, how can we determine the directionality of spread of a temporal clause-linking device (i.e. who passed it to whom) once an areal cluster has been identified? To tackle these research questions, I will adopt a series of methodological steps primarily inspired by Comrie (2007, 2008b, 2016) and Mithun (1992, 2005, 2007, 2008a, 2008b, 2012a, 2012b, 2012c, 2013). Chapter 10 explores the areality of clause-linking strategies in detail.

1.5 Summary

This chapter has discussed in detail the main goals of this dissertation concerned with the analysis of the cross-linguistic diversity of temporal clause-linking strategies, their semantic polyfunctionality, and their areality. In particular, this chapter has formulated and motivated the various research questions addressed in the present study. The next chapter (Chapter 2) presents the general theoretical background of the study, which draws on the instruments of analysis and explanatory apparatus of the functional-typological. I show, in detail, how various usage-based factors can be employed for explaining the form and function of temporal clause-linking strategies. Furthermore, in this chapter, I introduce the methodological steps that have been followed to build the sample of the present study.

CHAPTER 2

Theoretical foundations and methodology

This chapter characterizes the theoretical background, the empirical foundation, and the essential methodological procedures of the present study. §2.1 introduces the reader to the basic assumptions and analytic tools of the functional-typological approach to the study of language. It is shown that this approach has relied for the most part on iconic and economic factors to explain why languages are the way they are. However, I place emphasis on the fact that the range of domains from which typological explanations are drawn may come from other domains, namely, the domains of social cognition (§2.2), conceptualization (§2.3), and memory (§2.4) (Diessel 2019b: 25; Nichols 2007: 234).

The discussion then shifts to the sample of languages to be investigated and the sources of information that have been tapped (§2.5). This section begins by discussing the different types of sampling methods in linguistic typology and supports the decision of adopting the Genus-Macroarea method proposed by Miestamo (2005) in the present study. This section also provides a detailed explanation of the structure and motivations behind the selection of languages and some of the methodological challenges that have been faced. It is noted that while compiling a broad and representative sample for investigating temporal adverbial clauses is a challenging task due to what Bakker (2011: 106) calls a 'bibliographical bias', the sample of the present study includes enough genera from each macro-area to facilitate quantitative generalizations about frequencies of types in the individual areas.

2.1 A functional-typological approach to explaining generalizations

Linguistic typology has played an important role in the field of linguistics, and especially in the last few decades it has developed into a major area of research with its own professional organizations (e.g. The Association for Linguistic Typology) and journals (e.g. *Linguistic Typology*, *Studies in Language*, *Sprachtypologie und Universalienforschung*) (Rijkhoff 2007: 2). Linguistic typology is a field not unified in its theoretical orientation. While in some typological work, classification seems to be the main rationale, in some other work, finding correlations among different parts of the structure of a language (Comrie 1988: 146) or exploring the areal distribution of typologically relevant features are the main rationale. However, it is likely that most typologists would subscribe to the view that any typology starts by attempting to classify individual entities (in this case, languages) into types (Comrie 1988: 146).

The present study is situated within the framework of linguistic typology in the Greenbergian tradition. This framework is concerned with the cross-linguistic comparison and classification of observable surface structures of human languages, with the aim of uncovering the similarities and differences among languages regarding the encoding of one specific phenomenon (Comrie 1989: 33). It has been widely recognized that comparison of languages in world-wide perspective can give us not only taxonomies, but also intriguing limits on cross-linguistic distributions (Haspelmath 2019: 1). In this regard, when one is exploring a specific parameter, not all values of the parameter are equally attested, that is, while some values are very common, other values are less common or rare. At first sight, the study of similarities across languages and the study of differences among languages might seem in conflict with one another. However, the two studies proceed in parallel in that linguists who are interested

in exploring similarities across languages are also interested in exploring differences among them (Comrie 1989: 33). With this in mind, one of the main goals of this dissertation is to provide a comprehensive description of the formal means by which temporal adverbial clauses are encoded in the languages of the world, which will reveal common and rare trends of grammatical coding in this functional domain.[8] Furthermore, this will uncover the areas where these common and rare trends are attested in the world.

This research has as its goals the cross-linguistic comparison and classification of temporal clause-linking strategies, but also in explaining why temporal clause-linking strategies are the way they are. Most functional typologists agree with the fact that similarities in formal coding are motivated by factors associated with language use. In this regard, the structures of language emerge from interrelated patterns of experience, social interaction, and cognitive mechanisms (Beckner et al. 2009: 2). For instance, as will be shown in this dissertation, cross-linguistically, demonstratives are common in the expression of 'and then' (see §2.2.1). This stems from the fact that demonstratives first designate spatial relations, then temporal relations. After this, a discourse-deictic use could emerge from either of those, in which they refer to an adjacent clause or situation (Webber 1991). Accordingly, the fact that many languages employ this strategy for expressing an *after*-relation is not arbitrary. Rather, it is motivated by factors associated with language use. On the other hand, linguistic diversity arises because various factors compete with one another. This competition is the main reason why there is variation across languages (Croft 2003: ch. 3.3). Note that linguistic diversity may also arise due to arbitrariness. A case in point comes from conceptual distinctions of inanimates. It has been observed that the behavior of arguments is distinguished based on a

[8] As pointed out by Mithun (2016: 1), determining the features that are common and rare cross-linguistically can help linguists to identify important features sooner in an unfamiliar language on the basis of fewer examples.

referential hierarchy, also known in the literature as animacy, empathy or indexability hierarchies. First and second person markers are distinguished from third person markers. Another similar distinction is concerned with those languages in which all pronouns are distinguished from non-pronouns, and those in which there is a distinction between humans and non-humans (Comrie 1989: 195-196). Inanimates seem not to be differentiated. Comrie (1989: 197) notes that most languages seem to leave this as an undifferentiated class, or, if there is any internal distinction, these distinctions tend to be arbitrary. This seems to be the case of the distribution of inanimate nouns among the three genders in the older Indo-European languages (Comrie 1989: 197). What this seems to indicate is that arbitrariness may also play a role in the variation across languages.[9]

This dissertation also explores correlations of temporal clause-linking strategies with other properties. A case in point comes from the polyfunctionality patterns that temporal clause-liking devices tend to develop. As was mentioned in Chapter 1, it is not entirely clear to what extent the form of the temporal device correlates with the polyfunctionality pattern it develops. Caution needs to be exercised with some of the correlations put forward in this dissertation. This stems from the fact that some correlations attested in the present study may be the result of language contact or may be due to the fact that the sample of the present study takes into account two or more languages of genera from the same family (see §2.5). As will be mentioned in §2.5, many languages of the sample are in areal vicinity and have been subject to intense contact. However, as acknowledged by Cristofaro (2003: 92) in her study of subordination, it is probably unavoidable to have a sample in which at least some languages

[9] There is one language where a very clear hierarchy of inanimate noun phrases has been found. In Navajo, inanimate entities that are capable of spontaneous motion are classified higher than other inanimates, the former including, for instance, wind, rain, running water, lightning (Comrie 1989: 197).

are not subject to intense contact. With this in mind, this research can make only a modest contribution to the domain of correlations. Note that for those correlations attested in the present study, an attempt will be made to explain them in terms of extra-linguistic factors. However, for some of them, it has not been possible to provide an explanation. In this regard, Comrie (1993: 11) mentions that "as in other domains of human inquiry, there are many instances where the level of our empirical investigation of a topic is very different from the level of our understanding of the motivation for the generalizations we have uncovered." Thus, empirical investigation and explanation will often be out of synchronization.

The picture sketched above of why languages are the way they are is known as the 'functional-typological approach'. Within this approach, functional explanations traditionally refer mainly to iconic and economic factors. This provides a major distinction between the functional-typological approach and that of mainstream generative grammar, which tends to argue that language is a unique phenomenon, subject to generalizations that are unique to language (Comrie 1993: 11). In what follows, I discuss how the factors mentioned above (i.e. iconicity, economy) have been employed for explaining various types of linguistic phenomena.

2.1.1 Iconicity

As work like that of Haspelmath (2008) shows, in the past 25 years, iconicity has become more and more popular in the functionalist literature. The principle of iconicity is concerned with the fact that the "structure of language reflects in some way the structure of experience'' (Croft 2003: 102). Various types of iconicity have been recognized in the literature.

'Iconicity of complexity' is probably one of the most relevant notions of iconicity for morphologically complex structures in that it predicts that more complex meanings are

expressed by more complex forms (Haspelmath 2008: 2). An illustrative example is found in the encoding of comparative and superlative constructions. In English, and many other languages around the world, comparative and superlative constructions are morphologically more complex than their positive counterparts. In this regard, the superlative tends to appear with a marker that contains more segmental material than the comparative one, as in English *large* (positive), *larg-er* (comparative), and *larg-est* (superlative), or as in Hungarian *nagy* 'large' (positive), *nagy-obb* 'larger' (comparative), and *leg-nagy-obb* 'largest' (superlative) (Downing & Stiebels 2012: 12). Another illustrative example comes from the encoding of causative constructions. Causatives are more complex semantically than the corresponding non-causatives. Therefore, they tend to be encoded by more complex forms, e.g. Turkish *düş* (*-mek*) 'fall', causative *düş-ür*(*-mek*) 'make fall, drop'. Iconicity of complexity seems to apply to concatenative morphology in that greater formal complexity manifests itself in additional segmental material. Accordingly, apophonic encodings such as ablaut are harder to evaluate in terms of formal complexity (Downing & Stiebels 2012: 12).

Another type of iconicity is that of 'iconicity of linearization', which refers to the fact that morpheme order has an iconic basis. Bybee (1985) shows that bound morphemes exhibit a universally preferred order in relation to their stem. She argues that the order of these morphemes is iconically motivated in that those affixes that occur closer to the stem show a higher relevance for the stem (e.g. valency and voice markers). On the other hand, those affixes that appear further away from the stem do not affect the meaning of the stem (e.g. agreement markers).[10]

[10] A similar proposal has been made for nominal features (see Malchukov 2004; Rijkhoff 2002).

'Iconicity of cohesion' predicts that the linguistic distance between expressions corresponds to their conceptual distance (Haiman 1985: 131). Linguistic distance is measured in terms of structural distance, i.e. the number of intervening prosodic/morphological/syntactic boundaries. For instance, in possessive noun phrases with body-part terms, the possessum and the possessor are conceptually inseparable. Accordingly, this results in greater cohesion of coding in many languages (Haspelmath 2008: 2). Another example comes from causative constructions. Causative constructions expressing direct causation show a greater degree of cohesion, whereas causative constructions indicating indirect causation show less cohesion (Comrie 1989: 172-173). Iconity of cohesion has also been employed for explaining the formal contrast between "accidental coordination" and "natural coordination". Wälchli (2005: ch. 3) mentions that in "natural coordination" (e.g. 'mother and father', 'husband and wife'), the noun phrases denote semantically closely associated concepts and can be said to form some conventionalized whole. This is mirrored in its low degree of distance. Regarding "accidental coordination" (e.g. 'my brother and the wall'), the coordination of noun phrases is not expected to co-occur. Accordingly, they tend to show structural distance due to its conceptual distance.

One type of iconicity that has been used for explaining the order of clauses is that of 'iconicity of sequence'. This concept refers to the sequential ordering of linguistic elements in discourse and complex sentence constructions (Diessel 2008: 469). That is, the order of elements in language parallels that in physical experience or the order of knowledge (Greenberg 1966: 103). Various studies have proposed that the order of clauses in adverbial clause constructions is usually iconic. With respect to conditional clause constructions, Haiman (1978) explains that the conditional clause tends to precede the figure clause because the conditional clause refers to a situation that is conceptually prior to the one expressed in the

figure clause (cf. Diessel 2008: 469). Purpose clauses tend to appear postposed to the figure clause because they denote the intended endpoint or result of the situation expressed in the associated clause (Schmidtke-Bode 2009: 110). The reader will note throughout the discussion of various types of temporal adverbial clauses that some of them always tend to show an iconic order, while others are more flexible with respect to this domain. For instance, all languages of the sample that express *after*-relations by 'and then' coordinating devices always link clauses that show an iconic order. That is, the ground clause always precedes the figure clause because it refers to a situation that occurs prior to the one in the figure clause. *Until*-clauses show a more diverse picture in the languages of the sample in that they may or may not show an iconic order. It is expected that *until*-clauses occur at the end of the complex sentence construction given that *until*-clauses denote a situation realized after the situation of the first clause (Diessel 2008: 470). However, as mentioned previously, the position of the *until*-clause may be iconic or non-iconic (see Chapter 7 for a more detailed explanation). In a similar fashion, *before*-clauses may or may not show an iconic order. It is expected that the *before*-clause occurs postposed to the figure clause. This stems from the fact that they refer to a situation that occurs posterior to the one in the other clause (Diessel 2008: 470). However, the position of the *before*-clause may be iconic or non-iconic (see Chapter 6 for a more detailed explanation).

2.1.2 Economy

Not only iconicity, but also economy is a pervasive principle of linguistic organization. This principle is concerned with the tendency to reduce as much as possible the phonetic substance and the information encoded in linguistic expressions. That is, economy represents a pressure

towards minimal effort and maximal simplification of expression (Cristofaro 2003: 9). It can be summarized as maximization of efficiency via minimal differentiation and maximization of informativeness (Hopper & Traugott 2008: 71). Haiman (1985: 158-159) proposes two types of economy: 'paradigmatic economy' (the reduction of the lexical inventory in a system) and 'syntagmatic economy' (the reduction of the length or complexity of an utterance or message). With respect to the former, this type is responsible for many types of polyfunctionality patterns of lexical items (recurrent association of related meanings with the same form; Cristofaro 2003: 9). Regarding the latter, this type predicts that the most frequent expressions tend to be reduced phonetically (the so-called Zipf's law). Redundant and/or recoverable information from context tends to be omitted (Cristofaro 2003: 9). In the present study, 'paradigmatic economy' will surface repeatedly in the analysis of polyfunctionality patterns of temporal clause-linking strategies. In particular, this principle will be invoked in Chapter 9.

Iconicity of sequence and paradigmatic economy will surface in various chapters in this dissertation. However, other factors will also be invoked to explain the form and function of temporal clause-liking devices. In particular, I will consider cognitive processes from three general domains, namely, the domains of social cognition, conceptualization, and memory (Diessel 2019b: 25). While the distinction between cognitive and social is important, it should not of course be forgotten that there is a cognitive basis to social interaction and that social interaction may affect cognition (Comrie 1993: 12). With this in mind, I will refer to these explanations as 'usage-based explanations' rather than 'functional explanations' (see Hetterle 2015: 16 for a similar thinking). In what follows, I introduce the factors from these domains that will be invoked in various chapters of this dissertation.

2.2 Social cognition

Social cognition refers to those aspects of mental processing shaped by social interaction. Many of the processes that are most central to social cognition, such as attribution, person perception, stereotyping, and so on, involve language in some manner (Holtgraves & Kashima 2008: 73). It is, in fact, difficult to think of any social-cognitive process that does not involve language in some manner.

Diessel (2019b: 25) identifies three cognitive processes of social cognition: 'joint attention', 'common ground', and 'auditory design'. These three cognitive processes will be important for exploring temporal clause-linking strategies in this dissertation and for supporting specific theoretical claims. In what follows, I provide an initial flavor of the interaction between these cognitive processes and temporal clause-linking strategies.

2.2.1 Joint attention

One of the main social cognitive processes that will be taken into account is that of 'joint attention'. The main idea of this cognitive process is that in order to communicate, interlocutors must focus their attention on the same experience, which may involve an object or event in the surrounding situation or a concept that is invoked by the preceding discourse (Diessel 2017: 8). Of particular importance is deictic pointing, a communicative device that is universally available for establishing joint attention and is commonly accompanied by demonstratives (Diessel 2017: 8). Demonstratives may have a discourse-deictic use, in which they refer to a previous clause or proposition. Accordingly, they may develop a clause-linking function (Diessel & Breunesse 2020). As will be shown in this study, demonstratives, used as temporal clause-linking strategies, are pervasive cross-linguistically. In particular, they seem to be

common in the encoding of *after*-clauses. For instance, demonstratives used as 'and then' devices seem to be common in Australian languages in the sample of this dissertation. This finding provides additional support for Diessel's (2006: 480) argument that demonstratives may be used as clause-linking devices because of their communicative function which is to focus the interlocutor's attention on the linguistic elements in the unfolding speech stream.

2.2.2 Common ground and auditory design

In order to communicate, speakers must share a 'common ground', which is concerned with language users' awareness of their shared knowledge, i.e. information about the physical speech situation and the background information about the communicative partner and general world knowledge (Diessel 2019b: 26). Common ground provides the basis for the 'auditory design', which refers to the process whereby speakers seek to construct a sentence according to their communicative intention in a particular situation. Accordingly, speakers must make choices of linguistic means depending on the social circumstances, physical speech situation, and background information, etc. In human languages, there is always more than one structural means for expressing the same function. Diessel (2019b: 24) mentions that there are always multiple ways of expressing a particular communicative intention, such as alternative constructions to describe the same scene (102a-b), alternative words to designate the same entity (103a-b), and alternative pronunciations (104a-b). It is of course necessary to stress that this decision-making process is an unconscious process in that the decisions speakers make in spontaneous conversation are often routinized and unconscious.

(102) a. *I sent Tom a letter*.

b. *I sent a letter to Tom*.

(103) a. *I didn't see the man*.

b. *I didn't see him*.

(104) a. *They are going to leave*.

b. *They're gonna leave*.

In the context of temporal adverbial clauses, common ground and auditory design are social cognitive processes that will surface repeatedly in various chapters. As was mentioned in Chapter 1, languages may have more than one primary strategy for expressing a particular semantic relation. In this scenario, there are various factors that may play a role in the decision-making process of the speaker.

First, recall that temporal clause-linking devices may be either polyfunctional (i.e. they may cover other temporal adverbial relations and/or other adverbial relations), or monofunctional (i.e. they cover only one particular adverbial relation). The mono/polyfunctionality of devices may play a role in the decision-making process of the speaker in that there may be communicative scenarios in which the speaker wants to express an adverbial relation unambiguously and other communicative scenarios in which ambiguity may not be a problem.

Second, temporal clause-linking strategies may bear additional functions beside the specific semantic relation they express (e.g. they may also function as switch-reference

markers, (ir)realis markers, etc.). A case in point comes from languages that have various formal types of 'and then' coordinating devices. Abau has two sequential coordinating devices: *nok* 'and then' and *sa* 'and then'. While *sa* 'and then' is used when there is a change of subject, *nok* 'and then' can only be used for describing a series of situations when there is no change of subject, as is illustrated in (105). Accordingly, the additional functions of devices may lead speakers to choose one type of sequential coordinating device over the other. Other languages that have sequential coordinators that may function as switch-reference markers are Supyire (*kà* 'then' indicates different-subject and *mà* 'then' indicates same-subject; Carlson 1994: 557) and Kombio (*i* 'then' indicates different-subject; Henry 1992: 104), among many others (see Chapter 5 for a more detailed explanation).

Abau (Sepik/Upper Sepik)

(105) *how* *hom* *loum* *menkin*,
taro 3PL.SBJ burn when
'When the taros were cooked,

ine-ih *hok* *or* *m-e* *lowr* *say*,
sister-KIN 3SG.SBJ.F blackness PL-OBJ scrape off
the sister scraped off the black (burned parts),

nok *liwak* *a.* ***Sa*** *sok* *hiy* *lousne*.
then sit eat then snake 3SG.SBJ.M appear
and then sat down to eat. Then a snake appeared.' (Lock 2011: 346-347)

Third, another factor that may lead speakers to choose one type of device over the other is whether the adverbial clause is a modifier or non-modifier. Recall that adverbial clauses may be modifiers in that they modify the propositional meaning of an element of the figure clause (Hampe & Gries 2018: 120). Note that they may also be non-modifiers in that they just provide the speaker's attitude towards the propositional content expressed in the figure clause, or relate to the speech act (rather than the propositional content) expressed by the figure clause (Schmidtke-Bode & Diessel to appear: 4). Languages may use different clause-linking devices depending on whether the adverbial clause is a modifier or non-modifier. A case in point comes from Nanga (Dogon). This language has various types of 'and then' coordinating devices. While *nà* 'and then', *nây* 'and then', and *ŋ́* 'and then' are used when the ground clause modifies the propositional meaning of an element of the figure clause (Heath 2016a: 329-332), the sequential coordinating device *ndé* 'and then' is employed when the ground clause relates to the speech act expressed by the figure clause (Heath 2016a: 333).

Fourth, there are languages which have a set of temporal clause-linking strategies that express different amounts of time between situations. Daga, a language spoken in Papua New Guinea, has various 'and then' coordinators used depending on the amount of time between situations. For instance, the sequential coordinator *boge* 'then', in the example in (106), indicates that the second situation immediately follows the first. The sequential coordinating device *amba* 'then' in (107), indicates that the second situation does not immediately occur after the first, but rather that more time has passed in comparison with the one expressed by *boge* 'then'. Finally, the sequential coordinating device *evi* 'then', which appears in the example in (108), indicates the longest time lapse between situations in comparison to the other

two sequential coordinating devices. With this in mind, amounts of time between situations is another factor that may lead speakers to choose one type of device over the other.

Daga (Dagan)

(106) *tapunea* *bo-en,* ***boge*** *gear-e* *aenagaet* *a-en.*
mother.in.law die-3SG.SBJ then fall-3SG.SBJ.SS away go-3SG.SBJ
'His mother-in-law died, (and) immediately he left (her house) and went away.' (Murane 1974: 241)

Daga (Dagan)

(107) *ve-an,* *pa* ***amba*** *am-on.*
leave-3PL.SBJ house then go-3PL.SBJ
'They left and then went home' (Murane 1974: 240)

Daga (Dagan)

(108) *kaewa* *wa-ini* *uno-taia,* ***evi*** *sia* *anan* *uno.*
greeting say-3SG.SBJ.HAB finish-3SG.SBJ.PRS then again war NEG
'The peace-maker causes (the fighting) to finish, and then (there is) no war.' (Murane 1974: 241)

The fact that languages may have various devices available depending on the amounts of time between situations can be explained by a cognitive process known as 'schematization', that is, a construal of a situation by adjusting the granularity of the scalar dimensions. This

cognitive process has been employed for explaining the construal of spatial dimension. For instance, examples (109a-b) could describe the same scene, but (109b) invites the hearer to attend to the thickness of the vegetation in the field by using a preposition requiring a three-dimensional volume; (109a) instead construes the field as a two-dimensional surface without thickness (Croft & Cruse 2004: 52).

(109) a. *She ran across the field*.

b. *She ran through the field*.

Although schematization has been employed for explaining the construal of spatial dimensions, it can also be used for explaining the construal of temporal scalar adjustments (Croft & Cruse 2004: 52), such as the ones shown by the Daga 'and then' coordinators.

The factors illustrated above should suffice to demonstrate that common ground and audience design are of central significance to speakers' choice of temporal clause-linking strategies. Accordingly, common ground and auditory design will be used in various analytical chapters of this dissertation.

2.3 Conceptualization

Meaning is shaped by conceptualization, which is the structuring of experience or semantic content (Diessel 2019b: 28). Conceptualization is not specific to language. This cognitive process is inspired by general psychological research on vision. Gestalt psychologists showed that visual perception is guided by general cognitive principles such as reification (which is the enrichment of perceptual information through inference), among others (Diessel 2019b:

28). There are various types of general processes of conceptualization that have been employed by linguists, such as metaphor, metonymy, fictive motion, force dynamics, and reification, etc. Of these, 'metaphor' and 'metonymy' will be important for explaining the polyfunctionality patterns of temporal clause-linking strategies.

The main assumption is that polyfunctionality patterns in synchronic data reflect paths of semantic development diachronically. It has been claimed that metonymization, also known as "conventionalization of implicature", "hypoanalysis", and "context-induced reinterpretation", plays an important role in the diachronic development of polyfunctionality patterns of clause-linking strategies. In this regard, there is always a historical stage in which only one of the meanings of the polyfunctional clause-linking device is available. After this, the device develops a new meaning in specific contexts which then becomes conventionalized (i.e. the pragmatic implicature becomes conventionalized). In the context of temporal adverbial clause-linking devices, it has been proposed that devices encoding temporal clauses are the source domain of changes in that they usually develop other adverbial meanings (e.g. conditional, concessive, causal, purpose; Kortmann 1997: 347). In metonymyzation, 'X', initially associated with a conceptual situation 'A', comes to be associated with a conceptual situation 'B' because 'B' is either part of the global meaning 'C' of a complex expression 'Y' of which 'X' is a component, or can be inferred from 'C' anyway (Cristofaro 2010: 40). Thus, metonymization reveals which processes of form-meaning redistribution may take place.

One instance that provides a clear example of conventionalization of implicature comes from the development of 'while' in English. This clause-linking device originated in Old English in an adverbial phrase consisting of the accusative distal demonstrative, the accusative noun *hwile* 'time', and a subordinating device (Hopper & Traugott 2008: 90). This phrasal

expression was reduced by late Old English to the device *wile* 'while'. In the process, other conversational implicatures arose. In particular, a causal implicature was dominant in some examples dating from the later fourteenth century (Hopper & Traugott 2008: 91). Note that this pragmatic implicature did not become conventionalized in English. However, in some Germanic languages this implicature became conventionalized (e.g. in German the temporal meaning of *weil* has become obsolete and the causal meaning has become the main meaning). In English, a different implicature of 'while' became conventionalized, that of surprise concerning the overlap in time of the situations expressed by the ground and the figure clause. This led to the *but*-meaning and *although*-meaning, in particular, in contexts where clauses appeared with present-tense stative verbs e.g. 'while you like peaches, I like nectarines' (Hopper & Traugott 2008: 91).

The polyfunctionality patterns of clause-linking devices are not random. It has been argued that they arise via metaphorization (Hetterle 2015: 260), that is, a process involving the conceptual transfer from one domain to another. Note that this conceptual transfer from one domain to another is referred to as "mapping" or "associative leap" and is motivated by analogy and iconic relationships (Hopper & Traugott 2008: 84). Taking this vision as our point of departure, the polyfunctionality of devices seems to provide evidence for the semantic relatedness of the respective meanings.

What the discussion above seems to indicate is that in the case of semantic change, metonymization (i.e. conventionalized implicatures) is what makes conceptual similarity (i.e. metaphorical relatedness) visible (Hetterle 2015: 261). To put it another way, conceptual similarity becomes visible via conventionalized implicatures in that conventionalized

implicatures are subject to specific morphosyntactic constraints. Metonymization and metaphorization will surface in Chapter 9.

2.4 Memory-related processes

Memory has often been described as some kind of place where information is stored. However, in current cognitive psychology, memory is now considered the place where various cognitive processes interact in the activation, processing, and organization of knowledge (Diessel 2019b: 30). In what follows, I discuss some memory-related processes that will be invoked in various chapters of this research.

2.4.1 Routinization

Frequency is an important determinant for the storage of linguistic knowledge (Diessel & Hilpert 2016: 2). Accordingly, usage-based linguists have shown that many aspects of grammatical knowledge are the result of language users' experience with frequent strings of linguistic expressions (Diessel 2016: 2). It has been claimed that the more often linguistic elements occur together in language use, the stronger is the link between them in memory. The mechanism underlying the language users' knowledge of cooccurrence patterns is routinization (Logan 1988). Linguistic communication is among the most highly automated forms of human behavior (Schmid 2017: 3). Routinization is a process that transforms uncontrolled processes into automatic processes through repetition or practice (Diessel 2019b: 35). Human beings routinize frequently recurring tasks. As a result, the boundaries between the components of these tasks fade (Mithun 2002: 83). Regarding routinized linguistic expressions, the elements of the string may lose their independence and boundaries are blurred. The whole chunk is

compressed and tends to undergo phonetic reduction because speakers have more practice in producing them (Diessel 2007: 115). Furthermore, routinized expressions are more easily predictable, and thus more easily recognizable (Diessel 2007: 115).

Routinization has been employed for explaining the emergence of collocations (e.g. *all of a sudden, I wonder if*) and the emergence of syntactic constituents (Bybee 2002). In the context of temporal clause-linking devices, routinization will be invoked in various chapters to explore phrasal temporal clause-linking devices. These phrasal devices are not or not sufficiently lexicalized. To give an initial flavor of this, many Romance languages overwhelmingly use phrasal expressions in the encoding of temporal adverbial clauses (e.g. Spanish *tan pronto como* 'as soon as'). Other examples come from Slavic and Celtic languages. Some of these languages have phrasal expressions involving an adposition meaning 'from, since', a temporal noun meaning 'time', and a complementizer, relativizer or free adverbial subordinator 'when'. A case in point is the Polish phrasal subordinator *od czasu jak* 'since', which involves the adposition *od* 'from' the temporal noun *czasu* 'time', and the free adverbial subordinator *jak* 'when' (Kortmann 1997: 147).

2.4.2 Analogy

Analogy crucially relies on the recognition of similarity between two functions and then the extension of the construction schema to express another similar function (Diessel 2019b: 16). That is, analogy refers to the process by which a speaker comes to use a novel item in a construction (Bybee 2010: 57). Note, however, that the notion of analogy is used in many different ways by linguists. In historical linguistics, the term analogy is used for describing a morpho-phonemic change in paradigms. Two types are traditionally distinguished. First,

analogical levelling indicates the loss of an alternation in the paradigm. Second, analogical extension is concerned with those instances in which an alternation is introduced into a paradigm that did not have it before (Bybee 2010: 66). Analogy has also been invoked in first language acquisition research for describing how a child works from specific utterances to the construction of more general patterns (Bybee 2010: 65). In the present study, analogy will be invoked in Chapter 10 for explaining specific theoretical aspects of language contact situations involving pattern replication of temporal clause-linking devices. Some brief remarks on the role of analogy are in order here.

As will be shown throughout the chapters of this dissertation, temporal clause-linking devices range from simple morphological forms to more complex forms (e.g. 'at the time when…'). These devices may appear in complex sentence constructions that occur with specific properties. For instance, in various languages of the sample, a clause-linking device meaning 'at the time when' must appear in a construction in which the figure clause is encoded by a linker meaning 'and'. Furthermore, both clauses must appear in the irrealis.[11] This gives rise to the following construction schema:

(110) *AT THE TIME WHEN*_____IRREALIS MARKING + *AND*_____IRREALIS MARKING.

In language contact situations involving pattern replication of temporal clause-linking devices, speakers copy construction schemas, such as the one shown in (110). Recall that by pattern replication is meant those instances where only the patterns of the other language are replicated, i.e. the organisation, distribution and mapping of grammatical or semantic meaning, while the form itself is not borrowed (Sakel 2007: 15). With this in mind, while speakers

[11] The reader is referred to Mithun (1995) for a more detailed discussion of the notion 'irrealis.'

sometimes may copy the whole construction schema shown in (110), sometimes they may only copy specific constructional properties of the schema (e.g. speakers may only copy by means of native material the temporal clause-linking device meaning ‘at the time when’, etc.).

In the context of adverbial clauses, various studies have shown that in language contact situations involving pattern replication, what speakers copy are construction schemas, such as the one in (111). A case in point comes from Mixtec languages. The Mixtec languages, along with Cuicatec and Triqui, constitute the Mixtecan subgroup of the Amuzgo-Mixtecan branch of the Oto-Manguean language family (Kaufman 1988; Longacre 1955). Mixtec languages express counterfactual conditional meanings by the following construction schema:

(111) SUBORDINATOR_____SYMMETRIC (REALIS) + ‘AND’_____SYMMETRIC (REALIS) + CF PARTICLE.

Based on the construction schema shown in (111), Mixtec languages have a complex sentence construction that appears with a free adverbial subordinator and a general coordinating device. This construction also contains a counterfactual particle whose meaning is similar to ‘but it did not’. This is illustrated in the Ocotepec Mixtec example in (112), and in the Yosunda example in (113).

Ocotepec Mixtec (Oto-Manguean/Mixtecan)

(112) *tú* *ní* *xíhī* *de* *tatan*,
if COMPL drink.COMPL 3SG.SBJ medicine
‘If he had drunk the medicine,

dě *xā* *ni* *ndu:v̄ahā* *de* ***níkū***.

and already COMPL get.well.COMPL 3SG.SBJ but.no

he would already have gotten well.' (Alexander 1988: 285)

Yosunda Mixtec (Oto-Manguean/Mixtecan)

(113) *nú* *ni* *xíhī* *dā* *tāna*,

if COMPL drink.COMPL 3SG.SBJ medicine

'If he had drunk the medicine,

tī *xa* *ni* *nduvaha* *dā* ***níkú***.

and already COMPL get.well.COMPL 3SG.SBJ but.no

he would already have gotten well.' (Farris 1992: 154)

Huasteca Nahuatl, a Uto-Aztecan language spoken in Mexico, has a counterfactual conditional construction similar to the one attested in Mixtec languages in that the figure clause is followed by a counterfactual word, as can be seen in (114).

Huasteca Nahuatl (Uto-Aztecan/Aztecan)

(114) *tlan* *okichpil* *ach-ki-mah-**ki*** *tlen* *melauak*,

if boy NEG-3SG.OBJ-know-PFV SUB truth

'If the boy had not known the truth,

*miki-**ki*** ***pero*** ***amo***.

die-PFV but NEG

he would have died.'

The Huasteca Nahuatl counterfactual conditional construction in (114) shows a symmetric pattern in that the verbs of both clauses show perfective marking. Interestingly, various Mixtec languages have symmetric counterfactual conditionals, that is, the verbs of the figure and ground clause are encoded by the same TAM values, as is illustrated in (112) and (113) (see Haiman & Kuteva 2001: 101).

In light of the above discussion, Huasteca Nahuatl speakers seem to have copied various of the construction properties of the schema shown in (111) for expressing counterfactual conditional meanings.

2.5 Sample

The present study explores the cross-linguistic variation of temporal clause-linking strategies. Accordingly, determining the languages that will serve as data sources for exploring the amount of variation in this domain is an important methodological step. In asking about the possible range of cross-linguistic variation, we are speaking of the range of variation that characterizes some particular sample of human languages (Comrie 1993: 4). To do so, we must equip ourselves with a sample representative of human languages, with respect to the phenomenon that we are investigating, i.e. temporal clause-linking strategies. However, while this points the way towards a solution, it does not automatically provide a solution. This stems

from the fact that we still need to ask the following question: what is the basis of such a sampling procedure?

It goes without saying that the range of variation in this domain can be addressed by simply including every one of the world's approximately 7,000 languages in the study. However, this is impractical in that not all languages have been described with respect to the phenomenon under investigation (Comrie 1989: 10). Furthermore, even if one had access to adequate sources for all 7,000 languages, it would be time-consuming to include them all (Miestamo et al. 2016: 235) and the sample would be unbalanced. With this in mind, typologists rely on samples smaller than 7,000 languages.

In the typological literature, there have been several proposals for sampling. Note, however, that the adoption of one sampling method over another will depend in the type of research question(s) to be explored. If one is interested in exploring statistical testing of tendencies and correlations, probability samples can do a great deal to uncover valid statistical generalizations. On the other hand, if one is interested in exploring the cross-linguistic diversity of the encoding of one specific phenomenon, variety samples are the best method in that they can reveal even the rarest strategies or types of expression in the domain explored (Rijkhoff et al. 1993: 171).

With respect to probability samples, they are meant to explore crosslinguistic frequencies of features, correlations between them, or other statistical measures. For these types of samples, it becomes crucial that the samples have as few biases as possible that could distort the numbers. That is, it is important that the sampled languages are as independent of each other as possible in terms of genealogy and areal contacts (Miestamo et al. 2016: 235). If one is interested in finding statistical tendencies and correlations, such as, for example, whether

languages tend to prefer SVO rather SOV order, then it is most important for the sample to not be genetically or areally biased (Cristofaro 2003: 91). Another example comes from reduplication. If one is interested in exploring which of the following variables is more common: (i) the language does not have reduplication; (ii) the language has partial reduplication only; (iii) the language has full reduplication only; and (iv) the language has both partial and full reduplication, then only samples consisting of independent units can shed light on this matter (Velupillai 2012: 49-50). The last example is concerned with adpositions. We may want to establish what the chance is of a language being postpositional, prepositional, or neither. In order to find out the real preferences among these three types, we will want only independent cases in our sample (Bakker 2011: 102). The methods proposed in Dryer (1989) and Perkins (1989) are designed especially for this purpose. However, note that the requirement that the languages be independent units makes it rather difficult to construct a good probability sample. Even with a sample of relatively small size, it is impossible to include only languages that are completely independent of each other in these respects (Rijkhoff & Bakker 1998: 265). There are some studies that have tried to overcome this issue. However, there are only two ways out (Rijkhoff & Bakker 1998: 265). First, a small sample is used that is not quite representative with respect to genetic, areal, and/or cultural diversity (Perkins 1992). Second, a large sample is used and genetic and areal relationships are manipulated to meet the requirements on statistical tests (Dryer 1992: 83). Probability samples should not be confused with random samples. A random sample refers to a sample that does not take into account any form of genetic and areal stratification (Rijkhoff & Bakker 1998: 265).

Variety sampling aims at capturing as much of the world's linguistic diversity as possible (Miestamo et al. 2016: 234). Accordingly, the more languages in sample, the better

equipped it is to capture the crosslinguistic variety of the phenomenon under study. In this regard, it is likely that by taking into account a large sample no linguistic features, not even the rarest ones, are disregarded. Note that small variety samples can uncover what is common. However, they are not suitable for determining features that are cross-linguistically rare. That is, the coverage of rare features is random in a small variety sample (Miestamo et al. 2016: 237). Large variety samples should ideally be genetically and areally balanced, in that this increases the variety covered by the sample. There are two sampling methods that have been designed for variety sampling: the Diversity Value method proposed by Rijkhoff et al. (1993) and Rijkhoff & Bakker (1998), and the Genus-Macroarea method proposed by Miestamo (2005).

The Diversity Value method proposed by Rijkhoff et al. (1993) and Rijkhoff & Bakker (1998) is designed as a method for building variety samples. In this method, genetic stratification is done by taking into account any classification representable in tree format, such as Ruhlen (1991) and Grimes & Grimes (1996). The number of languages to be considered from each genetic grouping is measured by taking into account its internal diversity. This is done by calculating its Diversity Value. The Diversity Value of each genealogical grouping is determined based on the number of intermediate levels between the top node (i.e. the name of the language family) and the terminal nodes at the bottom of the language tree. That is, the weight of diversity entirely rests on the intermediate levels of the tree (see Rijkhoff and Bakker1998: 270-272 for a more detail explanation). The intermediate levels are thought to be the expression of the linguistic diversity of a particular language family. Note that this method does not involve any areal stratification. Furthermore, it has been argued that some genetic classifications in tree format are controversial.

The Genus-Macroarea method proposed by Miestamo (2005) has been used for building variety samples. In this method the primary genetic stratification is made at the genus level, and the primary areal stratification at the level of macro-areas. A genus is a maximal group of languages whose relatedness is fairly obvious without systematic comparative analysis (Dryer 1989). Some examples of genera are the branches of Indo-European: Germanic, Romance, Slavic, etc. Macro-areas are continent-size linguistic areas independent of each other (Dryer 1989). Miestamo et al. (2016: 240) mention that "languages within macro-areas are to some extent typologically similar due to either (ancient) contact or (very deep) genealogical affinity, beyond the reach of the methods of historical linguistics." There are two variants of this method: a bottom-up and a top-down variant. First, in the bottom-up variant, sample size is not predetermined. That is, this variant tries to include languages from as many genera as possible. The language chosen from each genus should be made based on the availability of the sources (Miestamo et al. 2016: 247). That is, the language chosen from each genus should be the one for which there is a source or sources providing a detailed description of the phenomenon under study. It has often been claimed that the language chosen from each genus should be the one that shows the most the modal, or most archaic, way of encoding the phenomenon under scrutiny (Bickel 2008: 223). However, sometimes information about typicality of each genus is not available. Second, in the top-down variant, the size of the sample is determined in advance. The proportional representation of the genetic diversity of each macro-area is counted to determine the languages to be included in the sample (see Miestamo et al. 2016: 256 for a more detailed explanation).

In the present study, I take into account a sample of two hundred eighteen languages based on the Genus-Macroarea method proposed by Miestamo (2005). In particular, the

bottom-up variant of the method is adopted. As mentioned above, in this method, the primary genetic stratification is made at the genus level, and the primary areal stratification at the level of macro-areas. The languages of the sample are shown in Table 1. Using this type of sample maximizes the likelihood of finding the different types that occur cross-linguistically. Furthermore, taking one language from each genus also minimizes a genetic bias. In what follows, I explain the structure and motivations behind their selection.

Table 1. Languages of the sample per macro-area

Macro-area	Sample languages	Sum
Africa	!Xun, Bangime, Beja, Boko, Duka, Emai, Eton, Fongbe, Gaahmg, Gumuz, Hadza, Hausa, Hebrew, Ik, Iraqw, Izi, Jalkunan, Kabba, Kisi, Koyra Chiini, Lango, Lele, Lumun, Ma'di, Majang, Makary Kotoko, Mbembe, Mbodomo, N/uuki, Ngiti, Noon, Nubian, Sidaama, Somali, Supyire, Tamashek, Ts'ixa, Tommo So	38
Australia	Anindilyakwa, Arrernte, Bardi, Bininj Gun-Wok, Gaagudju, Gamilaraay, Garrwa, Gooniyandi, Gurr-Goni, Kalkatungu, Kayardild, Mangarrayi, Marrithiyel, Meryam Mir, Miriwung, Nakkara, Ngankikurungkurr, Nyangumartha, Wagiman, Wambaya, Worrorra	21
Eurasia	Abkhaz, Ainu, Armenian, Atong, Bantawa, Baoan, Basque, Bru, Bunan, Burushaski, Dargwa, Dhimal, English, Finnish, Galo, Georgian, Greek, Hungarian, Ingush, Japanese, Japhug, Kayah Monu, Kasong, Ket, Kharia, Khmer, Khwarshi, Korean, Lao, Lawa, Lezgian,	54

	Lithuanian, Malto, Mandarin, Mongsen Ao, Nuosu, Palula, Persian, Pnar, Russian, Saami, Semelai, Spanish, Tamil, Tangsa, Telugu, Tundra Nenets, Turkish, Udihe, Udmurt, Welsh, Xong, Yukaghir, Zoulei	
North America	Alacatlatzala Mixtec, Amuzgo, Ayutla Mixe, Barbareño Chumash, Cherokee, Central Alaskan Yup'ik, Chitimacha, Chontal, Cora, Creek, Crow, Cupeño, Haida, Huasteca Nahuatl, Isthmus Zapotec, Lillooet, Maricopa, Musqueam, Ottawa, Onondaga, Rama, Sahaptin, Santiago Chinantec, Slave, Southeastern Tepehuan, Teribe, Necaxa Totonac, Tzeltal, Ute, Warihio, Yaqui, Yuchi	32
Papunesia	Abau, Abui, Aghu, Amele, Awtuw, Balantak, Barupu, Batak, Begak, Bilua, Hatam, Ilocano, Inanwatan, Indonesian, Kaluli, Komnzo, Makasae, Manambu, Marind, Maybrat, Momu, Moskona, Motuna, Namia, Oksapmin, Paiwan, Puyuma, Rukai, Saaroa, Savosavo, Tagalog, Tetun, Thao, Tidore, Tina Sambal, Toqabaqita, Urim, West Coast Bajau, Wooi, Yimas	40
South America	Aguaruna, Alto Perené, Apinajé, Baure, Cavineña, Cholón, Cubeo, Epena Pedee, Garifuna, Huitoto, Hup, Iquito, Kakua, Kokama Kokamilla, Kwaza, Macushi, Mako, Mamaindé, Mapuche, Matsés, Mosetén, Movima, Paez, Paresi, Paumarí, Piro, Sanuma, Tariana, Trumai, Urarina, Yagua, Yauyos Quechua, Yurakaré	33

In the Genus-Macroarea method, constructing a sample without predetermined sample size means, at its simplest, picking one language from every genus. Based on this, I attempted to find one language from each of Dryer's genera for which the available literature gives sufficient information on the grammar of temporal clause-linking strategies expressing: (1) *when*-relations, (2) *while*-relations, (3) *after*-relations, (4) *before*-relations, and (5) *until*-relations. However, for some genera, I was not able to find any language that meets that criterion. Taking this procedure as my point of departure, I was able to find sufficient information on one language in each of exactly two hundred eighteen genera (i.e. 218 genera out of 543), which accounts for the final sample of two hundred eighteen languages. The languages of the sample are situated in different macro-areas.

The main advantage of the genus is that these genealogical groupings are cross-linguistically comparable in terms of time depth, which is not more than 3,500 to 4,000 years (Dryer 1989). This maximizes the potential variety in the sample while still enabling a rather large sample size. Furthermore, this minimizes a genetic bias (Miestamo et al. 2016: 248). Note that the usage of the word 'minimizes' is due to the following. Languages from different genera of the same family may be different with respect to the way they encode temporal adverbial clauses. However, there may be instances where they express in the same way specific types of temporal adverbial relations because they share a feature inherited from their common ancestor (Comrie 1989: 10). This is why variety sampling is not suitable for hypothesis testing but has its merits in exploratory qualitative research (Rijkhoff & Bakker 1998).

Areal stratification plays an important role in that it ensures that the number of languages in a sample are uniformly distributed over geographically independent areas. Dryer (1992) distinguishes the following macro-areas: Africa, Eurasia, Southeast Asia & Oceania,

Australia and New Guinea, North America, and South America. Based on geographical independence, Hammarström & Donohue (2014) review these macro-areas and propose a different division: Africa, Eurasia, Papunesia, Australia, North America, and South America. These areas have been adopted in the latest editions of WALS instead of Dryer's original six areas (Miestamo et al. 2016: 240). While an ideal language sample would also be areally balanced, it is difficult to come up with a sample that is both genetically and areally balanced, for the simple reason that some macro-areas have more genera than others. Furthermore, some macro-areas are better represented than others because of the availability and quality of the sources. As is shown in Table 2, Eurasia is somewhat overrepresented in comparison to the other macro-areas, i.e. Australia, North America, and South America.

Table 2. Number of genera included in the sample

Macro-area	Number of genera	Number of genera in the sample	Coverage
Africa	77	38	49.35%
Australia	43	21	48.83%
Eurasia	82	54	65.85%
North America	95	32	33.68%
Papunesia	136	40	29.41%
South America	110	33	30%
Total	543	218	40.14%

One interesting observation gleaned from Table 2 is that languages from North America are not underrepresented in comparison to other studies dedicated to the typological study of complex sentence constructions. In most typological studies of adverbial clauses, languages from this macro-area are usually underrepresented for the reason that sources usually lack detailed information on this type of complex sentence construction (Hetterle 2015: 58; Schmidtke-Bode 2009: 22). However, it has been possible to fill this gap thanks to the knowledge of various experts on languages from this area (e.g. Marianne Mithun, Daniel Hieber, Zarina Estrada-Fernández, Jane Hill, Donna B. Gerdts). Note that Papunesia is the least well represented area with 29.41% of its genera covered in the sample. This stems from the fact that while many sources provide detailed descriptions of temporal clause-linking strategies expressing *while*-relations and *after*-relations, they do not offer any description of the other temporal adverbial clauses that this study explores. I did not attempt to take additional steps to improve areal balance, e.g. by omitting genera from macro-areas that contain more genera, given that this would disrupt the genetic balance of the sample and increase the probability that I would accidentally miss construction types that are attested but cross-linguistically rare.

Overall, then, the sample of the present study aims at broad genetic and geographical coverage of the world's languages. Its basic classificatory principle is that of genetic independence, but as was shown above, two or more languages from different genera of the same family may be taken into account. The sample is thus quite well-suited to exploring cross-linguistic variation in the encoding of temporal adverbial clauses. Furthermore, given that my dissertation sources tend to employ discourse data and show how social and communicative processes operate in a range of contexts, the database will provide a glimpse of what speakers have used spontaneously.

Throughout my dissertation, I use maps to visualize the data and corresponding analyses. These maps include a data-point for each language of the sample, and show how languages are categorized according to a particular feature. They are more exhaustive than the survey maps, and as such they can also be used for investigating areal and genetic patterns. All maps in this dissertation have been created with the Interactive Reference Tool accompanying WALS.

Before I leave the present chapter, mention should be made of the following. In order to enhance the quality of the data, different types of comparative material have been taken into account, in particular etymological dictionaries and book-length overviews of linguistic areas (e.g. Mithun 1999 on North American languages, Foley 1986 on Papuan languages, Dixon 2002 on Australia, Heine & Nurse 2008 on African languages). Furthermore, native speakers and linguistic fieldworkers on the respective languages have also been consulted: (1) to confirm certain analyses of the data and/or discuss alternative analyses (e.g. morphological make-up of linking strategy and mono/polyfunctionality) and (2) to corroborate possible directions of spread of a trait. By and large, this method of data collection has been described as the 'grammar-cum-dictionary method' (Kortmann 1997: 53), i.e. the basic information on temporal clause-linking devices has been collected from available descriptive grammars and dictionaries, and corrected and/or modified by native speakers and linguistic fieldworkers.

Having introduced the theoretical background, the empirical foundation, and the essential methodological procedures of the present study, I can now proceed to exploring, in the following chapters, the range of clause-linking strategies by which *when*-relations, *while*-relations, *after*-relations, *before*-relations, and *until*-relations tend to be expressed.

CHAPTER 3

When-clauses

When-clauses are not specific, in that the exact extent of the temporal meaning is unspecified and subject to variation (Cristofaro 2012; Diessel 2008: 470; Guerrero 2021; Hetterle 2015: 47). They can convey any reference time (i.e. before, after, and around the time of the figure clause) and can also convey any time interval (e.g. short or long). However, the reference time and the time interval can only be recovered from the discourse context (Cristofaro 2003: 159). In this chapter, I explore the range of clause-linking strategies by which *when*-clauses are encoded in the sample and discuss whether *when*-relations tend to be expressed by strategies without restricted devices or by restricted devices. Recall the notion 'restricted' is employed in this dissertation as a cover term to talk about various types of formal devices (see §1.4.1). I begin below by addressing the range of strategies without restricted devices attested in the database along with their frequency (§3.1). Then, I present the various subtypes of restricted devices, to which I devote more space since these are most common in the sample (§3.2). For the different subtypes of restricted devices, I discuss whether they tend to be monofunctional or polyfunctional. Various rare strategies found in the database are also briefly discussed (§3.3). Finally, it is shown that many languages of the sample have more than one primary restricted device for expressing 'when'. A brief discussion of the factors that may lead speakers to choose one primary strategy over the other is introduced (§3.4). A summary of the chapter as a whole is also provided (§3.5). In this chapter and the following chapters dedicated to the study of *while*-clauses (Chapter 4), *after*-clauses (Chapter 5), *before*-clauses (Chapter 6), and *until*-clauses (Chapter 7), I do not discuss the range of ways in which clause-linking strategies have been operationalized and the policies adopted to explore the mono/polyfunctionality of

clause-linking devices in the present study. The reader is referred to Chapter 1. Another aspect of restricted devices to bear in mind is the following. When I mention that a device is polyfunctional, I do not show the range of meanings within the domain of adverbial clauses that a particular device can have. The reader is referred to Chapter 9 for more information related to the polyfunctionality of restricted devices.

3.1 Strategies without restricted devices

Of the three types of semantically non-specific types of clause-linkage introduced in Chapter 1, asyndesis is the only one attested in the expression of 'when' in the languages of the sample. It is likely that most languages of the world can combine clauses by asyndetic constructions (Noonan & Bavin 1981: 45). However, it is not common that this strategy becomes the primary one for expressing adverbial relations (e.g. 'when', 'because', etc.). In the sample, only a few languages convey 'when' by asyndesis as a primary strategy (4/218=1.83%). This is in line with other cross-linguistic studies that have shown that the expression of 'when' by asyndesis as a primary strategy is not frequent (e.g. Guerrero 2021). Interestingly, it is only attested in Australian languages in the database. In the Gurr-Goni example in (115), there is a lack of any formal markers linking the clauses. In this example, the *when*-relation is recovered from the discourse context. In a similar fashion, in the Wambaya example in (116), there is no explicit marking of the *when*-relation. In this construction, the *when*-relation is also recovered from the discourse context.

Gurr-Goni (Mangrida/Burarran)

(115) *njiwurr-warpurr*, *njiwurr-ni-ø* *Nangak* *njiwurr-yu-y*.
1PL.SBJ-little 1PL.SBJ-be-REAL Nangak 1PL.SBJ-stay-REAL
'When we were little, we stayed at Nangak.' (Green 1995: 306)

Wambaya (Mirndi/Wambayan)

(116) *yarru* *g-amany* *irda* *g-a* *anki* *mirra.*
go 3SG.SBJ-PST father.NOM 3SG-PST alive.NOM sit
'He came when my father was alive.' (Nordlinger 1993: 218)

The remaining cases of asyndesis are found in Marrithiyel (Green 1989: 356) and Wagiman (Cook 1987: 305).[12] Note that asyndesis may be the primary strategy for other types of adverbial relations in Australian languages, such as counterfactual conditionals (e.g. 'If I had seen him, I would have told him'; Olguín Martínez & Lester 2021). As is shown in other chapters of this dissertation, various Australian languages also employ asyndesis as a primary strategy for other semantic relations (e.g. Chapter 5).

Asyndetic constructions with 'when' inferences are also attested in Africa; in particular many Chadic languages have this strategy as a primary one (Frajzyngier 1996: 42). In the present study, however, there are no African languages that employ asyndesis as the primary strategy for conveying 'when'.

[12] As is mentioned by McGregor (1988: 38, 1994: 35), the attention of Australianists has tended to focus on complex sentences in which clauses are related by restricted devices. However, in many Australian languages, asyndesis is by far the most frequent strategy used for conveying various types of temporal adverbial relations.

3.2 Restricted devices

Unlike the picture described in §3.1, languages tend to employ many and diverse restricted devices in the expression of 'when'. In view of this cross-linguistic diversity, my primary focus in this section is to provide a detailed description of the range of restricted devices attested in the sample along with their frequency. For the purposes of the present study, they have been organized into four types: restricted adverbial subordinators, restricted deranking devices, and temporal nouns. Furthermore, I discuss some less common strategies attested in the present study (e.g. demonstratives). Before I proceed, one remark on monofunctional and polyfunctional restricted devices is in order here. It has often been claimed that restricted devices encoding *when*-clauses are always polyfunctional in the languages of the world (Guerrero 2021). This stems from the fact that *when*-clauses do not have a basic temporal meaning. Accordingly, they can refer to 'any time'. However, although it is likely that any adverbial meaning may be inferred from constructions encoded by *when*-devices, it is important to distinguish pragmatic inferences not (yet) conventionalized from conventionalized implicatures. For instance, in Begak (Austronesian/North Borneo), various meanings can be inferred from constructions encoded by the free adverbial subordinator *kidon* 'when' (e.g. 'after') (Goudswaard 2005: 373). However, these meanings arise due to pragmatic inferences and are not (yet) conventionalized. Therefore, this device is considered monofunctional in the present study. On the other hand, in Huasteca Nahuatl (Uto-Aztecan/Aztecan), the free adverbial subordinator *kemah* 'when' is polyfunctional in that it can be used for expressing 'before', 'after', and 'while' (Olguín Martínez & Estrada Fernández 2019). This polyfunctional pattern is due to implicatures that have been conventionalized.

Accordingly, the Huasteca Nahuatl free adverbial subordinator *kemah* 'when' is considered polyfunctional in this research.

3.2.1 Restricted adverbial subordinators

Restricted adverbial subordinators are one of the most common strategies found in the database of the present study. Of the two hundred eighteen languages of the sample, one hundred eleven languages have restricted adverbial subordinators expressing 'when' (111/218=50.91%). These devices may be free subordinating items (90/111=81.08%), as is illustrated in the Abau example in (117), where the *when*-clause is marked by the free adverbial subordinator *menkin* 'when'. There are languages in which restricted adverbial subordinators may be bound morphemes (21/111=18.92%), as can be seen in the Noon example in (118), where the *when*-relation is indicated by the bound adverbial subordinator *-aa*. Bound adverbial subordinators tend to be enclitics or suffixes, as is mentioned below, but proclitics and adverbial prefixes are also occasionally attested in the sample.[13]

Abau (Sepik/Upper Sepik)

(117)	*uwr-sa*	*hom*	*yoh*	*so-m-e*	*la*	***menkin***,
	man-woman	3PL.SBJ	banana	DEM-PL-OBJ	eat	when

'When the people ate those bananas,

[13] It has been shown that the distinction between clitics and affixes is difficult (Haspelmath 2011). Interestingly, the authors of the sources consulted for the present study usually explain whether a bound adverbial subordinator is more clitic-like or more affix-like based on specific criteria (e.g. consistent position within a morphological construction and uninterruptability, etc; see Bickel & Nichols 2007 and Himmelmann 2014). Accordingly, when it comes to these notions, I repeat the labels adopted by the authors of grammars of particular languages.

hom-kwe *sawk* *won* *non* *là*.

3PL.SBJ-TOP CHD grease COMIT eat.PFV

they ate them with appetite.' (Lock 2011: 366)

Noon (Atlantic-Congo/Cangin)

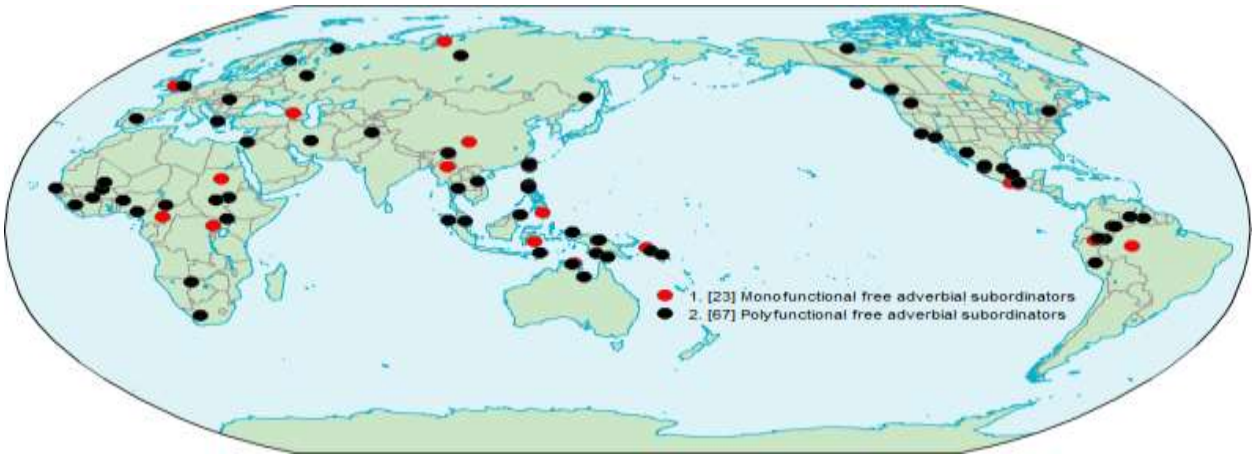
(118) *fu* *hay-**aa***, *ɗù* *yah.*

2SG.SBJ come-when 1PL.SBJ.INCL go

'When you come, we will leave.' (Soukka 2000: 224)

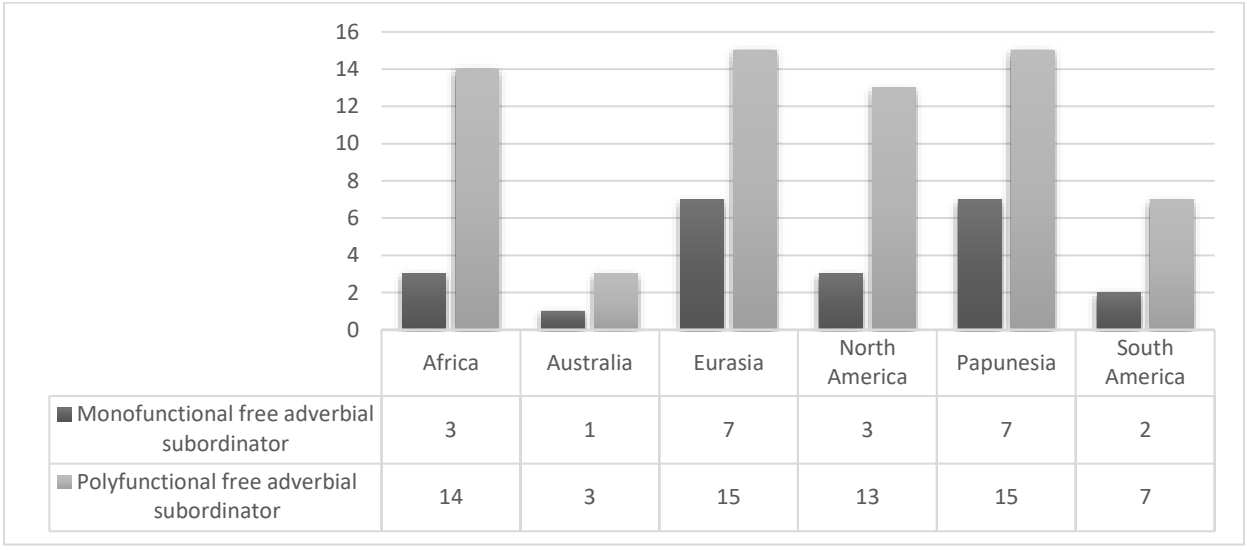
As is shown in Map 1, of the ninety languages of the sample that use free adverbial subordinators as a primary strategy for encoding *when*-clauses, twenty-three languages have monofunctional free adverbial subordinators (23/90=25.55%), and sixty-seven languages have polyfunctional free adverbial subordinators (67/90=74.45%). This indicates that polyfunctional free adverbial subordinators are more common than monofunctional free adverbial subordinators.

Map 1. Free adverbial subordinators encoding *when*-clauses



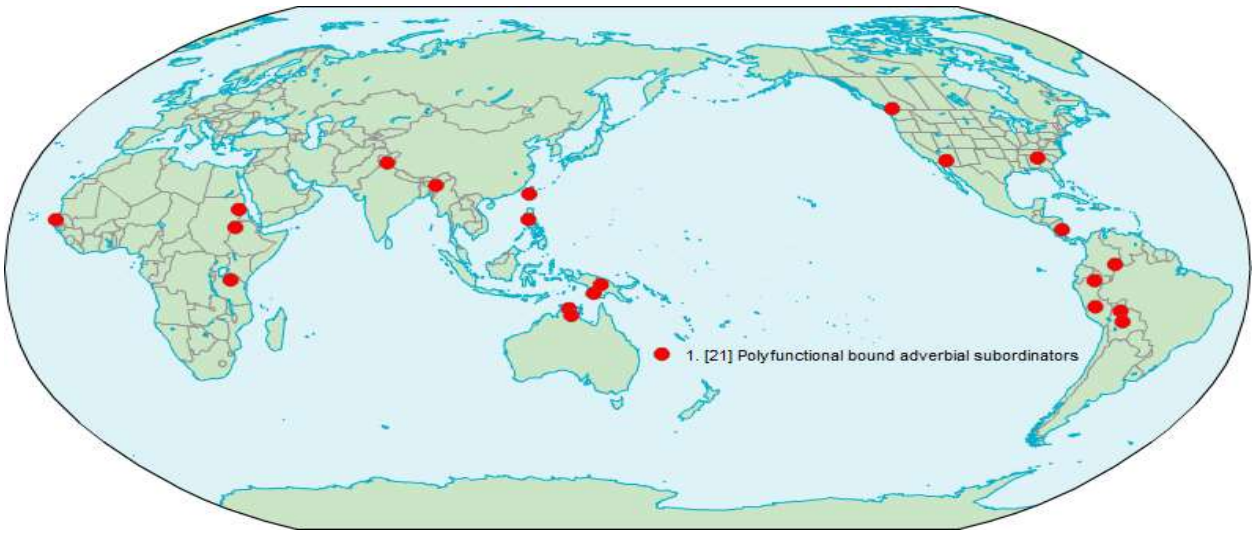
Map 1 hints at the importance of geography as a factor influencing structural distributions. As is shown in Figure 2, monofunctional free adverbial subordinators seem to be more common in Eurasia and Papunesia while polyfunctional free adverbial subordinators seem to be more frequent in Africa, Eurasia, North America, and Papunesia.

Figure 2. Free adverbial subordinators encoding *when*-clauses per macro-area



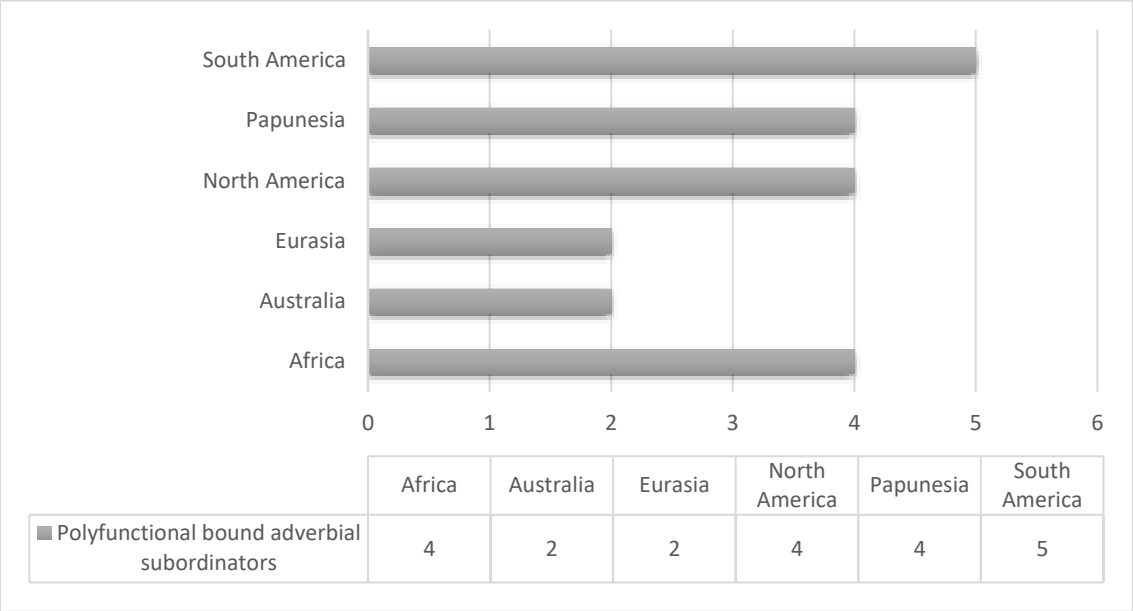
	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional free adverbial subordinator	3	1	7	3	7	2
Polyfunctional free adverbial subordinator	14	3	15	13	15	7

Map 2. Bound adverbial subordinators encoding *when*-clauses



Polyfunctional bound adverbial subordinators are attested in all macro-areas showing few effects of genetic or areal grouping, as is shown in Map 2 and Figure 3. Unlike free adverbial subordinators which may be monofunctional or polyfunctional, all bound adverbial subordinators are polyfunctional in the sample.

Figure 3. Bound adverbial subordinators encoding *when*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Polyfunctional bound adverbial subordinators	4	2	2	4	4	5

Of the bound adverbial subordinators attested in the sample, most tend to be suffixes (13/21=61.90%), as in the Rama example in (119), where the *when*-clause is marked by the verbal suffix *-ka* 'when'. This is in line with various cross-linguistic studies that have shown that bound adverbial subordinators tend to be suffixes (e.g. Dryer 2013b). Dryer (2013b) explains that this tendency may be due to the fact that there is a general suffixing preference in inflectional morphology. However, it has recently been shown that there are languages that encode adverbial clauses by adverbial subordinators that are prefixes (e.g. Coptic, Japhug

Rgyalrong, and Cree; Dryer 2021; Grossman et al. 2018: 514;), as is shown in the Gumuz example in (120), that appears with the verbal prefix *éé-* 'when'.

Rama (Chibchan/Rama)

(119) *pulkat* *mah-**ka**,* *an-aapaik-i.*
breeze NEG-when 3PL.SBJ-paddle-TNS
'When there is no breeze, they paddle.' (Craig 1990: 212)

Gumuz (Gumuz)

(120) ***éé**-ba-á-aʃ-ágá* *zibá* *zenzên,*
when-AFF-3SG.INTR-blow-NON.FUT wind fast
'When the wind blew hard,

baha *b-a-fú-ka-gá-ts* *ɓaga-má* *ka=aŋwa.*
person AFF-3SG.TRANS-wrap-INSTR-NON.FUT-CL body-3SG.POSS INSTR=clothes
the person wrapped his body with clothes.' (Ahland 2012: 435)

In spite of the fact that most languages of the sample tend to employ adverbial subordinators that are suffixes, 8 languages (8/21=38.10%), spoken in different areas of the world, have bound adverbial subordinators that are prefixes. A closer analysis reveals that these devices are attested for the most part in Africa, North America, and Papunesia.

First, adverbial subordinator prefixes seem to be attested in African languages, in particular in Hadza (Kirk Miller, personal communication), Gumuz (Ahland 2012: 432), and

Eastern Nilotic languages. With respect to Eastern Nilotic languages, most of them tend to convey 'when' by subordinating prefixes, as in (121). This strategy is also attested in Turkana (Dimmendaal 1983: 392), Ateso (Barasa 2017: 257), Asimjeeg Datooga (Griscom 2019: 249),[14] and Anywa (Reh 1996: 411), among others.

Lopit (Eastern Nilotic)

(121) *á-cá* *náŋ* *bì* ***l**-ó-lót-ù* *xàbò.*
1SG-dance.IPFV 1SG.NOM indeed when-3SG-come-VEN chief.NOM
'I was dancing when the chief arrived.' (Moodie & Billington 2020: 323)

Subordinating prefixes used in the expression of 'when' are also found in languages spoken in North America. They are attested in Algonquian languages (e.g. Arapaho; Cowell & Moss 2008: 386), Salishan languages (e.g. Musqueam; Suttles 2004: 93),[15] Iroquoian languages (e.g. Oneida; Abbott 2006: 114; Seneca; Chafe 2015: 50),[16] Kalapuyan languages (e.g. Santiam Kalapuya; Banks 2007: 15), Caddoan languages (e.g. Caddo; Melnar 2004: 81; Chafe 2018), and Yuman languages (e.g. Maricopa; Gordon 1986: 266; Jamul Tiipay; Miller 2001: 250). Before I proceed, one remark on Algonquian temporal adverbial clauses is in order here. Temporal adverbial clauses, and other types of adverbial clauses, tend to be encoded in Algonquian languages by subordinating prefixes and conjunct order (Dahlstrom to appear;

[14] Examples of adverbial subordinator prefixes in other varieties of Datooga are available in some of the literature, although the constructions have never been explicitly described (Griscom 2019: 250).
[15] Salishan languages tend to express 'when' by means of the nominalizing prefix *s-*. Constructions encoded by this verbal prefix are known as "propositional nominalizations" (Kroeber 1999: 135).
[16] Lake Iroquoian languages have a verbal prefix **tsh-* called the "coincident" (Chafe 2015: 50) that can be reconstructed back to Proto-Lake Iroquoian (Marianne Mithun, personal communication). This verbal prefix can be used for conveying 'when' and can also be used for encoding constructions, such as 'we two are the same height'. Lake Iroquoian languages belong to the Northern Iroquoian branch and include languages like Seneca, Cayuga, Onondaga, and Mohawk, among others.

Mithun 1999: 266; Mithun 2008c: 101; Stassen 2009: 510). The conjunct order is a verbal order that appears in subordinate clauses (Campana 1996; Brittain 1997; Drapeau 2014; Wolfart 1973;). However, it has been noted that when one examines unscripted connected speech, conjunct order is not restricted to syntactically subordinate clauses in the strict sense and may also appear in main clauses (Buszard-Welcher 2003; Mithun 2008c: 101; Starks 1994). The conjunct order is a verbal order that has its own specialized person marking system and its own negation morphosyntax (Valentine 2009: 197). This order contrasts with the independent order and imperative orders. Roughly, the independent order is used with verbs in main clauses and the imperative order is used with commands. These orders also have their own inflectional templates and their own negation morphosyntax (Valentine 2009: 197). Temporal adverbial clauses marked by subordinating prefixes and the conjunct order may also show 'changed conjuncts'. This is a morphological process which mutates the first vowel of the initial morpheme in the ground predicate (Clarke et al. 1993; Mithun 1999: 266). Accordingly, if the first vowel is /ii/, it mutates to /aa/, if it is /a/ or /i/, it mutates to /e/, and so on (Valentine 2009: 266). In the Ottawa example in (122), the ground clause is marked *eni-*. This form is a changed conjunct in that its first vowel has mutated from /i/ to /e/ (unmutated form *ini-*). Furthermore, both the ground clause and the figure clause show conjunct order forms in that they appear with specialized person markers (i.e. *-ann* in the ground clause and *-ag* in the figure clause).

Ottawa (Algic/Algonquian)

(122) ***eni***-*dgoshn*-***aan*** *dash* *besho,* *mii* *gii-gnoon*-***ag***.

there.CHANG.CNJ-arrive-1SG.CNJ then near then PST-speak-1SG.3SG.CNJ

'When I got near her, I spoke to her.' (Valentine 2009: 204)

James Andrew Cowell (personal communication) informs me that in many Algonquian languages 'when' may also be expressed by a construction in which the ground clause only shows conjunct order and appears with a subjunctive, as in the Innu example in (123).[17]

Innu (Algic/Algonquian)

(123) *tipiškâ*-***t-i***, *ni-ka=natwâpatê-n* *nê* *tâwapêkaykan*.

be.night-3SG.CNJ-SUBJ 1SG-FUT=go.get-1SG.INDEP DEM violin

'When the night comes, I will go get the violin.' (Drapeau & Lambert-Brétière 2012: 200)

Adverbial subordinator prefixes that convey 'when' are also attested in Austronesian languages (cf. Stassen 2009: 395). In particular, they are found in Greater Central Philippine languages (e.g. Tagalog; Schachter & Otanes 1972: 445; Cebuano; Tanangkingsing 2009: 92), Sangiric languages (e.g. Toratán; Himmelmann & Wolff 1999: 71), and Celebic languages (e.g. Muna; van den Berg 1989: 250; Tukang Besi; Donohue 1999: 412).[18]

[17] Another construction used in the expression of 'when' in many Algonquian consists of an iterative suffix and conjunct order. Note that in this construction the ground clause may be a changed conjunct (e.g. Arapaho; Cowell & Moss 2008: 90).

[18] Bound morphemes in Austronesian include prefixes as well as suffixes; however, of the two, prefixes are more common, which is an unusual typological trait (Jonsson 2012: 59).

Adverbial subordinator suffixes and prefixes encoding *when*-clauses are polyfunctional, as was mentioned above. This seems to indicate that if a language employs a bound adverbial subordinator for expressing 'when', it tends to be polyfunctional irrespective of whether it is a prefix or suffix.

Before I proceed, one remark on free and bound adverbial subordinators is in order here. Two languages of the sample have adverbial subordinators that must appear with a universal quantifier meaning 'all'. Tommo So, a Dogon language spoken in Mali, employs the bound adverbial subordinator *=yo* accompanied by *kèm* 'all' for conveying 'when' and also 'if' (McPherson 2013: 435). Another language spoken in this area also encodes *when*-clauses and *if*-clauses by a similar pattern. In Koyra Chiini, a Songhay language spoken in Mali, the free adverbial subordinator *nda* and the universal quantifier *kul* 'all' are used in the expression of 'when' and 'if' (Heath 1999a: 264). Given that this pattern is rare and is only attested is languages spoken in the same area, language contact may have played a role here.

3.2.2 Restricted deranking devices

Restricted deranking devices are another strategy that is frequent in the database of the present study. In the Sidaama example in (124), the ground clause is marked by the verb form *-wote* 'when'. This is a deranking device that does not appear in independent declarative clauses and marks the ground clause for its semantic relationship to the figure clause.

Sidaama (Afro-Asiatic/Highland East Cushitic)

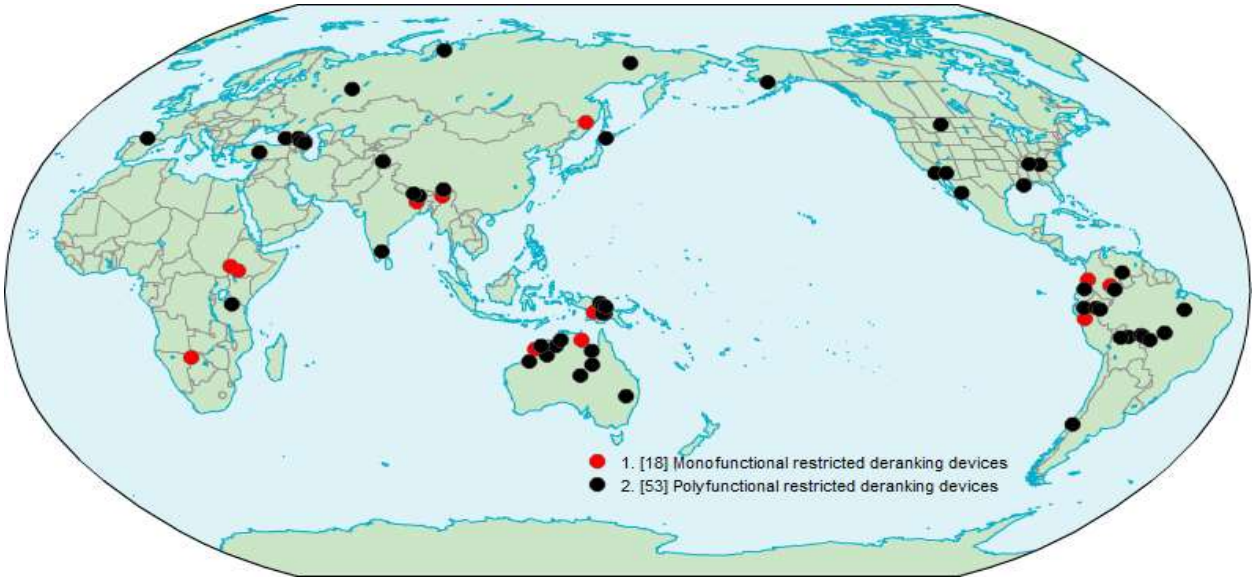
(124) *faršó* *ag-ø-anno-**wote***, *dimb-ø-anno*.

farsho drink-3SG.SBJ.M-IPFV-when get.drunk-3SG.SBJ.M-IPFV

'When he drinks farsho (local beer), he gets drunk.' (Kawachi 2007: 448)

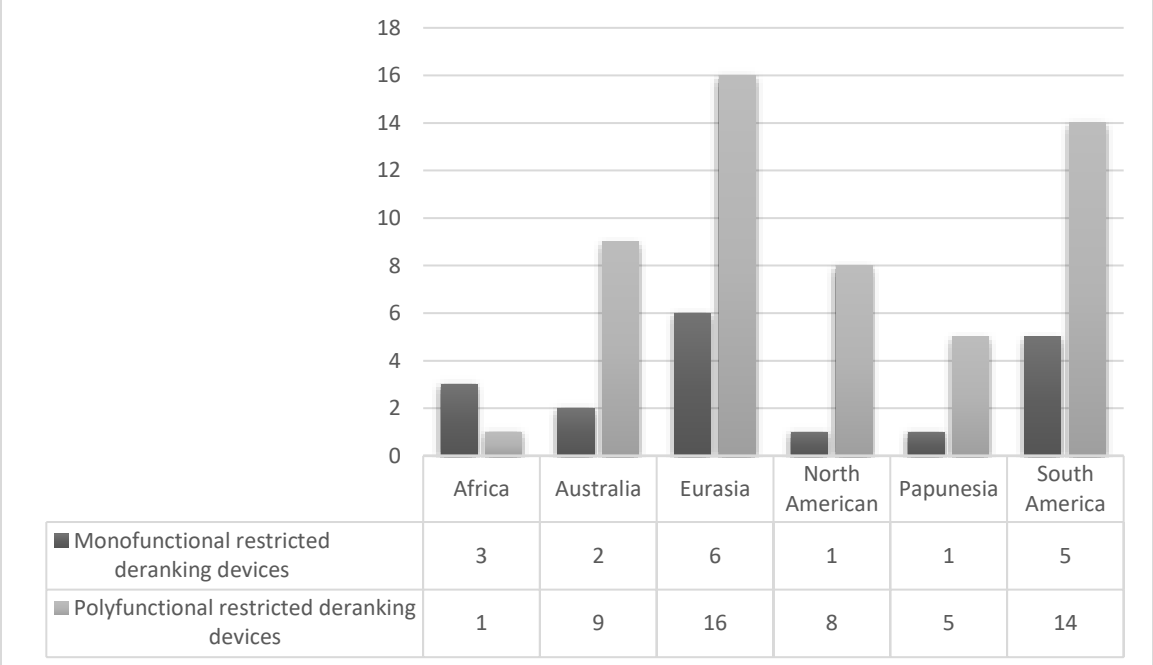
Seventy-one languages have restricted deranking devices that convey 'when' (71/218=32.56%). As is shown in Map 3, eighteen languages have monofunctional restricted deranking devices that encode *when*-clauses (18/71=25.35%) and fifty-three languages have polyfunctional restricted deranking that express *when*-relations (53/71=74.65%). This indicates that polyfunctional restricted deranking devices are more frequent than monofunctional restricted deranking devices in the sample. Restricted deranking devices have been given several different names in various linguistic traditions.

Map 3. Restricted deranking devices encoding *when*-clauses



There are several observations to be gleaned from Figure 4. First, monofunctional restricted deranking devices are attested in all macro-areas. Second, polyfunctional restricted deranking devices are found in all macro-areas, but Figure 4 suggests that there are certain geographical skewings. The most evident asymmetry can be detected between Africa, with scarce occurrences of polyfunctional restricted deranking devices, and Eurasia, South America, and Australia (cf. Blake 1993; Dench 2006; Stassen 2009: 407), which are host to the majority of these devices in the sample. Regarding Eurasia, polyfunctional restricted deranking devices expressing 'when' seem to be frequent in Nakh-Daghestanian languages (e.g. Lezgian, Khwarshi, Icari Dargwa, Ingush; cf. Comrie et al. 2012; cf. Creissels 2010).

Figure 4. Restricted deranking devices encoding *when*-clauses per macro-area



	Africa	Australia	Eurasia	North American	Papunesia	South America
Monofunctional restricted deranking devices	3	2	6	1	1	5
Polyfunctional restricted deranking devices	1	9	16	8	5	14

Another important aspect of restricted deranking devices is the following. As is shown in Figure 4, restricted deranking devices are not frequent in the encoding of *when*-clauses in

the African languages of the sample (cf. Amha & Dimmendaal 2006). However, it has been noted that Eastern and Southern Bantu languages have an intriguing restricted deranking device called the "situative tense marker."[19] The situative is a term that has been used in Bantu linguistics at least since Doke (1935). This is a specialized verb form that appears in the pre-initial slot of the verbal predicate of the ground clause (; Guerois 2019: 754; Schadeberg & Mucanheia 2000; Stassen 2009: 427), as in the Makhuwa example in (125).

Makhuwa (Atlantic-Congo/Bantu)

(125)	*nikhwáttá*	***na**-khalá*	*nikíthi,*	*o-hááná*	*o-loól-áka.*
	5.wound	SIT-stay	5.unripe	2SG.SBJ-have	2SG.SBJ-treat-DUR

'When the wound is fresh, you have to treat it.' (Van der Wal 2014: 51)

Situatives are part of the verbal conjugational system of many Eastern and Southern Bantu languages and do not have an independent time reference, but express the relative temporal relation with respect to the time of the situation in the figure clause instead (Van der Wal 2014: 51). Situative markers occur in ground clauses, denoting a 'when' relation (Nurse 2008: 123). But apart from 'when', this strategy may also be associated with other adverbial domains in various Eastern and Southern Bantu languages, such as 'if' (Guérois 2017), 'after' (Van der Wal 2014: 52), and 'while' (Wilhelmsen 2019: 676). Situatives appear to be a local innovation in the Savanna languages from eastern Democratic Republic of the Congo, Uganda, and Kenya down to South Africa, and not attributable to Proto-Bantu (Nurse 2008: 248).

[19] The situative tense marker found across Eastern and Southern Bantu languages has the same segmental shape as the persistive tense, a.k.a. "still-tense". Nurse (2008: 148) mentions that reliable tonal data for this *ki-* are too few to permit any comprehensive tonal statement but it appears to be tonally different from the persistive.

It may be worth noting that Bantu languages have another type of verbal form used for expressing 'when' not found in the sample of the present study. This verbal form is known as the "subjunctive" (cf. Stassen 2009: 424).[20] The subjunctive tends to be formed by the final vowel *-e* and is inherently tenseless in that the other TAM slots of the predicate of the ground clause remain empty. This means that the context or the predicate of the figure clause indicates the tense value (Guérois 2015: 386). The subjunctive is widespread in Bantu and has been reconstructed for Proto-Bantu (Nurse & Devos 2019: 224). This deranking device denotes not only 'when', but also other meanings in specific contexts, such as conditional meanings (Nurse & Devos 2019: 225), purpose meanings (Guérois 2015: 386; Jumwa Ngowa & Ngonyani 2020: 108), and other more factual adverbial meanings, e.g. 'after' (Carlson 1994; Nurse & Devos 2019: 226). There is no room to present each of the above cases individually here; readers specifically interested in this issue are referred to the references mentioned before.

Although not specified in Map 3 and Figure 4, various types of case markers play a role in the expression of 'when'. Case markers used adverbially are considered converbs (cf. Hetterle 2015: 91). Case markers are usually considered a nominal category indicating the function of a noun phrase in a clause. However, it has been shown that case markers may also appear on verbal forms expressing 'when' and other adverbial relations between clauses (e.g. Aikhenvald 2008; Mithun 1999: 264). In particular, oblique cases tend to be used as clause-linking devices (e.g. locative case markers, comitative case markers; Dixon 2009: 13; Stassen 2009: 277; van Gijn 2019: 201). In the Epena Pedee example in (126), the locative case marker *-de* marks the ground clause for its semantic relationship to the figure clause.

[20] This form occurs not only in complex sentence constructions, but also in monoclausal constructions (e.g. imperatives; Nurse & Devos 2019: 224). However, it is not clear whether it is in origin a subordinate category which acquired independent uses through 'insubordination' (Nurse & Devos 2019: 224).

Epena Pedee (Choco)

(126) *tu-dú* *hĩ* *baai-da-rú-**de**,* *bɨirɨ* *kʰõra-da-čí.*
ground-down jump fall-COMPL-PRS-LOC foot strike-COMPL-PST
'When he jumped to the ground, he struck his leg.' (Harms 1994: 151)

In the languages of the sample, various oblique case markers can be used with a 'when' function. The most common oblique case markers are locative case markers (6/71=8.45%), as in the Anindilyakwa example in (127). This is not surprising given the close connection between space and time in human languages (see Haspelmath 1997). In total, there are four languages that have locative case markers that are monofunctional (4/6=66.66%) and two languages that have locative case markers that are polyfunctional (2/6=33.33%).

Anindilyakwa (Gunwinyguan)

(127) *winalhakina* *nanarrikayini-**mwantja**,* *aningwa* *nalhawirrathinimwa.*
3PL.SBJ.DU.M 3PL.SBJ.DU.M.throw-LOC spear return
'When they threw the spear, it was returning.' (Leeding 1991: 490)

Locative case markers used in the function sketched before are common in languages spoken in Australia and South America. With respect to Australian languages, the fact that speakers of these languages may use locative case markers for expressing 'when' has not gone unnoticed and echoes Blake (1993: 47), who has shown that this type of oblique case marker used adverbially is common in Australian languages (e.g. Wanyi, Alayawarra, Pitta-Pitta, Margany). Regarding languages of South America, van Gijn (2019) notes that locative case

markers may be used as a linkage device for evoking 'when' in many languages spoken in this macro-area (e.g. Embera). Note that there seem not to be African languages in the sample that use locative markers as *when*-devices. However, Jakobi & El-Guzuuli (2016: 162) show that this pattern is attested in various Saharan languages (e.g. Kanuri, Andaandi).[21]

Other oblique case markers that can be used with a 'when' function are ablative case markers and comitative case markers. Each of these oblique case markers is dealt with in turn. First, ablative case markers as *when*-devices only occur in two Australian languages in the present study (Nyangumarta; Sharp 2004: 379; Ngankikurungkurr; Hoddinott & Kofod 1988: 77). These devices are polyfunctional. Second, comitative case markers as *when*-devices are only attested in languages spoken in Papua New Guinea in the database of the present study (Momu; Honeyman 2016: 498; Awtuw; Feldman 1986: 166). These devices are also polyfunctional.[22]

3.2.3 Temporal nouns

When-clauses that appear with temporal nouns are common in the sample (81/218=37.15%). Formally, these constructions are similar to relative clauses, but functionally they are largely equivalent to temporal adverbial clauses. They can be considered constructions that are not (yet) fully grammaticalized (i.e. constructions that are still closely related to relative clauses). Such temporal clauses literally translate as 'at the time…' or 'the instant…' and are mostly attested in Africa, Eurasia, and Papunesia in the sample. In Africa, they are found for the most part in Atlantic-Congo languages (e.g. Eton, Emai, Mbodomo, Kisi, Noon, Supyire), Afro-

[21] Jakobi & El-Guzuuli (2016: 162) mention that it is more common to find dative case markers encoding purpose clauses in Saharan languages.
[22] Van Gijn (2019) mentions that comitative case markers denoting 'when' are attested in various South American languages (e.g. Yaminahua).

Asiatic languages (e.g. Lele, Beja, Somali, Hausa), and Dogon languages (e.g. Tommo So).[23] In Eurasia, this construction is attested for the most part in Nakh-Daghestanian languages (e.g. Lezgian), Sino-Tibetan languages (e.g. Atong, Nuosu, Bunan), and Austro-Asiatic languages (e.g. Khmer, Kharia).[24] In Papunesia, *when*-clauses encoded by a temporal noun are pervasive in Austronesian languages (e.g. West Coast Bajau, Balantak),[25] Timor-Alor-Pantar languages (e.g. Makasae), and West Papuan languages (e.g. Tidore).

This construction has been referred to in various ways (e.g. "temporal relative clause"; Lichtenberk 2008: 1173; Stassen 2009: 448). In the present study, I refer to these constructions as 'attributive temporal clauses' (Olguín Martínez 2020). The advantage of using this term is that it has enabled me to take into account relative clauses, as in (128), and general noun-modifying clause constructions, that is, a single construction that covers all or a significant part of the noun-modifying clause construction range of a language (Matsumoto et al. 2017: 6). Japanese is a language that has a general noun-modifying clause construction encoded by *toki* 'time' that conveys 'when', as (129).

Fongbe (Atlantic-Congo/Kwa)

(128)	***hwènù***	*ɖé-è*	*à*	*xá*	*átín*	*jí*	*ɔ́,*
	time	OP-RES	2SG.SBJ	climb	tree	on	DEF

'At the time you climbed up the tree,

[23] This construction is also found in Songhay languages (e.g. Koyra Chiini), Nilotic languages (e.g. Lango), and Mande languages (e.g. Jalkunan).
[24] Attributive temporal clauses can also be found in Dravidian languages (e.g. Tamil), Hmong-Mien languages (e.g. Xong), and Tai-Kadai languages (e.g. Lao). Stassen (2009: 448) notes that this construction is common in Southeast Asian languages (e.g. Austro-Asiatic languages, Tai-Kadai languages, Hmong-Mien languages).
[25] Generic temporal nouns are very common in Oceanic languages. They are found in languages spoken in Vanuatu (François 2010), in New Caledonia (Isabelle Bril, personal communication), and in the Solomon Islands (Hill 2011: 274; Keesing 1985: 215).

ùn *mɔ̀* *wè*.

1SG.SBJ see 2SG.OBJ

I saw you.' (Lefebvre & Brousseau 2002: 170)

Japanese (Japonic)

(129) *Hiroshi-ga* *hon-o* *yonde-i-ta* ***toki***,

Hiroshi-NOM book-ACC read-ASP-PST time

'At the time Hiroshi was reading a book,

Yumi-ga *me-o* *samashi-ta*.

Yimi-NOM eye-ACC wake.up-PST

Yumi woke up.' (Oshima 2011: 5)

Recall that temporal nouns that appear in attributive temporal clauses may be generic, as in (130), where the ground clause appears with the generic temporal noun ***wàgàtù***^{L} 'time'.

Ben Tey (Dogon)

(130) *ɔ̂:-m* ***wàgàtù***^{L} *yé-m̀* *kú* ***ɲây***^{ⁿ},

chief-ANIM.SG time come.IPFV-PTCP.INAN DEF with

'At the time the chief was coming,

ɔ̀r ᵐ́ɔ́: *bírɛ́* *bírɛ́-m̀=bɛ̀-ỳ.*

field work work-IPFV=PST-1SG.SBJ

I was working in the fields.' (Heath 2015a: 243)

The temporal noun may also be non-generic, as in (131), where the temporal noun *ìsòkpísòkpá* 'moment' is semantically specific and is used for marking the *when*-relation holding between clauses.

Emai (Atlantic-Congo/Edoid)

(131) ***ìsòkpísòkpá*** *lí* *ó̱* *rɛ̱́* ˈ *míɛ̱́* *Òhí,*

moment REL 3SG.SBJ PST.PERF.take see Ohi

'The moment she saw Ohi,

ó̱ *ó* ˈ *vbì* *ìwè.*

3SG.SBJ PST.PERF.enter LOC house

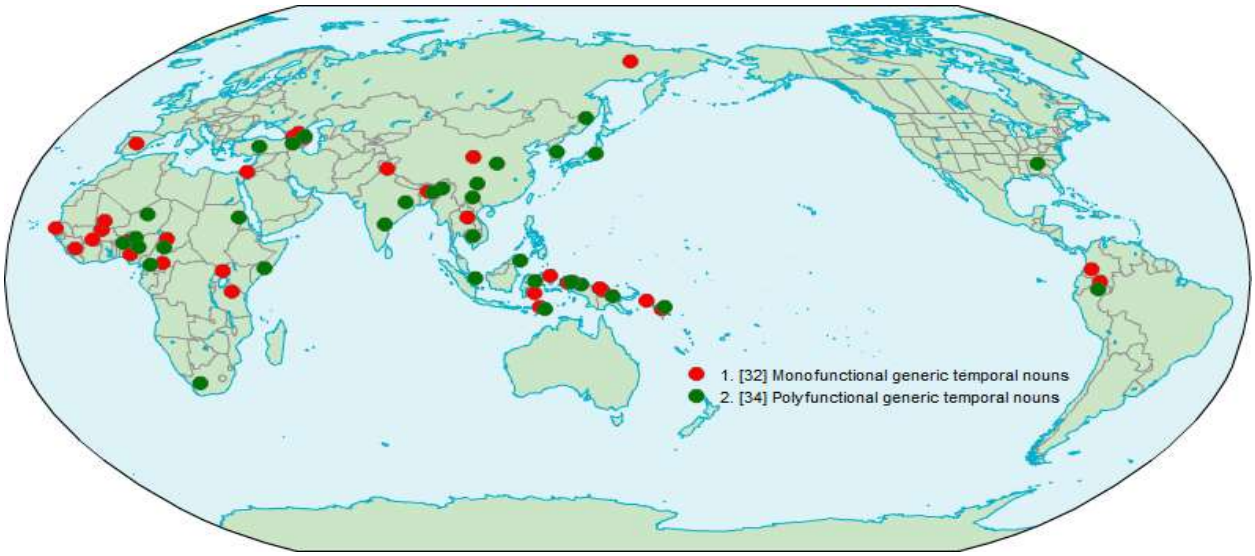
she entered the house.' (Schaefer & Egbokhare 2017: 913)

3.2.3.1 Generic temporal nouns

The most common type of temporal noun in the database is that of generic temporal nouns (66/218=30.27%), as can be seen in Map 4. While the value 'monofunctional generic temporal nouns' characterizes thirty-two of the sample languages (32/66=48.48%), the value 'polyfunctional generic temporal nouns' characterizes thirty-four of the sample languages

(34/66=51.52%). This seems to indicate that monofunctional and polyfunctional nouns are almost equally common in the languages of the sample.

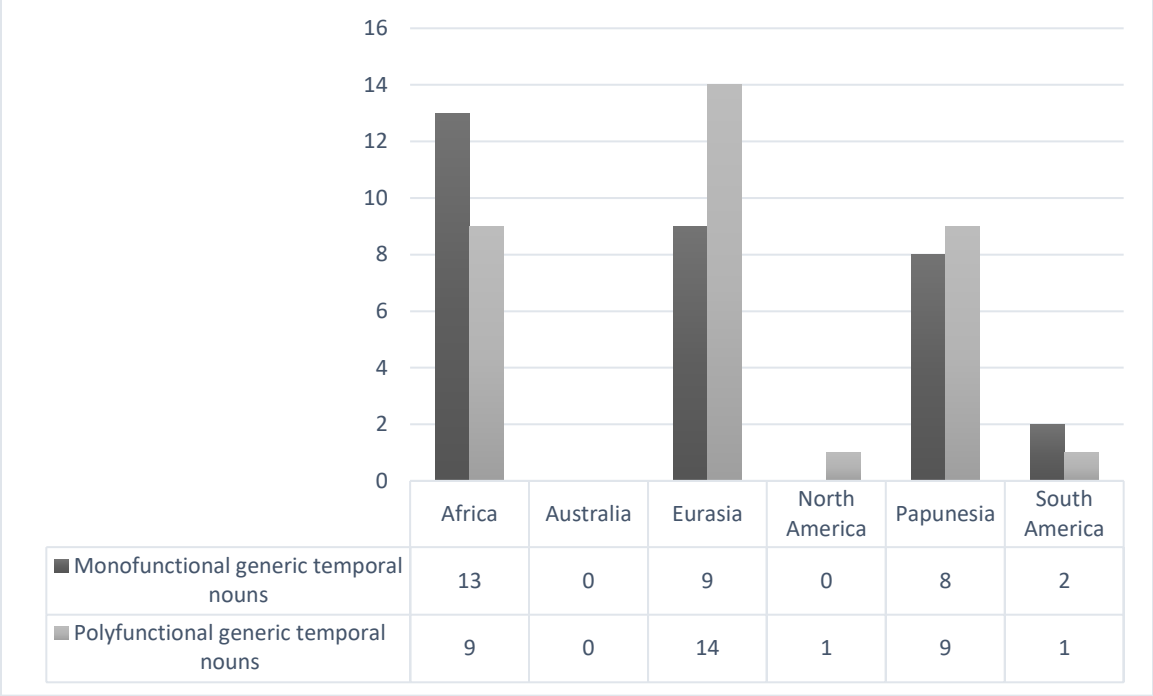
Map 4. Generic temporal nouns encoding *when*-clauses



As can be seen in Figure 5, the distribution of generic temporal nouns may be explained in geographical terms in that the bulk of languages with this strategy cluster in Africa, Eurasia, and Papunesia. While monofunctional generic temporal nouns seem to be more frequent than polyfunctional generic temporal nouns in Africa, the opposite picture is found in Eurasia in that polyfunctional nouns are more common than monofunctional ones in the sample. Regarding Papunesia, the number of languages that show monofunctional and polyfunctional nouns is almost the same. There are some other observations to be gleaned from Figure 5. First, attributive temporal clauses with generic temporal nouns are completely absent from Australia in the languages of the sample. This seems to stem from the fact that in this area, languages tend to convey 'when' by restricted adverbial subordinators (§3.2.1), and restricted deranking devices (§3.2.2). Second, attributive temporal clauses that appear with generic temporal nouns

are almost completely absent from languages of North America. Rather, *when*-clauses tend to be formed by free adverbial subordinators, bound adverbial subordinators, and restricted deranking devices (see §3.2.1 and §3.2.2).

Figure 5. Generic temporal nouns encoding *when*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional generic temporal nouns	13	0	9	0	8	2
Polyfunctional generic temporal nouns	9	0	14	1	9	1

Generic temporal nouns may appear with different morphological make-up. By way of illustration, an example of each configuration follows. The most common patterns are generic temporal nouns that are bare and temporal nouns that appear with locative case markers or locative adpositions. In (132), the generic temporal noun *bili* 'time' is bare in that it lacks "flagging", i.e. case markers or adpositions. The number of languages with bare generic temporal nouns in my data amounts to 32/66=48.48%. In (133), the generic temporal noun *mona* 'time' appears with the locative preposition *jig*. In total, there are fifteen languages coded

in the database as containing a generic temporal noun accompanied by a locative case marker or locative adposition (15/66=22.72%).

Daakaka (Austronesian/Oceanic)

(132) ***bili*** *na* *ka* *ya=ta* *tas* *tene* *ka* *ya=p* *tiye,*
time COMP SUB 3PL.SBJ=DIST sit wait COMP 3PL.SBJ=POT kill
'At the time they were waiting to kill him,

te *mo* *kuowilye* *mo* *nok.*
CONJ REAL know REAL finish
he already knew.' (von Prince 2015: 391)

Moskona (East Bird's Head)

(133) *jig* ***mona*** *noga* *mas* *es* *oysa* *jog,*
LOC time REL rain spray finished already
'At the time the rain stopped,

ofa *ek* *maw* *egak* *ed* *meren* *odog.*
3SG.SBJ see sun leg strike lake leg
he saw the sun's rays strike the lake's surface.' (Gravelle 2010: 349)

There is one less common pattern attested in the present research. Various Caucasian languages have a construction in which the generic temporal noun appears with a dative case marker (5/66=7.57%), as in (134), where *dro* 'time' occurs with the dative case marker *-s*.

Georgian (Kartvelian)

(134) *tvitmprinav-ši* *še-svi-is* ***dro*-*s***,
aeroplane-in PREV-enter-GEN time-DAT
'At the time I enter a plane,

gul-is *r-ev-a* *m-e-cʾqʾ-eb-a* *xolme*.
heart-GEN churn-THEM-MASD me-IND.OBJ-begin-THEM-it generally
I start to feel nauseous as a rule.' (Hewitt 1995: 591)

Other Caucasian languages also have a similar pattern. In the Lezgian example in (135), the generic temporal noun *č'awu* 'time' appears with the dative case-marker *-z*. In the Ingush example in (136), the generic temporal noun *xaana* 'time' is in the dative.[26] The forms of the generic temporal noun and the dative marker are not the same, but the pattern is similar. Given

[26] Other patterns that have been noted in the literature, but are not attested in the database are the following. Generic temporal nouns may be marked by third person possessive markers. This seems to be found in various Oceanic languages, such as Sinaugoro (Tauberschmidt 1999: 85), Hoava (Davis 2003: 275), and Sisiqa (Ross 2002: 466), among others. Generic temporal nouns may also appear with complementizers in languages spoken in other areas of the world. In particular, Iranian languages tend to express 'when' by a general noun-modifying clause construction that occurs with a generic temporal noun and a complementizer. This pattern is found all across the Iranian area, from Kurdish to Pamir languages to Pashto (Belyaev 2013: 9). There is no room to present each of these instances, but the interested reader is referred to Zyar (2013: 435), Bailey (2018: 431), Rastorgueva et al. (2012: 214), and Nourzaei et al. (2015: 112). More detailed work is needed in the future to provide a more fine-grained picture of these patterns.

that this morphological pattern is cross-linguistically rare and is only found in languages spoken in the same area, diffusion through language contact is most likely to have taken place.

Lezgian (Nakh-Daghestanian/Lezgic)

(135) *rağ* *dağ-lari-n* *q'uluq^{h}* *akat-aj* ***č'awu***-z,
sun mountain-PL-GEN behind set-AOR.PTCP time-DAT
'At the time the sun had set behind the mountains,

Hürmet *wiči-n* *k'wali-z* *xta-na*.
Hürmet self-GEN house-DAT return-AOR
Hürmet returned home.' (Haspelmath 1993: 375)

Ingush (Nakh-Daghestanian/Nakh)

(136) *siexan* *Ahwmad* *hwa=chy-veannacha* ***xaana***,
yesterday Ahmed DEIC=N-go.PTCP.OBL time.DAT
'Yesterday at the time Ahmed got home,

bolx *bezh* *joallar* *so*.
work do.CVB.SIM PROG.IMPERF 1SG.SBJ
I was working.' (Nichols 2011: 605)

After walking the reader through the two most common ways by which generic temporal nouns are marked, I would like to explain why these nouns tend to be bare or appear with locative case markers or locative adpositions in the sample of the present study.

With respect to bare nouns, Cristofaro & Giacalone Ramat (2007: 76) show that a number of languages do not use case markers or adpositions to relativize temporal nouns. In this respect, Givón (1990: 679) explains that the absence or optionality of adpositions in relativized temporal nouns stems from the fact that temporal nouns usually occur as circumstantials. Therefore, since the default role for temporal nouns is that of circumstantials, they tend to appear without case markers or adpositions (Cristofaro & Giacalone Ramat 2007: 76).

Regarding locative case markers or locative adpositions, the generic temporal noun typically serves an oblique function in the attributive clause. However, in the languages of the sample, attributive temporal clauses do not include morphosyntactic indication of the semantic role of the generic temporal inside the attributive clause. Interestingly, the oblique function of the generic temporal noun is encoded externally by locative case markers or locative adpositions. Cristofaro & Giacalone Ramat (2007: 76) explain that there is usually no overt presence of the syntactic role of the generic temporal noun inside the relative clause. This stems from the fact that the generic temporal noun in this construction provides a temporal setting for the situations being described rather than designating discourse participants relevant to ongoing discourse, that is, generic temporal nouns in attributive clause constructions do not function as relevant referents and topics for further conversation. For instance, in the construction *at the time we met, it rained*, the speaker's intention is not to identify some

particular time with respect to others in which it rained (e.g. *at the time it was raining*). Rather, the speaker's intention is to establish a linkage between the meeting and the rain.

Before I leave the present section, two remarks on generic temporal nouns are in order. First, one phenomenon widespread in the languages of Europe, as well as in other languages of the world, is concerned with those instances in which the generic temporal noun appears with a restricted adverbial subordinator or a restricted deranking device (lit. 'at the time when…'). This is only attested in Kabba, as in (137), and Creek, as in (138), in the database. Other languages, not included in the sample, for which this phenomenon has been attested are Khwe (Killian-Hatz 2008: 346), Anywa (Reh 1996: 411), Hindi (Koul 2009: 126), and Kwara'ae (Macdonald 2010: 315).

Kabba (Central-Sudanic/Bongo-Bagirmi)

(137)	***kàrè***	*ké*	***toké***	*mbɔ́n*	*nàa*	*ké*	*làglis*	*núnga,*
	time	REL	when	assemble	REC	REL	church	finish

'At the time when the church meeting was finished,

m-aw	*m-áse*	*lò*	*biil*	*té*
1SG.SBJ-go	1SG.SBJ-look	place	city	LOC

I went for a walk in the city.' (Moser 2004: 175)

Creek (Muskogean)

(138) *hiyá* *itálwa* *im-iːkaná* *s-apinkaliːc-itá* *kóhm-iː* *isti-hátk* *tíyamk-íː*
this tribe DAT-land INSTR-steal-INF want-DUR person-white mix-DUR

okíta *ôːm-**oːf*** *miːkk-akí* *táːt-iːt* *ôːm-iː*-s.
time be-when chief-PL PST-DUR-THEM be-DUR-IND
'At the time when white people were rushing around intent on taking these tribes' lands, they were chiefs.' (Martin 2011: 397)

A distributional characteristic of this phenomenon which I would like to note relates to the obligatoriness versus omissibility of the generic temporal noun or the restricted device. For those languages that show this type of construction, it is common that the temporal noun is the element that is usually dropped. Cross-linguistically, various types of adverbial clauses may appear at the same time with two clause-linking devices expressing the specific semantic relation in question. In this scenario, one of the markers is usually dropped (Hetterle 2015: 108). Schmidtke-Bode & Diessel (to appear: 15) mention that in the recent typological and psycholinguistic literature, such patterns have attracted increasing attention under the label of 'redundancy management in grammar'.

Second, in two languages of the sample, the generic temporal noun is doubled. An example of this pattern is found in the Kisi example in (139), where the generic temporal noun *téléŋ* 'time' is doubled.

Kisi (Atlantic-Congo/Mel)

(139) ***téléŋ-ó- téléŋ*** *ŋ̀* *sɔ̀lá* *bà* *pɛ́,*

time-DIST-time 2SG.SBJ get hand if

'At the time you (happen to) get some money,

pùɛ́ɛ́ŋ *yá* *lé* *pá* *lé* *pààwà* *cìɛ̀yó.*

forget me NEG IDPH for rent house

don't forget about (paying) my house rent.' (Childs 1995: 262)

Interestingly, in the other language of the sample, the doubled generic temporal noun construction is a synonym rather than a copy. In Bunoge, the generic temporal noun *nàŋgà* 'time' functions as an echo for *dénì* 'time' as in (140). A closer analysis reveals that this pattern is attested in various Dogon languages. Heath (2014a: 273) shows that the echoed noun is often marked in different Dogon languages morphologically or tonally as a possessum 'the time of the time I came…'.

Bunoge (Dogon)

(140) ***dénì*** *ŋ̀* *ʔégè* ***nàŋgà,*** *dɔ̌:wɛ̀.*

time 1SG.SBJ come.PFV time die.PFV.3SG.SBJ

'He/She died at the time I came.' (Heath 2014a: 273)

Dogon languages have another attributive temporal clause construction that allows temporal nouns to be doubled. Interestingly, these doubled nouns are only possible with

temporal nouns that are non-generic, such as a temporal noun meaning ‘day’. In the Togo Kan example in (141), the attributive temporal clause is formed by *nìŋìrⁿì* ‘day’ which is doubled.[27]

Togo Kan (Dogon)

(141)	***nìŋìrⁿì***	*ú*	*yɛ́r-ɛ́*	***nìŋìrⁿì***,
	day	2SG.SBJ	come-PFV	day

‘The day you came,

nî	*àrⁿú*	*lɔ́w-ɛ̀*.
here	rain	rain.fall-PFV

it rained.’ (Heath 2015b: 303)

3.2.3.2 Non-generic temporal nouns

Unlike generic temporal nouns, non-generic temporal nouns, as in (142), are not frequent in the present study (15/81=18.51%). These devices may be monofunctional or polyfunctional. However, as can be seen in Map 5, non-generic temporal nouns tend to be overwhelmingly monofunctional (13/15=86.66%). This contrasts with the cross-linguistic picture of generic temporal nouns shown in §3.2.3.1, where it was noted that monofunctional and polyfunctional nouns are almost equally common in the languages of the sample.

[27] The construction in (140) resembles a double-headed relative clause. Dryer (2013c) shows this pattern as a general possibility for relative clauses in Jamsay, another Dogon language.

Jalkunan (Mande/Western Mande)

(142) ***ɲɛ̄ɛ́*** *mì* *mā* *nɔ̀ŋɔ́* *dɛ̀kɛ́,* *mā* *wál* *mɛ̀ɛ̀=nɛ̄ɔ.*

year REL 1SG friend finish.PFV 1SG work do.PFV=NEG

'The year my friend passed away, I did not do any work.' (Heath 2017: 307)

Map 5 hints at the importance of geography as a factor influencing the distribution of attributive temporal clauses encoded by non-generic temporal nouns. As is shown in Figure 6, monofunctional non-generic temporal nouns tend to be very common in African languages in the sample. This strategy is completely absent from Australia and is almost completely absent from languages of the Americas in the database. This is line with the findings of §3.2.3.1.

Map 5. Non-generic temporal nouns encoding *when*-clauses

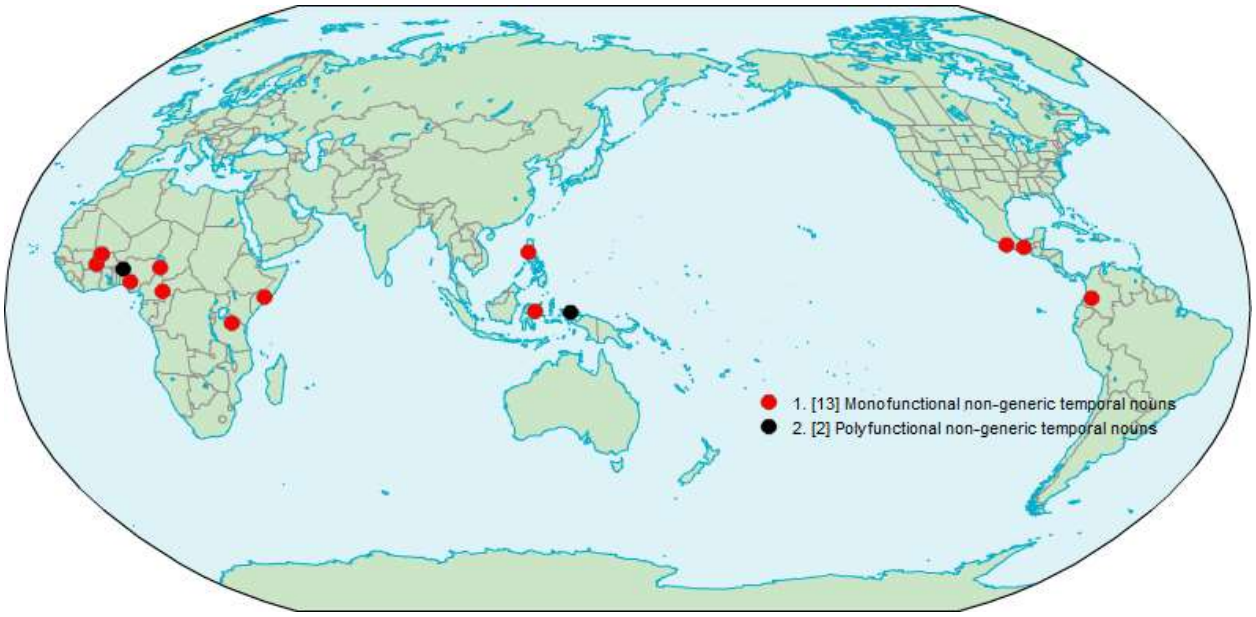
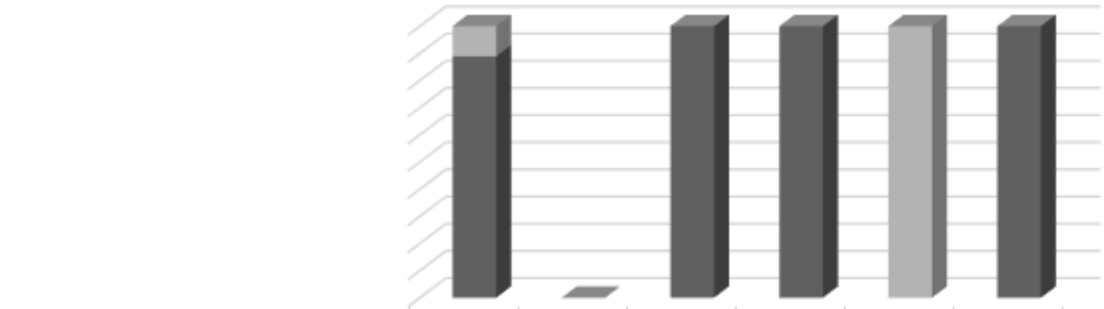


Figure 6. Non-generic temporal nouns encoding *when*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Polyfunctional non-generic temporal nouns	1	0	0	0	1	0
Monofunctional non-generic temporal nouns	8	0	2	2	0	1

As is illustrated in Figure 6, non-generic temporal nouns are almost completely absent from Eurasia and Papunesia. However, as was shown in §3.2.3.1, generic temporal nouns are common in Eurasia and Papunesia. Non-generic temporal nouns tend to be bare in that they do not occur with case markers or adpositions (12/15=80%). This seems to indicate that there is a preference for not indicating the oblique function of the non-generic temporal noun. As was argued above, this stems from the fact that since the default role for temporal nouns is that of circumstantials, they tend to appear without case markers or adpositions.

3.2.3.3 Omitted temporal nouns

In what follows, I discuss two types of attributive clause constructions that have been traditionally neglected. The first construction is concerned with attributive temporal clauses in which the temporal noun is optional. The second construction is an attributive temporal clause that appears without a temporal noun ‘at the (moment) she left...’. For this construction, it is

sometimes possible to provide historical evidence that the temporal noun has been omitted.[28] Each of these constructions is dealt with in turn.

Attributive temporal clauses in which the temporal noun is optional are attested in three languages of the sample (3/218=1.37%).[29] An example of this pattern is found in Fongbe. In this language, attributive temporal clauses are encoded by the generic temporal noun *hwènù* 'time' accompanied by the definitive marker *ɔ́,* as in (143).

Fongbe (Atlantic-Congo/Kwa)

(143)	***hwènù***	***ɖé-è***	*à*	*xá*	*àtín*	*jí*	***ɔ́,***	*ùn*	*mɔ̀*	*wè.*
	time	OP-RES	2SG.SBJ	climb	tree	on	DEF	1SG.SBJ	see	2SG.OBJ

'At the time you climbed the tree, I saw you.' (Lefebvre & Brousseau 2002: 171)

The temporal noun in (143) can be omitted, but not the definitive marker *ɔ́*. When the temporal noun is omitted (Lefebvre & Brousseau 2002: 171), the nominal operator *ɖè* and the resumptive pronoun *-è* must appear in the construction, giving rise to a headless relative clause-like structure, as in (144).

[28] Special thanks to Jürgen Bohnemeyer and Eitan Grossman for fruitful discussions on these types of attributive temporal clauses.

[29] Rodrigo Becerra Para (personal communication) informs me that Mapuche has two attributive temporal clause constructions. First, 'when' may be expressed by the relativized temporal noun *antü* 'day' (e.g. *feychi* ***antü*** *aku-lu eymi*... DEM day arrive-NMLZ 2SG.SBJ… 'the day when you arrived…'). Second, *when*-clauses may be encoded by the relativized temporal noun *tripantu* 'year' (e.g. *feychi* ***tripantu*** *aku-lu eymi*... DEM day arrive-NMLZ 2SG.SBJ… 'the year when you arrived…'). He mentions that both non-generic temporal nouns are optional in attributive temporal clauses and can be omitted. One possible hypothesis is that temporal nouns are omitted in these constructions because the predicate of the ground clause appears with the restricted deranking device *-lu* (Smeets 2008: 219). This is in line with the discussion of §3.2.3.1 in which it was noted that when attributive temporal clauses appear with a restricted adverbial subordinator or a restricted deranking device, it is the temporal noun that is omitted.

Fongbe (Atlantic-Congo/Kwa)

(144) ***ɖé-è*** *à* *xá* *àtín* *jí* ***ɔ́,*** *ùn* *mɔ̀* *wè.*

OP-RES 2SG.SBJ climb tree on DEF 1SG.SBJ see 2SG.OBJ

'At the time you climbed the tree, I saw you.' (Lefebvre & Brousseau 2002: 171)

Another example, similar to the one mentioned in (144), is attested in Atong. In this language, *when*-clauses are encoded by the generic temporal noun *somay* 'time' that appears with the locative =*ci*, as in (145).

Atong (Sino-Tibetan/Bodo-Garo)

(145) *u=ci* *muʔ-butuŋ* ***somay=ci,***

DIST.DEM=LOC stay-when time=LOC

'At the time they lived there,

badri *nemen* *manʔ=ay* *saʔ-a=no.*

Pname very in.great.amounts=ADV eat-CUST=QUOT

Badri was very rich (ate in great amounts), it is said.' (van Breugel 2014: 521)

Seino van Breugel (personal communication) mentions that the generic temporal noun *somay* 'time' is optional and can be omitted, but not the locative =*ci*, as in (146).

Atong (Sino-Tibetan/Bodo-Garo)

(146) *sa=gaba* *naw* *nem-khal-butuŋ=**ci**,* *thəy-ok.*

be.ill=ATTR younger.sister good-COMPL-when=LOC die-COS

'At the time my younger sister was getting better, she died.' (van Breugel 2014: 519)

The second type of construction is concerned with attributive temporal clauses that appear without a temporal noun 'at the (moment) she left...'. For this construction, it has been possible to provide historical evidence that the temporal noun has been omitted in five languages (5/218=2.29%). By way of illustration of this construction, consider the Cuwabo example in (147). In this language, *when*-clauses are encoded by a relativized verb that appears with the concordial prefix of class five *ni-* but not with a temporal noun. The temporal noun *ńsaká* 'time' is among the many nouns that belong to class five and is implied in this construction (Guérois 2015: 485).[30]

Cuwabo (Atlantic-Congo/Bantu)

(147) ***ni**-vád-el-é=íyé=na* *va-ńlúgú=ní,* *e-hí-tw-éy-a.*

5-hit-APPL-PFV.REL=3SG=INSTR 16-stone=LOC 9-PFV.DJ-break-NTR-FI

'When she hit the stone, it broke.' (Guérois 2015: 485)

Another example can be found in Abau. In this language, the attributive temporal clause occurs without a temporal noun, as in (148). From a diachronic perspective, this construction appeared at some stage with the generic temporal noun *enekwei* 'time' (Lock 2011: 364).

[30] Another Bantu language that also shows a similar situation is Mankon (a Grassfields Bantu language) (Leroy 2010: 556). It remains an open task to explore whether more Bantu languages show this type of construction.

Evidence that this construction used to appear with this temporal noun comes from the fact that the ground clause is marked by the masculine topic marker *hokwe*, which tends to occur with this temporal noun in postpositional phrases (e.g. 'He left at that specific time'; Lock 2011: 108). Other languages in which this type of construction are found are Arapaho (Cowell & Moss 2008: 387), Ma'di (Blackings & Fabb 2003: 536), and Kodava (Ebert 1996: 47).

Abau (Sepik/Upper Sepik)

(148) *ha* *so-rey* *ma* *lwak* ***ho-kwe***, *ho-kwe* *nuw-hok.*
1SG.SBJ DEM-there REL be M-TOP M-TOP INT-fear
'When I was there, I was really afraid.' (Lock 2011: 364)

Before I proceed, one remark on Savosavo is in order here. At some historical stage, this language spoken in the Solomon Islands expressed 'when' by means of the generic temporal noun *taemu* 'time' accompanied by the third person masculine singular pronoun *lo* and the locative case enclitic *=la*, as in (149). The third person masculine singular pronoun *lo* was preceded by the relativizer *-tu*. Wegener (2012: 273) notes that this construction grammaticalized into the sequential coordinating device *tulola* 'and then', used for expressing temporal subsequence in the current stage of the language. The careful reader may note that *taemu* 'time' is not part of the sequential coordinator *tulola* 'and then'. This seems to indicate that at some diachronic stage the noun *taemu* 'time' was omitted giving rise to a headless relative clause. After this, it is likely that the construction appearing with the relativizer *-tu*, the third person masculine singular pronoun *lo*, and the locative case enclitic *=la* grammaticalized into the sequential coordinator *tulola* 'and then'. What the Savosavo example

seems to show is that formally reduced attributive temporal clauses can set the stage for further diachronic developments.

Savosavo (Solomons East Papuan/Savosavo)

(149) *lo* *kise-ghu* *lo* *ba-**tu*** ***lo*** ***taemu=la***

DET.SG.M fight-NMLZ 3SG.M come-REL DET.SG.M time-LOC.M

'At the time when the fighting came,

apoi *vata* *togho-ghu=me* *te* *pala-i* *ivaghu=la*.

what kind live-NMLZ=2PL.NOM EMPH make.3SG.M-FIN day=LOC.M

what kind of life where you leading that day?' (Wegener 2012: 273)

For the examples discussed above, it has been possible to provide historical evidence that the temporal noun has been omitted. However, some examples remain unclear (8/218=3.66%). Consider the example in (150) from Yucatec Maya:

Yucatec Maya (Mayan)[31]

(150) ***le**=káa=h-náats'-nah=e'*,

DEF=SEQ=PRV-near-COMPL=TOP

'When he (the prodigal son) approached,

[31] Example provided by Jürgen Bohnemeyer (personal communication).

káa=t-u=hach=k'ahóolt-ah	dèekeh	*u=pàal*.
SEQ=PRV-A3=INT=acquaintance-APPL	COMP	A3-child

he (his father) really recognized that he was his child.'

Formally, the construction in (150) has the structure of a headless relative clause. The definite article *le*= on the left edge marks the ground clause as nominalized (Bohnemeyer 1998). While it would be syntactically possible to insert a generic temporal noun, such as *òorah* 'time' after the definite article *le*=, this does not seem to be idiomatic in Yucatec Maya (Jürgen Bohnemeyer, personal communication). Of course, it is possible that temporal nouns were included at some earlier stage. However, this historical scenario is not likely in that there really are no autochthonous temporal nouns of the relevant kind in Yucatec Maya (Jürgen Bohnemeyer, personal communication).

Another interesting example comes from Makhuwa. Speakers of this language indicate *when*-relations by a headless relative clause encoded by the demonstrative *vale*, as in (151). As can be observed in this example, the construction shows a ground clause that appears with the concordial prefix of class 16 *wa*-, but not with a temporal noun. It is tempting to propose that the temporal noun is implied, as was shown in the Cuwabo example above. However, Van der Wal (personal communication) points out that synchronically no temporal noun is elided. Diachronically, there may have been a general word for 'time' but there is currently no such word in class 16 in Makhuwa.

Makhuwa (Atlantic-Congo/Bantu)

(151) ***wa****-tuph-aly-ááka* ***valé****,* *khúńt-eya* *mwétto*.

16-jump-PERF.REL-POSS.1SG.SBJ DEM NARR.break-STAT 3.leg

'When I jumped, I broke my leg' (Van der Wal 2012: 239)

In the Basque example in (152), the verb form of the ground clause is homophonous with a relative clause with a deleted temporal noun. From a historical perspective, it is tempting to propose that this construction is a headless relative clause that appeared with a temporal noun. The fact that the locative suffix *-n* can appear in this construction seems to reinforce this hypothesis (Hualde & Ortiz de Urbina 2003: 720). However, as noted by Hualde & Ortiz de Urbina (2003: 720), the example in (152) cannot be understood strictly speaking as a relative clause with some deleted noun head.

Basque (Isolate)

(152) *ni* *hiltzen* *naizenea-****n****,* *ez* *ehortz* *eliza-n*.

1SG.SBJ die.IPFV AUX-LOC NEG bury church-LOC

'When I die, don't bury me in the church.' (Hualde & Ortiz de Urbina 2003: 720)

Other languages that have constructions for which it has not been possible to provide historical evidence that the temporal noun has been omitted are Garrwa (Mushin 2012: 296), Ngankikurungkurr (Hoddinott & Kofod 1988: 217), Worrorra (Clendon 2014: 388), Burushaski (Noboru 2012: 199), Aguaruna (Overall 2009: 183), and Mosetén (Sakel 2002:

437).[32] There is no room to present each of these cases individually here, but readers are referred to the references mentioned before.

3.3 Less common restricted devices

As has been mentioned in various parts of this research, one of the main goals of this dissertation is to establish common and rare trends of grammatical encoding in the expression of temporal adverbial relations. The previous section explored the most common trends in the grammatical encoding of *when*-clauses. In what follows, the discussion now turns to rare strategies, or strategies showing low frequency in the languages of the sample. These strategies have been divided into correlative constructions (§3.3.1), demonstratives used as clause-linking devices (§3.3.2), verbs used as clause-linking devices (§3.3.3), and articles used as clause-linking devices (§3.3.4). Each of these strategies is dealt with in turn. The investigation of these strategies proceeds along exactly the same lines as those that were followed in the previous section in that the mono/polyfunctional and cross-linguistic distribution of these rare strategies is also addressed.

3.3.1 Correlative constructions

The term 'correlative' has multiple uses in linguistics. First, this term may refer to a construction in which the head noun appears in a full form within the relative clause and appears again in the main clause in a pronominal or non-pronominal form (Keenan 1985: 164; Lipták 2009: 1). Constructions showing this pattern are known as "correlative relative clauses" (Lehmann 1993: 349). Languages encoding relative clauses by this correlative pattern would

[32] Various Macro-Ge languages, not included in the sample, seem to have a similar construction (Rivail Ribeiro 2012: 40).

express the equivalent of the English construction ‘Ram saw the knife with which the man killed the chicken’ as ‘with which knife the man killed the chicken, Ram saw that knife’ (Comrie 1989: 146). In this example, the noun phrase (i.e. ‘the knife’) appearing in the first clause, a.k.a. correlative clause, is taken up again in the second clause, a.k.a. correlate clause.[33] However, it would be possible to have a coreferential pronoun in the second clause instead of the repeated noun phrase (Comrie 1989: 146). One important characteristic of correlative relative constructions is that while the correlative clause tends to be marked by a correlative marker (e.g. relativizer, interrogative marker) (Keenan 1985: 164), the correlate clause tends to have a demonstrative (Lipták 2009: 4). This is nicely illustrated in the Hindi example in (153), where the correlative clause appears with the relativizer *jo* and the correlate clause appears with the demonstrative pronoun *vo* ‘that’.

Hindi (Indo-European/Indo-Aryan)

(153) ***jo*** *laRkii* *khaRii* *hai* ***vo*** *lambii* *hai*.
REL girl standing is that tall is
‘The girl who is standing is tall (lit. *which girl is standing*, *that is tall*).’ (Srivastav 1991; cf. Lipták 2009: 1).

Correlative constructions used as relative clauses are well-known in the ancient Indo-European languages (e.g. Sanskrit, Latin, Greek, and Hittite) and in modern Indo-Aryan languages (e.g. Hindi) (Lipták 2009: 1). Interestingly, it has been noted that an outstanding feature of Indo-Aryan correlatives is that their use is not limited to relative clauses in that

[33] Wälchli (2018: 180) employs the term “correlatopic clause’ to refer to the correlative clause, and the term “correlaphoric clause” to refer to the correlate clause.

formally identical constructions are also used for various types of adverbial clauses, including *when*-clauses (Masica 1991: 415).[34] In particular, this type of construction is frequent when a generic temporal noun appears in the correlative clause and this generic temporal noun is taken up again in the correlate clause, as is shown in the Kashmiri example in (154). Another Indo-Aryan language, not included in the sample, that shows this pattern is Rajbanshi. In this language, the correlative clause appears with the generic temporal noun *kʰuna* 'time' and the relative pronoun *jei-*, as in (155). Note that the correlate clause appears with the same generic temporal noun *kʰuna* 'time' accompanied by the demonstrative *ʌi-* 'that'. Other Indo-Aryan languages with a similar pattern are Maithili (Yadav 1997: 361) and Bangla (David 2015: 286), among others.[35] These constructions are similar to the attributive clause constructions described in §3.2.3. Therefore, these should be considered attributive temporal clauses showing a correlative pattern.

Kashmiri (Indo-European/Indo-Aryan)

(154) *Aslaːm aːv* ***tami saːti***
Aslam come.PST REL time
'At the time Aslam came,

[34] Manner clauses and locative clauses also tend to be encoded by correlative relative constructions in Indo-Aryan (lit. 'which way…that way'; lit. 'which place…that place'; Koul & Wali 2006: 160; Yadav 1997: 364).
[35] In various Indo-Aryan languages not included in the sample of the present study, there are correlative constructions used in the expression of 'when', in which the correlative clause and correlate clause occur without temporal nouns, but only with a correlative marker (e.g relative pronoun, interrogative marker) and a demonstrative. The interested reader is referred to Bhatt & Lipták (2009: 349) for a more detailed analysis. Interestingly, various Baltic languages have similar correlative constructions (Wälchli 2018: 180).

yemi ***saːtɨ*** *Mohan* *doːraːn* *oːs*.

CORR time Mohan run.PRS.PTCP was

Mohan was running.' (Koul & Wali 2006: 159)

Rajbanshi (Indo-European/Indo-Aryan)

(155) ***jei-kʰuna*** *mo-r* *gʰʌr-er* *lok-tʌ* *ni* *rʌhʌ-b-ɪ* *gʰʌr-ʌt,*

which-time 1SG-GEN house-GEN man-CL NEG be-FUT-3SG house-LOC

'At the time my husband is not at home,

ʌi- kʰuna *ja-ba* *hʌ-b-ɪ*.

DEM-time go-INF must-FUT-3SG

I will have to go.' (Wilde 2008: 328)

The correlative attributive temporal construction described above is also attested in Dravidian languages and Munda languages in the sample. Regarding Dravidian languages, Tamil has a correlative construction, where the correlative clause appears with the generic temporal noun *pootu* 'time' marked by *e-* 'which' and the correlate clause occurs with the generic temporal noun *pootu* 'time' marked by the demonstrative *a-* (Lehmann 1993: 351). With respect to Munda languages, Kharia expresses 'when' by a similar pattern. In (156), while the correlative clause is encoded by *bhere* 'time' and *ata*, the correlate clause is marked by the demonstrative *hin* 'that' and *bhere* 'time'.

Kharia (Austro-Asiatic/Munda)

(156) ***ata*** ***bhere*** *bulbul* *poɾda* *raja* *Nãwkod* *Najor* *Israeli* *lebu=ki=te*

CORR time Babylon village king Nawkod Najor Israeli person=PL=OBL

bãdi *bay=kon* *misar* *raij* *ɖoˀɖ=na* *laɾ=ki*,

imprisonment make-SEQ Egypt kingdom take=INF IPFV=MID.PST

'At the time Nawkod Najor, king of the village of Babylon, imprisoned the Israelis and was taking them to Egypt,

hin ***bhere*** *ho=ki* *purkha=ki* *Khaɽiya* *buŋ=ga* *aw=ki=may*.

that time that=PL ancestor=PL Kharia INSTR=FOC love=MID.PST=3PL

these ancestors (of the Israelis) lived with the Kharia.' (Peterson 2011:186)

The last example comes from a South American language. In Cholón, one of the primary strategies used for expressing 'when' and 'whenever' is a correlative relative construction involving the generic temporal noun *pok* 'time', as in (157).

Cholón (Hibito-Cholón)

(157) ***into*** ***mek*** ***pok*** *mi-he* *a-lu-pakt-aŋ*

which all time 2SG-BEN 1SG.SBJ-interior-be-A

'At the time I think of you,

iŋko	***mek***	***pok***	*Dios*	*mučan*	*a-m-a-t-aŋ.*
that	all	time	God	prayer	1SG.SBJ-2SG.OBJ-APPL-do-A

I recommend you to God.’ (Alexander-Bakkerus 2005: 333)

In total, four languages of the sample express ‘when’ by correlative attributive temporal clauses (4/218=1.83%). Note that all these constructions in the sample are polyfunctional in the database. The careful reader may have noticed that this construction is mainly attested in South Asian languages not genetically related (i.e. Tamil, Indo-Aryan languages, and Kharia). Given that this pattern is rare, it seems reasonable to consider that this pattern may have spread through language contact (see Chapter 10 for a more detailed analysis).

Second, the term ‘correlative’ may also refer to constructions in which the first clause in linear order appears with a clause-linking device and the second clause appears with another one. This is the sense in which grammars refer to “correlative (adverbs)” or “correlative subordinators” to describe pairs of words like ‘if…then’, ‘although… yet/nevertheless’, and ‘either... or’, etc. (Haspelmath 2004). For a lack of a better term, I refer to these instances as ‘correlative clause-linking devices’. This type of construction is only attested in the database in languages in which the ground clause appears with a restricted device and the figure clause appears with a general coordinating device ‘and’, as in the Musqueam example in (158).

Musqueam (Salishan/Central Salish)

(158)	***haˀ***	*cən*	*nə́m̓,*	***ˀəy̓***	*c̓əxʷléˀ*	*ˀəy̓*	*k̓ʷə́c-nəxʷ*	*cən.*
	when	1SG.SBJ	go	and	usually	and	look-TRANS	1SG.SBJ

‘When I go, I generally see him.’ (Suttles 2004: 437)

This linguistic phenomenon has been described by Bertinetto & Ciucci (2012) as para-hypotaxis. The authors propose the following schema:

(159) Restricted device + ground-clause + Coordinator + figure-clause.

The term para-hypotaxis was introduced by Sorrento (1929) for some syntactic configurations observed at an early stage of Romance languages (e.g. Old French, Old Italian, Old Occitan, Old Spanish, and Old Portuguese). Ross et al. (2018) have identified this phenomenon in various languages not genetically related, including Swahili, Cree, Chinese, and Zamucoan languages, among many others.

One interesting para-hypotactic construction should be discussed here. The Supyire example in (160) is similar to the correlative attributive construction found in the South Asian languages mentioned above in that the first clause of the Supyire construction is marked by the generic temporal noun *tèni* 'time'.

Supyire (Atlantic-Congo/Gur)

(160) *u* *a* *kwùùlò* ***tèni*** *ǹdé-mù* *ì* *gé,*
3SG.SBJ PERF shout time.DEF DEM-REL at REL
'At the time he shouted,

kà *pi* *í* *wá* *na* *u* *cyàhà-n.*
and 3PL.SBJ NARR be.there PROG him laugh-IPFV
they laughed at him.' (Carlson 1994: 551)

However, one crucial difference between the Supyire para-hypotactic construction and the correlative construction attested in South Asian languages has to do with the fact that the Supyire generic temporal noun *tèni* 'time' is not taken up again in the second clause by a coreferential noun phrase or a coreferential pronoun. Instead, the second clause only appears with the general coordinator *kà* 'and', without a nominal expression linked to *tèni* 'time'.

Overall, there are five languages of the sample that have para-hypotactic constructions in the expression of 'when' (5/218=2.29%). As was shown before, this is attested in Musqueam and Supyire. The other languages with this pattern are Lumun (Smits 2017: 657), Khmer (Haiman 2011: 178), and Alacatlatzala Mixtec (Zylstra 1991: 148). All of these constructions are polyfunctional. A closer look reveals that para-hypotactic constructions in the expression of 'when' are common in Mixtec languages. First, the Diuxi-Tilantongo Mixtec example in (161) is similar to the Supyire constructions discussed above in that the first clause appears with a temporal noun and the second clause with a general coordinating device. However, in the Diuxi-Tilantongo Mixtec example, the ground clause appears with the non-generic temporal noun *orá* 'hour'. Another type of para-hypotactic construction attested in Mixtec languages involves a construction where the ground clause appears with a clause-linking device descended from a body-part term meaning 'face' (Hollenbach 2015: 168) and the second clause with a general coordinating device, as in the Magdalena Peñasco Mixtec example in (162).[36]

[36] It has been shown that Mixtec languages also employ para-hypotactic constructions for expressing various types of adverbial relations (e.g. conditional meanings, concessive meanings, causal meanings, etc.; Olguín Martínez to appear).

Diuxi-Tilantongo Mixtec (Oto-Manguean/Mixtecan)

(161) ***orá*** *xúún* *dá'ú* *ích**í***,
hour be.produced.CONT rain road
'When (lit. the hour) the rain falls on the trail,

té *ndó'yó* *dichí* *yɨxɨ́n*…
and be.wet.CONT unmarried.person tender
the infant gets wet…' (Kuiper & Oram 1991: 379)

Magdalena Peñasco Mixtec (Oto-Manguean/Mixtecan)

(162) ***nuu*** *yi'i* *sa* *inn* *kuiya*, *ma* ***te*** *ni* *ku'u* *xeen* *sa*.
face be.inside.PRS 1SG year nine DEF and PST be.sick much 1SG
'When I was nine, I got sick.' (Erickson de Hollenbach 2013: 419)

3.3.2 Demonstratives used as clause-linking devices

All languages use demonstratives for spatial reference (Diessel 2006, 2013, 2014). Interestingly, it is well-known that across languages, demonstratives may be routinely used for combining clauses (Kratochvíl 2011; Mithun 1987). Diessel & Breunesse (2020: 305) have recently shown that demonstratives may function as relative pronouns, complementizers, and adverbial subordinators, among others.

In the present study, seven languages of the database (7/218=3.21%) have demonstratives as clause-linking devices in the encoding of *when*-clauses (see Heine & Kuteva 2005: 115). This is found in Tamashek (Heath 2005: 66), !Xun (König & Heine 2001: 121),

Lumun (Smits 2017: 662), Abui (Kratochvíl 2007: 284), Oksapmin (Lough 2009: 284), Crow (Graczyk 2007: 347), and Ndengeleko (Ström 2013: 176). Note that these devices are polyfunctional in the sample. The usage of demonstratives in the expression of 'when' can be interpreted as being part of a more general process whereby markers having typically spatial reference are gradually employed as markers for textual or discourse reference (Heine & Kuteva 2002: 116).

These demonstratives are only weakly grammaticalized in that they can still appear with nominal properties. Accordingly, they can be considered items that are not (yet) fully grammaticalized. For instance, in the Ndengeleko example in (163), the ground clause is marked by the demonstrative *aa* 'that', used for denoting 'when'. This demonstrative appears with the agreement prefix *ʊ-*, which seems to indicate that this demonstrative is not (yet) fully grammaticalized. Note that adnominals in Bantu appear with agreement prefixes that indicate their nominal status (Meeussen 1967: 96).

Ndengeleko (Atlantic-Congo/Bantu)

(163)	***ʊ-aa***	*u-a-bii*	*ʊ-amwalimu,*	*ʊ-yɪgan-age*	*buli.*
	AGR-DEM	2SG-be.PST-PFV	AGR-teacher	2SG-teach-PST.IPFV	how

'When you were a teacher, how did you teach? (Ström 2013: 176)

Although demonstratives used as clause-linking devices are not frequently attested in the expression of 'when', they seem to be more common in the encoding of other types of temporal adverbial clauses (e.g. see Chapter 5).

3.3.3 Verbs used as clause-linking devices

There is evidence in the database of the present study that verbs may also be used in the encoding of *when*-clauses. Of the languages of the sample, seven languages have verbs used in the expression of 'when' (7/218=3.21%). In the same way as demonstratives, verbs can be considered items that are not (yet) fully grammaticalized in that they still appear with verbal properties. A case in point comes from Pnar. In this language, *when*-clauses are encoded by the verb *ma* 'to become', as in (164). In this example, *ma* 'to become' still appears with verbal properties (i.e. it occurs with the realis marker *da*).

Pnar (Austro-Asiatic/Khasian)

(164) ***ma*** ***da*** *paʔ* *kɔ,*

become REAL give.sign 3SG.NOM.F

'When it signals,

tɛ *u=sɲiawtʰoʔ* *wa* *kat-tu* *da* *tɔʔ* *u=hiar*

NON.VIS NON.FIN=understand NMLZ as-MEDL REAL be NON.FIN=descend

(they) will know that now is harvest season.' (Ring 2015: 396)

The range of verbs used in the expression of 'when' is not random in that only certain types of verbs have been attested in the database. First, motion verbs (e.g. 'to arrive', 'to reach', 'to go') may be routinely used for combining clauses denoting 'when'. This is illustrated in the West Coast Bajau example in (165), where the ground clause is marked by the verb *teko* 'arrive'. As will be shown in other chapters, verbs meaning 'to arrive' or 'to reach' are more

common in the expression of other temporal adverbial relations (e.g. see Chapter 7 for a detailed discussion of the expression of 'until' by verbs meaning 'to arrive'; cf. Heine & Kuteva 2002: 46).

West Coast Bajau (Austronesian/Sama-Bajaw)

(165) ***teko*** *iyo* *pu'*,
arrive 3SG to.there
'When he was there,

kakal *Hussin* *mandi* *en-diam* *telaga'* *e*.
still Hussin bathe.AV PREP-inside well DEM
Hussin was still bathing in the well.' (Miller 2007: 415)

The fact that motion verbs can be gradually grammaticalized for expressing 'when', and other temporal adverbial relations, appears to be an instance of a process whereby verbs can come to structure narrative discourse (Heine & Kuteva 2002: 69). This pattern is found in Mongsen Ao (Coupe 2006: 415), Mosetén (Sakel 2002: 437), and Toqabaqita (Lichtenberk 2008: 1179). These devices are polyfunctional in the sample.

Second, verbs meaning 'to happen' or 'to become' may also be employed in the encoding of *when*-clauses. As can be seen in the Semelai example in (166), the ground clause is marked by the verb *knaʔ* 'to happen'. Verbs meaning 'to happen' or 'to become' in this usage are only attested in Semelai and Pnar in the database and are polyfunctional.

Semelai (Austro-Asiatic/Aslian)

(166)	***knaʔ***	*dɔs*	*hɛʔ*	*ke,*	*lɒc*	*b-knlək*	*kmpən*.
	happen	arrive	above	there	already	have-husband	wife

'When (he) arrived up there, (his) wide had already (re)married.' (Kruspe 2004: 388)

3.3.4 Articles used as clause-linking devices

It is well-known that *when*-clauses, and other types of adverbial clauses, may be encoded by nominalizations in many languages of the world (Lehmann 1988). Accordingly, they are often marked by the same morphological make-up as noun phrases (Diessel & Breunesse 2020: 311). In particular, they tend to be marked by articles or determiners that one might analyze as particular types of clause linking-devices. These devices are known in the literature as 'nominalizing articles' and are often based on demonstratives (Diessel & Breunesse 2020: 312). Of the languages of the sample, three languages employ articles or determiners as *when*-devices (3/218=1.37%). The languages showing this pattern are Mangarrayi (Merlan 1982: 21), Movima (Haude 2006: 162), and Musqueam (Suttles 2004: 104). These strategies are polyfunctional in the languages of the sample.

A closer look reveals that nominalizing articles are very common in Salishan languages. It has been shown that most Salishan languages tend to express 'when' and other types of adverbial meanings by "propositional nominalizations" (Kroeber 1999: 107). These are nominalized constructions in which the ground clause appears with the nominalizing prefix *s-* (see §3.2.1) and a preposed article that indicates the nominal status of the ground clause, as in the Musqueam example in (167). Kroeber (1999: 107) call this construction the "article-

marked nominalized clause". Besides Musqueam, this construction is also found in Straits Salish and Squamish (Stassen 2009: 370).

Musqueam (Salishan/Central Salish)

(167)	***kʷə***	***s-mi-s***	*técəl*	*kʷθeʔ*	*məstáyəxʷ*	*ni*,
	ART	NMLZ-AUX-3SG.POSS	arrive.here	that	person	AUX

'When that person got here,

ʔə	*čxʷ*	*kʼʷec-nəxʷ*.	
Q	you	look-TRANS	

did you see him?' (Suttles 2004: 104)

In a number of languages, the article of the ground clause may also appear with a locative preposition, as in the Lushootseed example (168), where the ground clause is encoded by the locative preposition *ʔal*, the article *ti*, and the nominalizing prefix *s*-. This pattern is attested in Thompson Salish, Shuswap, and Okanagan (Stassen 2009: 373). Furthermore, the ground clause may be marked by possessive affixes and/or special person markers (Czaykowska-Higgins & Kinkade 1997: 41).[37] These special person markers are generally referred to as "conjunctive person markers" (Thompson 1979: 727). Newman (1980: 163) shows that these markers only appear in ground clauses in complex sentence constructions, such as temporal clauses and conditional clauses. Given that they are found in all Coast Salish

[37] Kroeber (1999: 107) notes that there are different formal types of propositional nominalizations found in Salishan languages, such as propositional nominalizations with possessive affixes, propositional nominalizations without possessive affixes, propositional nominalizations with an article, and propositional nominalizations that simply appear with the nominalizing prefix *s*-.

and some Interior Salish languages (e.g. Comox, Thompson), they seem widespread enough that Proto-Salish is likely to have had some construction of this sort (Kroeber 1997: 434).

Lushootseed (Salishan/Central Salish)

(168) ***ʔal*** ***ti*** ***s-****ʔus-il* *həlgʷəʔ…*

LOC ART NMLZ-dive-INCH 3PL.SBJ

'When they dove (into the water)….' (Zahir 2018: 131)

Various Oceanic languages, in particular Polynesian languages, have a construction similar to the one discussed above in that they express 'when' by nominalized ground clauses marked by nominalizing articles. As is shown in the following constructions, the Maori example in (169) and the Samoan example (170) appear with the nominalizing article *te* and *le*, respectively. Note that the ground clauses in both examples are nominalized.

Maori (Austronesian/Oceanic)

(169) ***te*** *tae-**nga*** *o* *Hutu* *ki* *raro…*

ART arrive-NMLZ of Hutu to below

'When Hutu arrived in the underworld...' (Chung 1978: 300; cf. Stassen 2009: 335)

Samoan (Austronesian/Oceanic)

(170) ***ʔo*** ***le*** ***saw*** *a* *le* *ta'avale* *a* *leoleo,*

PART ART come.NMLZ of ART car of police

'When the police car came….' (Chung 1978: 306; cf. Stassen 2009: 335)

The Tahitian example in (171) is similar to the constructions in (169) and (170), in that it appears with a nominalizing article (i.e. the nominalizing article *te*) and the ground clause is nominalized in that it occurs with *-ra'a*. However, this construction also appears with the locative preposition *'ɪ*. This is analogous to the Lushootseed example discussed in (168).

Tahitian (Austronesian/Oceanic)

(171) ***'ɪ*** ***te*** *ara-**ra'a*** *mai* *teie* *vahine*

LOC ART wake.up-NMLZ DIR this woman

'When this woman woke up….' (Tryon 1970: 124; cf. Stassen 2009: 336)

3.4. The decision-making process

The previous sections made it clear that languages not only use free adverbial subordinators (e.g. English 'when'), but also other types of strategies. As has been shown, many languages may have more than one primary strategy in the expression of 'when'. This leads to the following question: what are the factors that play a role in the decision-making process of speakers? That is, if 'when' can be expressed in a particular language by two primary strategies, what are the factors that lead speakers to choose one strategy over the other? One possible answer to this question is that this decision-making process is arbitrary. However, as is demonstrated in this section, there may be more to the story. Of course, speakers seek to construct sentences according to their communicative intentions in a particular situation. Accordingly, speakers have to make choices of linguistic means depending on the social circumstances, physical speech situation, and background information, etc. (Diessel 2019b: 24). It is in the spirit of this claim that I proceed in this section. In particular, special attention

is paid to the role of mono/polyfunctionality and the role of discourse factors in the decision-making process.

3.4.1 Mono/polyfunctionality in the decision-making process

In the sample, eighty-seven languages have more than one primary strategy for expressing 'when' (87/218=39.90%). In what follows, I argue that mono/polyfunctionality seems to be by far the most common factor that influences speakers' choice of either of the primary strategies. Two main scenarios are possible. Each of these is dealt with in turn.

First, there are languages that have two primary *when*-strategies, one of which is monofunctional and the other polyfunctional. Forty-seven languages show this type of system (47/87=54.02%). The following examples illustrate this scenario. Beja has two clause-linking devices used in the encoding of *when*-clauses. In (172), the ground clause appears with the bound adverbial subordinator *=hoːb*. This device is monofunctional in that it only conveys 'when'. The other primary strategy is an attributive temporal clause marked by the generic temporal noun *doːr* 'time', as in (173). This noun appears with the clitic *oː=* and the predicate of the ground clause occurs with the relativizer *=eːb*. Vanhove (2014: 43) shows this construction is polyfunctional. That is, apart from 'when', this construction can also be found in contexts expressing 'while' and 'if'.

Beja (Afro-Asiatic/Beja)

(172) *a-dif**=hoːb**,* *biri* *dh=eː* *i-jam.*
1SG.SBJ-leave.PFV=when rain DIR=1SG.ACC 3SG.M-rain.PFV
'When I left, it rained over me.' (Vanhove 2014: 43)

Beja (Afro-Asiatic/Beja)

(173) *oː=tak* *ʃoːb-an=**eːb*** ***oː=doːr***…

DEF.SG.M.ACC=man greet-1SG.PFV=REL DEF.SG.M.ACC=time

'At the time I shook hands with the man...' (Vanhove 2014: 43)

In Mongsen Ao, *when*-clauses are marked by the restricted deranking device *-lìkàʔ*, as in (174), or by the restricted deranking device *-ku*, as in (175). While the former device is monofunctional, the latter device is polyfunctional in that it is used not only for conveying 'when', but also 'after', 'while', and 'before' (Coupe 2006: 446).

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(174) *a=khu-la* *ʧu* *tshəŋti* *ʧu* *tak-ja-**lìkàʔ***…

NON.RELAT=tiger-F DIST bamboo.matting DIST weave-CONT-when

'When the tiger was weaving the bamboo wall…' (Coupe 2006: 441)

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(175) *pa* *pùŋì* *ʧu* *atsə-líʔ* *wa-thùŋ-**ku***…

3SG wild.pig DIST look-SIM go-reach-when

'When he was going, looking for the pig…' (Coupe 2006: 446)

Another example similar to ones shown above comes from Urarina. This language has two primary *when*-devices that only differ with respect to its mono/polyfunctionality. In (176), the *when*-relation is denoted by the monofunctional free adverbial subordinator *hana*. In (177),

the bound adverbial subordinator *=ne* is polyfunctional (i.e. it is also employed for encoding *if*-clauses).

Urarina (Isolate)

(176) *kɯ-he-ɯrɯ-a* ***hana****=te,* *muku-e* *akaɯrɯ* *raj* *lintereno* *fwoko.*
go-CONT-PL-3SG when=FOC burn-3SG 3PL POSS flashlight lamp
'When they were going, the lamp of their flashlight went out.' (Olawsky 2006: 745)

Urarina (Isolate)

(177) *enanihka* *kɯane* *hauto-a=**ne**,* *ahariri* *ne-ĩ* *nerutu-e.*
canoe inside throw-3SG=when gamitana.fish be-PTCP turn.into-3SG
'When he threw it (the mojara fish) into the canoe, it turned into a gamitana fish.' (Olawsky 2006: 736)

Of the constructions shown above, speakers may choose one device over the other depending on specific communicative factors (e.g. social circumstances, physical speech situation, and background information). That is, there may be scenarios in which the speaker wants to express a *when*-relation unambiguously, i.e. by means of monofunctional devices, because there is a desire to be understood quickly and without special effort or disruption. There may also be other communicative scenarios in which ambiguity may not be a problem and the speaker chooses a polyfunctional device. In particular, speakers tend to use polyfunctional devices when they have good reason to believe that their addressees can readily

identify the intended denotation uniquely on the basis of their common ground (Clark & Murphy 1982: 294).

Second, there is another scenario in which both primary strategies are polyfunctional. That is, both strategies are used for expressing 'when' and other adverbial relations. Forty languages show this type of system (40/87=45.98%). However, in this scenario one of the devices may be bifunctional and the other one trifunctional or quadrifunctional. Put another way, the degree of polyfunctionality of one of the devices is larger than the other one. Consider the following examples illustrating this scenario.

Nyulnyul has two primary devices for expressing *when*-relations: the restricted deranking device *-uk*, as in (178), and the restricted deranking device *-karr*, as in (179). Both devices are polyfunctional. However, *-uk* is quadrifunctional in that it can be found not only in contexts expressing 'when', but also in contexts expressing 'while', 'because', and 'where' (McGregor 2011: 662). On the other hand, *-karr* is trifunctional in that it can be employed for denoting 'when', 'if', and 'lest' (McGregor 2011: 664). Accordingly, the restricted deranking *-uk* seems to have a higher degree of polyfunctionality than *-karr*.

Nyulnyul (Nyulnyulan)

(178) *i-ny-jalk-**uk**, wul-uk ngurrngurr i-na-ri.*
3SG.NOM-PST-fall-LOC water-LOC drown 3SG.NOM-CONJUG-pierce
'When he fell in the water, he drowned.' (McGregor 2011: 662)

Nyulnyul (Nyulnyulan)

(179) *way* *junk* *i-n-nyu* *Christmas* *creek*

away run 3SG.NOM-CONJUG-get Christmas creek

'He ran away from Christmas Creek station

wul *arri* *i-la-n-an-**karr**.*

water NEG 3SG.NOM-IRR-be-IPFV-when

when it was dry.' (McGregor 2011: 664)

Ngankikurungkurr is similar to Nyulnyul in that it also has two primary *when*-strategies that are polyfunctional, one of which has a higher degree of polyfunctionality than the other one. In (180), the *when*-clause is marked by *gimin* 'when'. This device is bifunctional in that it can be found in constructions encoding *when*-clauses and *while*-clauses (Hoddinott & Kofod 1988: 217). In (181), the ground clause appears with the polyfunctional restricted deranking device *-nimbi*. This device has a higher degree of polyfunctionality than *gimin* given that it is quadrifunctional (i.e. it is used in the expression of 'if', 'because', and 'lest'; Hoddinott & Kofod 1988: 77)

Ngankikurungkurr (Southern Daly/Ngankikurungkurr)

(180) *peyi* ***gimin*** *ngagadi* *tye,*

there when 1SG.go.PST PST

'When I went there,

mɪyɪ	*guguk*	*waddi*	*lalirr*	*tye.*
plant.food.GEN	wait	3SG.go.PST	eat	PST

they were still eating.' (Hoddinott & Kofod 1988: 219)

Ngankikurungkurr (Southern Daly/Ngankikurungkurr)

(181) *nguddam* *wul-**nimbi*** *Wooliana-nimbi,*
1PL.EXCL.PRS return-ABL Wooliana-ABL
'When we came back from Wooliana,

Rosaria	*yedi*	*di*	*tye.*
Rosaria	3SG.go.PST	cry	PST

Rosaria cried.' (Hoddinott & Kofod 1988: 77)

Kayardild conveys 'when' by the restricted deranking device *-ngarrba*, as in (182), and the restricted deranking device *-jarrb*, as in (183). Both primary strategies are polyfunctional. However, *-ngarrba* shows a higher degree of polyfunctionality than *-jarrb* in that *-ngarrba* is trifunctional (e.g. it is used to express 'when', 'after', and 'because') while *-jarrb* is bifunctional (e.g. it is used for expressing 'when' and 'if'; Evans 1995: 518)

Kayardild (Tangkic)

(182) *ngada* *kurri-n-**ngarrba*** *duujin-ngarrba,*
1SG.NOM see-NMLZ-when young.brother-when
'When I see younger brother,

wuu-ju *wuran-ku* *niwan-ju.*

give-POT food-FUT 3SG-FUT

I will give him the food.' (Evans 1995: 482)

Kayardild (Tangkic)

(183) *nyingka* *jungarra* *dangka-a* *wirdi-**jarrb***,

2SG.NOM big.NOM man-NOM become-when

'When you become a big man,

nyingka *kujiji-wu* *kala-thu.*

2SG.NOM spearhead-FUT cut-POT

you will cut spearheads.' (Evans 1995: 518)

When a speaker employs a construction with a polyfunctional clause-linking device, listeners are assumed to access the various meanings associated with the device. This means that listeners have to select among the different meanings, eventually selecting the right one. In the examples illustrated above, it is likely that speakers will use the device that has the least degree of polyfunctionality in specific communicative scenarios. In particular, if the speaker wants to be understood quickly, it is likely that bifunctional devices will be employed over those that are trifunctional or quadrifunctional given that they pose the least effort to listeners. Put another way, listeners can select the intended meaning in a faster way when the device is bifunctional than, say, trifunctional or quadrifunctional.

3.4.2 Discourse factors in the decision-making process

In the sample, four languages have more than one primary strategy for expressing 'when', one of which is used in specific discourse contexts (4/218=1.83%). In particular, one of the primary strategies is used only in tail-head linkage constructions.[38] In what follows, I discuss how this factor may influence speakers' choice of *when*-devices.

Tail-head linkage is a pervasive discourse pattern cross-linguistically. Stenzel (2016: 437) explains that this strategy functions "like a spotlight in an unfolding theatrical production, directing the audience's attention to specific scenes on the stage, illuminating first one, then moving on to another while leaving the first in the shadows."

Two types have been traditionally recognized: recapitulating and summary constructions. First, recapitulative constructions involve the repetition of the predicate of one clause (the tail clause) in the following clause (the head clause) (de Vries 2005: 364). For instance, in the Lango example in (184), the tail clause is *nìnò* 'he slept' and the head clause is *ì káré àmɛ̂ ònìnò* 'at the time he was sleeping…'.

Lango (Western Nilotic)

(184)	*tɛ̂*	*càmmò dyèl*	*tɛ̂*	***nìnò***.
	3SG.SBJ.and.then.HAB	eat.INF goat	3SG.SBJ.and.then.HAB	sleep.INF

'He ate the goat and he slept.'

[38] Tail-head linkage constructions have been documented under different names, such as "epic repetition" (Soukka 2000: 290), "resumptive linkage" (Devos 2008: 335), "lexical overlap" (Thompson et al. 2007), "backgrounding repetition" (McKay 2008), "head-tail linkage" (Fabian et al. 1998: 163), "anaphoric pro-verbs" (McKenzie 2015: 435-436), "recapitulation of clauses" (Stirling 1993: 17), "echo clauses" (Heath & Hantgan 2018), "anaphoric clause-linkage" (Allen 1987: 143), "conjunctive recapitulation" (Whitehead 2004: 160), and "framing clausal nominalization" (Post 2007: 778).

Ì ***káré*** ***àmɛ̂*** ***ònìnò***…

in time REL 3SG.SBJ.sleep.PFV

‘At the time he was sleeping… (Noonan 1992: 253)

Second, summary tail-head linkage constructions involve the replacement of the lexical verb of the tail clause by a generic or light verb (de Vries 2005; Guérin 2015; Guérin & Aiton 2019), as in the Siroi example in (185).

Siroi (Trans-New Guinea/Madang)

(185) *piro* *mbolnge* *ngukina*.

garden in plant.PST

‘She planted it in the garden.’

tangamba, *nu* *kinyna*.

doing.thus 3SG.SBJ sleep.PST

‘Having done so, she slept.’ (van Kleef 1988: 151)

Until recently, tail-head linkage was regarded as a phenomenon attested mostly in languages spoken in Papua New Guinea (Thurman 1975: 342; de Vries 2005: 363). However, documentation of languages from different macro-areas of the world has made it clear that the geographical extent of this phenomenon is rather large (e.g. South America; Guillaume 2011; Africa; Nicolle 2015: 11; Lovestrand 2018: 32; Australia; McKay 2008:5; Eurasia; Forker & Anker 2019: 19; North America; Martin 1998: 105-106; Wash 2001: 48-459).

As has been argued above, there are languages that may have two primary strategies. Interestingly, one of them is only used in tail-head linkage constructions. What this seems to indicate is that this discourse factor may influence speakers' choice of *when*-devices. Noon shows two primary strategies in the expression of 'when': the bound device *-aa*, as in (186), and the free adverbial subordinator *waa* 'when', as in (187). While the former can only occur in biclausal constructions encoding *when*-clauses, as in (186), the latter can only occur in tail-head linkage constructions, as in (187) (Soukka 2000: 290).

Noon (Atlantic-Congo/Cangin)

(186) *fu* *hay-**aa***, *ɗu* *yah*.
2SG.SBJ come-when 1PL.SBJ.INCL go
'When you come, we will leave.' (Soukka 2000: 224)

Noon (Atlantic-Congo/Cangin)

(187) *en-ee* *laman* *laak-ka* *towu* *ti-yaal* *taahay*.
be-PST chief have-NARR children ATTR-male three
'There was a man who had three sons.'

waa *ya* *laak-ka* *towu-taa* *ti-yaal* *taahay-taa*…
when 3SG have-NARR children-DEF ATTR-male three-DEF
'When he had these three sons…. (Soukka 2000: 290)

3.5 Summary

In this chapter, I have described the range of 'when' clause-linking devices attested in the sample. It has been shown that while strategies without restricted devices are not common in the database, restricted devices seem to be pervasive. The most common subtypes of restricted devices tend to be polyfunctional. In particular, free and bound adverbial subordinators, restricted deranking devices, and correlative constructions tend to be polyfunctional. Intriguingly, monofunctional and polyfunctional generic temporal nouns are almost equally common in the languages of the sample, while non-generic temporal nouns are almost always monofunctional. With respect to rare strategies, it has been shown that demonstratives used as clause-linking devices, verbs used as clause-linking devices, and articles used as clause-linking devices are polyfunctional in the sample.

While discussing the distribution of common and rare *when*-strategies, I have shown that some of these patterns appear in areal clusters. In particular, several Caucasian languages have a construction in which the generic temporal noun appears with a dative case marker (§3.2.3.1). Another rare pattern attested in several languages spoken in Mali is that of a construction marked by a free adverbial subordinator or bound adverbial subordinator plus a universal quantifier meaning 'all' (§3.2.1). Correlative attributive temporal constructions are also cross-linguistically rare (3.3.1). This construction is mainly attested in South Asian languages not genetically related in the database (i.e. Tamil, Indo-Aryan languages, and Kharia).

This chapter has also shown that when languages have more than primary strategy, there are two main factors that may lead speakers to choose one primary strategy over the other. First, there are languages that have two primary strategies in the expression of 'when',

one of which is monofunctional and the other polyfunctional. Of these devices, it is likely the speakers will choose monofunctional devices over polyfunctional devices when they want to express a *when*-relation unambiguously. Note that there are languages in which both devices are polyfunctional, one of which may be bifunctional and the other one trifunctional or quadrifunctional. In this scenario, if the speaker wants to be understood quickly, it is likely that bifunctional devices will be employed over those that are trifunctional or quadrifunctional given that they pose the least effort to listeners. Second, there are languages that have more than one primary strategy for expressing 'when', one of which is only used in tail-head linkage constructions.

CHAPTER 4

While-clauses

While-clauses express situations of co-occurrence or concomitance, i.e. situations taking place at the same time as the situation expressed in the figure clause (Dixon 2009: 10; Hetterle 2015: 47). Abbi (1991: 245) notes that there are cases where the duration of the figure clause situation is at least as long as that of the ground clause (e.g. 'All the while Kim was singing, Mary was dancing') and cases where the figure clause is a point of time or short time interval within the ground clause (e.g. 'While the guests were dancing, the clock struck midnight'). Accordingly, there seems to be a continuum of duration (Comrie 1985: 2; Xrakovskij 2009: 30). The languages of the sample do not have a specific construction applicable only to one type of overlap.

While-constructions along with *when*-constructions have been described as two types of 'simultaneity' (Xrakovskij 2009: 30). However, Kortmann (1997: 84) mentions that the two types differ from one another in an important way. The most important difference is their reference time. *When*-constructions are non-specific with respect to their reference time in that the exact extent of the temporal meaning is unspecified and subject to variation (Diessel 2008: 470; Cristofaro 2012; Hetterle 2015: 47; Guerrero 2021). That is, the reference time of *when*-constructions (before, after, or around the time of the figure clause) can only be recovered from the discourse context (Cristofaro 2003: 159). In a similar fashion, Declerck (1997) shows that *when*-clauses can specify either a time concurrent with the figure clause situation (*John will leave when I arrive*), a time to which the time of the figure clause is related (*When I arrive, John will already have left*), or the occasion(s) at which the situation of the

figure clause actualizes (*When a person has thoughtlessly or deliberately caused us pain or hardship, it is not easy always to say*). However, this interpretation largely depends on the discourse context. Kortmann (1997: 182) mentions that *when*-clauses cover a large part of the semantic spectrum of temporal adverbial relations, with the precise reading essentially depending on the discourse context (including TAM) of the construction, and apart from that, on the degree of delicacy one wants to adopt in classifying the relevant reading in a given context. In contrast, *while*-constructions have a specific reference time in that they refer to a length of time (*time during*; Dixon 2009: 10) and can only show a reference time involving situations that occur absolutely or partially simultaneously.

To keep the scope of the discussion manageable, I disregard here constructions in which the ground clause specifies the manner in which the situation expressed in the figure clause is carried out (König 1995: 70). This type of construction answers the question "How?" (e.g. 'I entered stumbling'; König 1995: 70; Kortmann 1997: 87).[39] However, although manner clauses are excluded from the present study, I discuss in §4.3.2 various Indo-Aryan constructions used for expressing manner. They are used to illustrate one main theoretical point concerned with language contact situations.

[39] To the best of my knowledge, König (1995: 66), Van Lier (2009: 194), and Hetterle (2015) are the only cross-linguistic studies that have explored manner constructions (e.g. *he studied exerting himself*). Based on these studies, the following properties seem to be characteristic of manner constructions. First, manner clauses often appear with imperfective or progressive markers. This is not surprising, because manner clauses usually express durative situations. That is, they specify how the situation in the figure clause is performed and focus on the entire duration of the figure clause situation (Hetterle 2015: 78). Second, manner clauses tend to be encoded by deranking devices (e.g. converbs; Hetterle 2015: 93). Third, manner constructions tend to have a same-subject constraint, and the subject is often deleted. This stems from the fact that the ground clause elaborates on the situation expressed in the figure clause, and the manner of performance in achieving the figure clause situation typically pertains to the same participant, namely the agent of the figure clause situation (Hetterle 2015: 102). Fourth, same-subject manner constructions tend not have a constructional alternative that covers different-subject scenarios (Hetterle 2015: 105). Fifth, clauses that express manner are significantly more strongly nominalized across languages than clauses that express other types of adverbial relations (Hetterle 2015: 175).

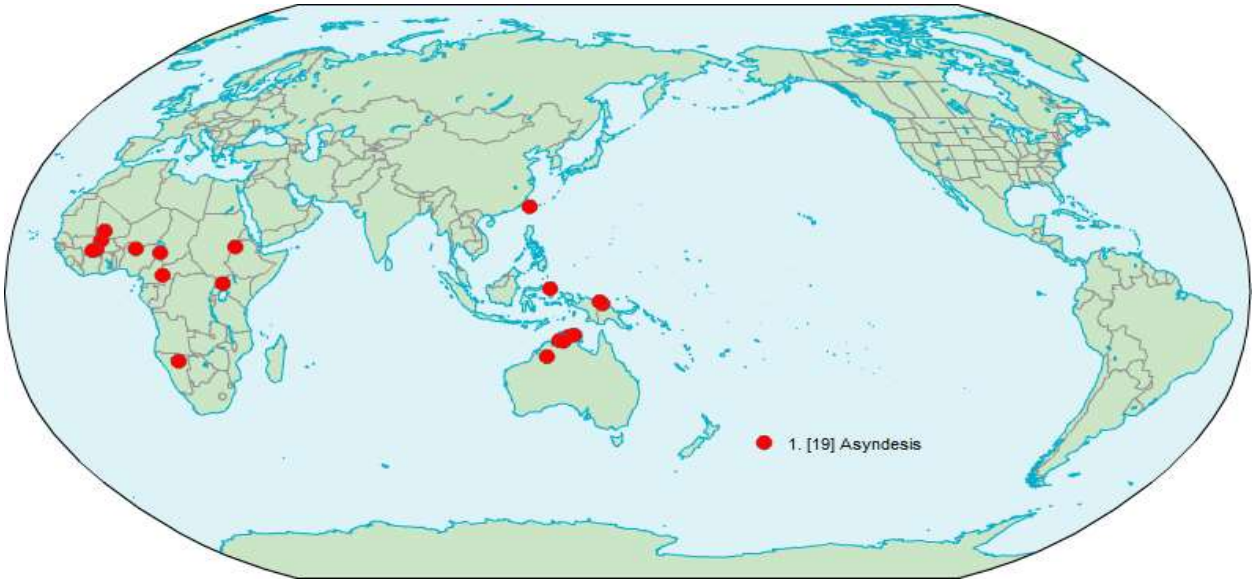
In this chapter, I show the range of strategies by which *while*-constructions are formed in the sample. The chapter is organized as follows. First, I discuss the languages which convey 'while' by means of strategies without restricted devices (§4.1). Then, I introduce the various types of restricted devices found in the database (§4.2). The discussion of restricted devices is organized in two parts. In the first part, special attention is paid to the most common restricted devices: adverbial subordinators (§4.2.1), deranking devices (§4.2.2), and temporal nouns (§4.2.3). Following this is a detailed treatment of the less common *while*-devices (§4.3). This discussion begins with the analysis of correlative constructions (§4.3.1) and continues with the analysis of verb-doubling (§4.3.2), adverb(ial)s meaning 'still' (§4.3.3), and verbs used a clause-linking devices (§4.3.4). In exploring the range of restricted devices used in the expression of 'while', I pay close attention to their mono/polyfunctionality and their cross-linguistic distribution. Although I note that restricted devices are more common than strategies without restricted devices in the expression of 'while', I show that strategies without restricted devices seem to be frequent in specific areas (e.g. asyndesis in Africa and Australia). Unlike *when*-clauses, *while*-clauses tend not to have more than one primary strategy. Accordingly, an analysis of the factors that may lead speakers to choose one primary strategy over the other is not pursued here. The discussion in this chapter is then summarized (§4.4). Note that when I mention that a device is polyfunctional, I do not show the range of meanings within the domain of adverbial clauses that a particular device can have. The reader is referred to Chapter 9 for more information related to the polyfunctionality of restricted devices.

4.1 Strategies without restricted devices

In Chapter 3, I showed that asyndetic constructions with 'when' inferences are rare. In contrast, many languages of the database employ strategies without restricted devices for conveying 'while': asyndesis and general coordinating devices. Of these strategies, asyndetic constructions with a 'while' interpretation are more frequent than general coordinating devices in the sample. In total, there are nineteen languages coded in the database as having asyndetic *while*-constructions (19/218=8.71%). Let us have a brief look at the cross-linguistic distribution of this strategy.

As is shown in Map 6, the distribution of asyndetic constructions is skewed, showing a peak in African languages (7/19=36.84%). Note that various Australian languages also convey 'while' by means of asyndetic constructions (5/19=26.31%). This pattern also occurs in Papunesia, but it is absent in Eurasia, North America, and South America in the database.

Map 6. Asyndetic *while*-constructions



In the Jalkunan example in (188), two clauses appear one after the other without any linking device. In order for the 'while' relation to be inferable from this construction, the ground clause must be marked by the progressive marker *-yà* and the figure clause must appear in the imperfective (Heath 2017: 301).

Jalkunan (Mande/Western Mande)

(188)	*Zàkîì*	*cíé*	*sò-**yà**,*	*mā*	*kú*	***bɔ́ɔ́**.*
	Zàkîì	be.PST	enter-PROG	1SG.SBJ	begin	exit.IPFV

'While Zaki was entering, I began to leave.' (Heath 2017: 307)

Mauri & Van der Auwera (2012: 396) show that TAM values may play a role in asyndetic constructions in that they serve as a pragmatic trigger of the 'while' interpretation (Verstraete 2014: 223). In particular, a tense-aspect marker, such as a continuative, durative, or imperfective can conventionally convey a *while*-meaning (Chung & Timberlake 1985: 257; Thompson et al. 2007: 254; Hetterle 2015: 78). This also holds for the nineteen languages of the sample in that a tense-aspect marker, such as a continuative, durative, or imperfective can conventionally convey a *while*-meaning in an asyndetic construction. More examples that support this claim follow.

Another asyndetic construction with a 'while' interpretation is found in Supyire. In this language, the specific combination of a ground clause marked by the progressive marker *u* conventionally renders a 'while' interpretation, as in (189) (Carlson 1994: 559). In (190), the linkage between the two clauses is not signaled by any linking device. The *while*-meaning in

the Yelmek example in (190) is achieved by using the progressive marker *kai* that occurs in the ground clause.

Supyire (Atlantic-Congo/Senufo)

(189) *kà* *pi* *í* *ḿ-pá* *jwó* *ná* *ú* *é*

and 3PL.SBJ NARR INTR-come speak with 3SG.POSS with

They came and spoke with her

ú ***u*** *mɛɛní* *sùù*.

3SG.SBJ.COMP PROG voice.DEF cry

while she was crying.' (Carlson 1994: 559)

Yelmek (Bulaka River/Bulaka River)

(190) *ked=i* *w-owlo-pu* ***kai*** *k-ekəlme-a-ni*.

now=FOC DIST.PST-sing-PFV PROG REC.PST-come.PL.SBJ-REC.PST-DIR

'He sang while they came.' (Gregor 2021: 366)

The discussion now turns to those languages that convey 'while' by means of general coordinating devices. Unlike asyndetic constructions, there are only three languages in the sample that have *and*-constructions with a 'while' interpretation (3/218=1.37%). In (191), the construction is encoded by the general coordinating device *ngarra* 'and'. This is the primary strategy for conveying 'while' in Nakkara (Eather 1990: 316).

Nakkara (Mangrida/Nakkara)

(191) *nakkamana* *ngarabba* *Ø-yu-rda* ***ngarra*** *nga-rreddja-nga* *njonja*.
dog 1SG.POSS 3SG-sleep-CONTEMP and 1SG-cook-CONTEMP fish
'My dog slept while I cooked the fish' (Eather 1990: 316)

Although the expression of 'while' by general coordinating devices is rare in the present study, it has been noted that many Polynesian languages convey 'while' by the general coordinating device **ma* (Lynch & Moyse-Faurie 2004: 460). Interestingly, Eastern Polynesian languages have a construction in which the ground clause and the figure clause are linked by a general coordinating device that must be followed by an article. The interested reader is referred to Lynch & Moyse-Faurie (2004: 464).

4.2 Restricted devices

The semantic relation between the ground and the figure clause in a *while*-construction is expressed by different clause-linking devices. The task of the present section is to dissect this variation in a systematic way. I start by homing in on what can be considered the most common restricted devices attested in the database. For this, I distinguish three types: restricted adverbial subordinators, restricted deranking devices, and temporal nouns. I am interested not only in describing common trends of grammatical coding in this functional domain, but also in less common trends. Accordingly, a description of less common restricted devices is also provided. These are organized into: correlative constructions, verb-doubling, adverb(ial)s meaning 'still', and verbs used as clause-linking devices. In discussing the range of common

and less common *while*-devices attested in the sample, I provide a general picture of their cross-linguistic distribution and their mono/polyfunctionality.

4.2.1 Restricted adverbial subordinators

While-constructions tend to be realized by restricted adverbial subordinators in the sample (90/218=41.28%). Restricted adverbial subordinators may be free or bound. Example (192) provides an instance of a free adverbial subordinator. In (192), the ground clause appears with *palate* 'while'.

Bilua (Solomons East Papuan/Bilua)

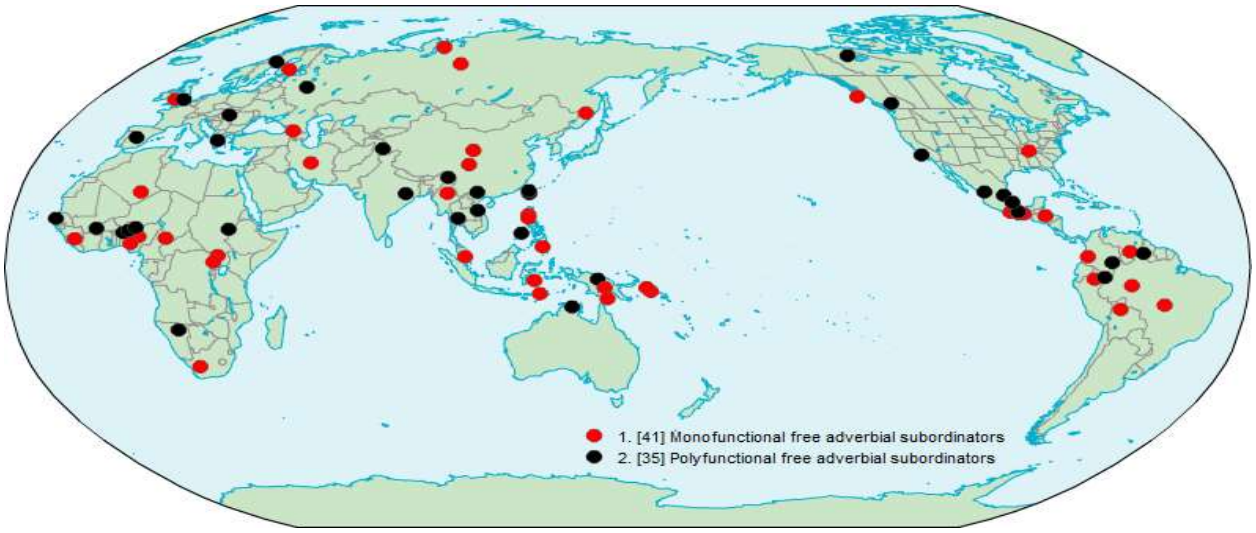
(192) *Australia el=o* ***palate*** *inio,*
Australia stay=NOM while FOC
'While I lived in Australia,

a=qe=ve kubo aza-aza=ma quli.
1SG=see=REM.PST many RDP-various=3SG.F thing
I saw many things.' (Obata 2003: 225)

Map 7 is concerned with free adverbial subordinators. Of the seventy-six languages that use free adverbial subordinators as a primary strategy for denoting 'while' (76/90=84.45%), forty-one languages have monofunctional free adverbial subordinators

(41/76=53.94%), and thirty-five languages have polyfunctional free adverbial subordinators (35/76=46.06%).[40]

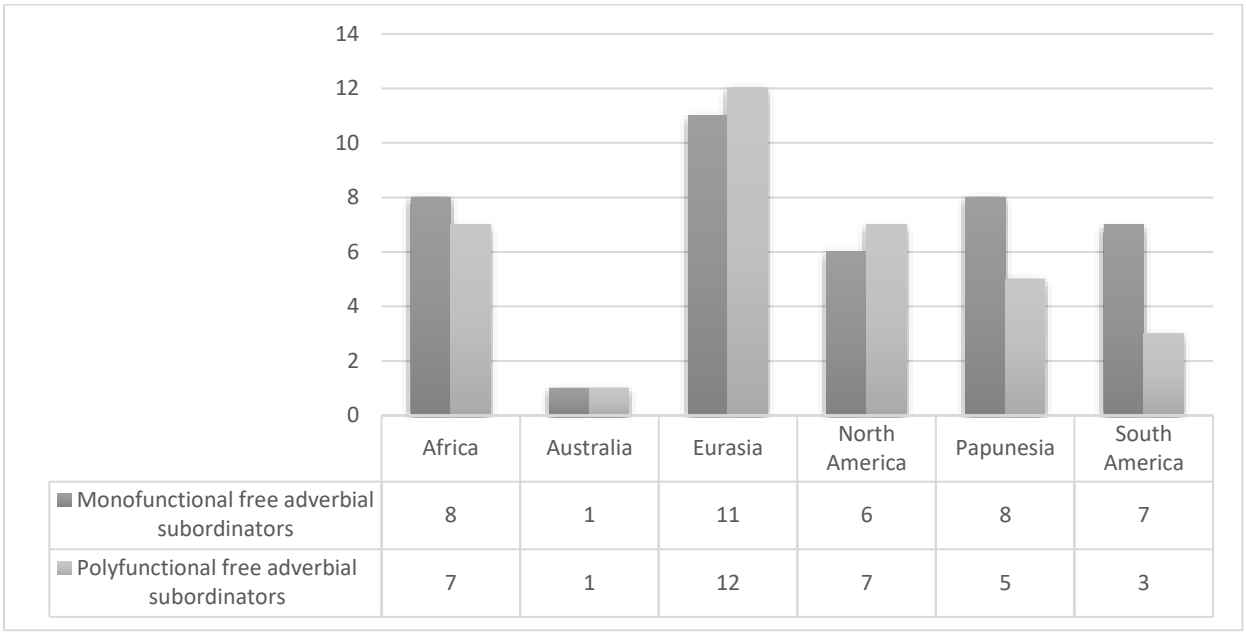
Map 7. Free adverbial subordinators encoding *while*-clauses



From a quantitative point of view, several observations can be made from Figure 7. First, monofunctional and polyfunctional free adverbial subordinators are almost non-existent in Australia. Rather, languages of this area convey 'while' with asyndetic constructions (see §4.1) and restricted deranking devices (see §4.2.2 below). Second, in Africa and North America, the number of languages with monofunctional and polyfunctional free adverbial subordinators is almost the same. Third, in Papunesia and South America, monofunctional free adverbial subordinators slightly outnumber polyfunctional free adverbial subordinators. Fourth, Eurasia displays a higher concentration of languages with monofunctional and polyfunctional free adverbial subordinators than the other just-mentioned areas.

[40] One interesting type of free adverbial subordinator is attested in Chon languages. Languages of this family express *while*-relations by means of a free adverbial subordinator that has to agree with the participant introduced in the ground clause (Fernández Garay 2010).

Figure 7. Free adverbial subordinators encoding *while*-clauses per macro-area

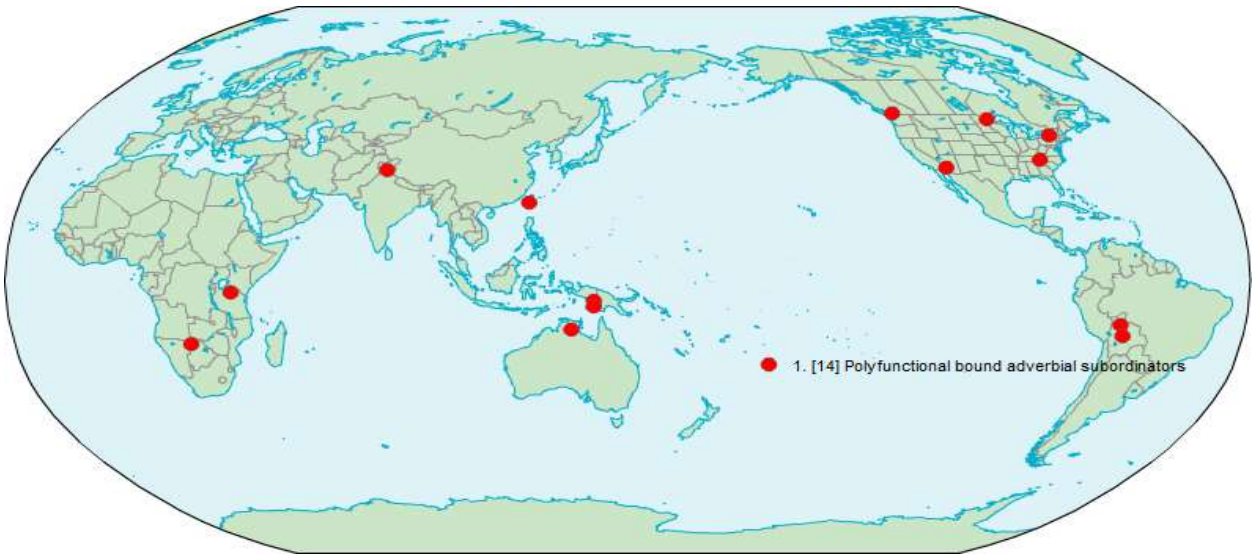


The discussion now turns to bound adverbial subordinators. Example (193) from Ts'ixa, illustrates the use of a bound adverbial subordinator. In this construction, the ground clause is marked by *=sè* 'while'. Unlike free adverbial subordinators, only fourteen languages have bound adverbial subordinators for conveying 'while' (14/90=15.55%).

Ts'ixa (Khoe-Kwadi)

(193) *ʔé.ǹ* *k'uí-tótùm̀-nà-hà* *tsé* *kò* *Mãã́* *ʔò* *kũũ̀̃=**se***.
3PL speak-INT-J-PST 1PL IPFV Maun ALL go=while
'They talked a lot while we were going to Maun.' (Fehn 2016: 272)

Map 8. Bound adverbial subordinators encoding *while*-clauses



Map 8 shows that bound adverbial subordinators are found in all macro-areas. However, they seem to be more common in North America. Note that all bound adverbial subordinators are polyfunctional. Interestingly, unlike the Ts'ixa example in (193), most bound adverbial subordinators used for expressing 'while' are prefixes (9/14=64.28%).

4.2.2 Restricted deranking devices

Restricted deranking devices also tend to encode *while*-constructions in the sample. This device is exemplified in the construction in (194) from Ingush, where the ground clause occurs with the deranking device *-azh*.

Ingush (Nakh-Daghestanian/Nakh)

(194)	*t'aaqqa*	*veo*	*hama*	*du'azh*	*wa-xeishaa*	*daagh-**azh***,
	then	1PL	thing	eat.CVB.SIM	down-sit.CVB.ANT	sit-CVB.SIM

'Well, while we were sitting eating,

yz *hwa* *siesag* *hwuona* *t'y=chuuxar*.

DEM 2SG.POSS wife 2SG.DAT at=shout.W.PST

your wife harped at you.' (Nichols 2011: 603)

Eighty-four languages have a restricted deranking device as a primary strategy for denoting 'while' (84/218=38.53%). These devices may be monofunctional or polyfunctional. Example (195) provides an instance of a monofunctional deranking device. In this construction, the ground clause and figure clause are linked by *-gú*. A typical example of a polyfunctional deranking device can be found in Kaluli. In this language, 'while' is conveyed by *-abiki*, as is shown in (196).

Tommo So (Dogon)

(195) *Tòŋò-Tóŋó* *yàà-**gú***, *mòtó=nɛ* *nùmb-ì-m*.

Tongo-Tongo go-while motorcycle=OBL fall-PFV-1SG

'While I went to Tongo-Tongo, I fell off the motorcycle.' (McPherson 2013: 493)

Kaluli (Bosavi)

(196) *Yalibi* *wena* *s-**abiki***, *Ganea-ya:* *miseyo:* *a:na* *nagalo:*.

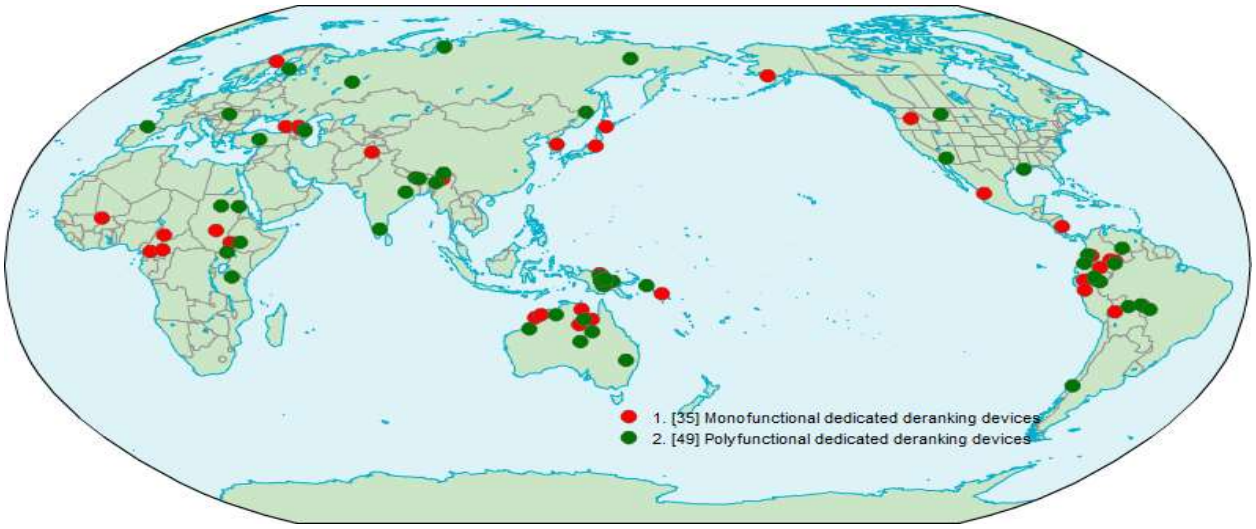
Yalibi here sit-while Ganea-POSS head.TOP there pain

'While Yalibi was here, Ganea had a headache.' (Grosh & Grosh 2004: 72)

Map 9 reveals that polyfunctional deranking devices (49/84=58.33%) are more common than monofunctional deranking devices (35/84=41.67%). Both types of devices are

attested in all the macro-areas. However, their distribution across macro-areas is not homogeneous.

Map 9. Restricted deranking devices encoding *while*-clauses

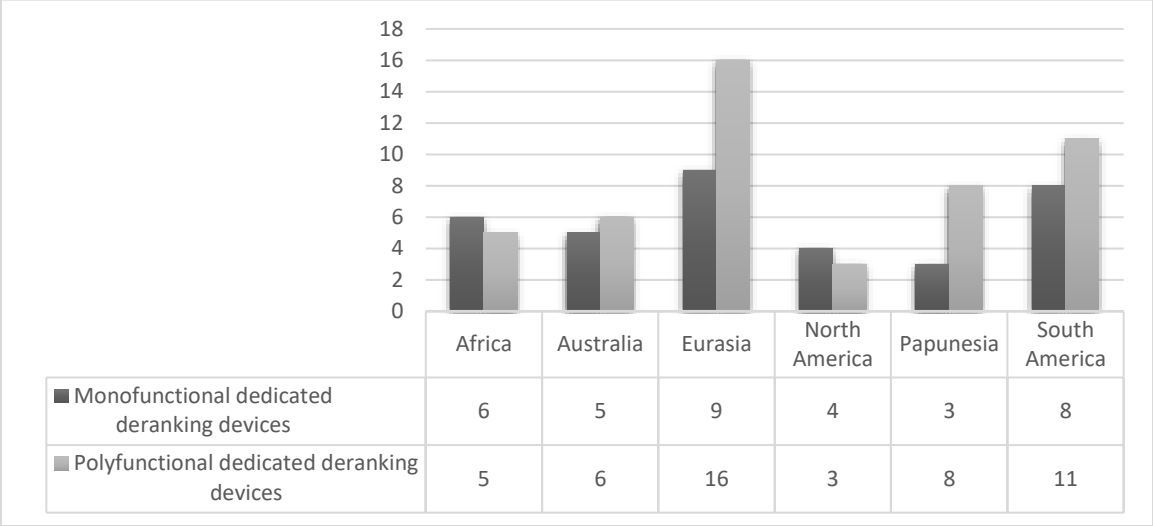


As can be read off Figure 8, *while*-constructions tend to be formed by restricted deranking devices in Eurasia and South America.[41] Restricted deranking devices used in the expression of 'while' occur next most frequently in Africa,[42] Australia, and Papunesia. Unlike the macro-areas mentioned before, North America hosts scarce occurrences of restricted deranking devices. Polyfunctional *while*-constructions are common in Australia, Eurasia, Papunesia and South America. On the other hand, monofunctional restricted deranking devices slightly outnumber polyfunctional devices in Africa and North America.

[41] *While*-restricted deranking devices are common in the sample of the present study in Arawakan languages, Quechuan languages (cf. van Gijn 2011: 11), Huitotoan languages, Lule-Vilela (cf. Golluscio 2010), Macro-Je languages (cf. Rivail Ribeiro 2012: 40), and Tupi-Guarani languages (cf. Nicholson 1975; Anchieta 1990; Duarte 2001; Rose 2009; Seki 2014).

[42] This seems to be a common feature of genetically-unrelated languages spoken in the Ethiopian region (Amha & Dimmendaal 2006).

Figure 8. Restricted deranking devices encoding *while*-clauses per macro-area



As was shown in §3.2.2, various oblique case markers can be used with a 'when' function. *While*-constructions are also encoded by oblique case markers in various sample languages. In total, ten languages employ oblique case markers for denoting 'while' (10/84=11.90%). The most common oblique markers are locative case markers (4/10=40%). These markers are monofunctional in the sample. Consider the Huitoto example in (197). In this language, 'while' is expressed by the locative case marker *-mo*. Wojtylak (2020: 497) mentions that *-mo* appears not only in noun phrases, but it can also extend to cover *while*-meanings.

Huitoto (Huitotoan/Huitoto)

(197) *gaɨri-d-e-**mo***, *jɨaɨ-kɨno* *rii-ya*.
gather-link-3PL-LOC other-CL.story arrive-NMLZ
'While (the people) were gathering, another message arrive.' (Wojtylak 2020: 497)

There is another type of case marker used adverbially in the sample. In four languages, comitative case markers can be employed for signaling 'while' (4/10=40%). These may be monofunctional (2/4=50%), as in the Mosetén example in (198), where the ground clause bears the comitative case marker *-tom*, or polyfunctional (2/4=50%), as in the Momu example in (199), where the *while*-relation is expressed by *-b*. Comitative markers used for conveying 'while' are common in the languages of the Athabaskan-Eyak-Tlingit family (e.g. Tlingit, Slave, and Sarcee; Stassen 2009: 341). Note that this is not attested in the sample languages belonging to this family.

Mosetén (Mosetenan)

(198) *yi'-si'-**tom*** *phe-ya-k-dye'*, *tits-o-n'-yi-tyi'-in* *ködi-chhë…*

say-LINK.F-COMIT talk-VS-?-NMLZ grab-VS-PROG-VS-LINK.M-PL tail-SUPERESS

'While he said this, he took his tail…' (Sakel 2002: 440)

Momu (Baibai-Fas)

(199) *a-ki-fi-u-**b**,* *abo* *eru* *nu* *onatin.*

IPFV-sleep-3PL.DU-NMLZ-COMIT frog that just one.separate

'While they were sleeping, the frog left them.' (Honeyman 2016: 497)

An interesting use of restricted deranking devices in some languages of the sample should be mentioned here. Various languages of the sample have extended the domain of *while*-clauses to encroach on that of constructions that are functionally similar to complement clauses. Of the eighty-four languages that have a restricted deranking device for denoting

‘while’, eighteen languages employ this strategy in constructions in which the figure clause appears with a ‘perception predicate’ (e.g. ‘to see’, ‘to hear’) (18/84=21.42%). This construction at first glance looks as if it were a complement clause construction. However, a closer analysis reveals that it is an adverbial clause construction. In (200), the figure clause predicate *en-* ‘see’ entails reference to another situation; we would thus expect it to take a clause as its complement. Syntactically, however, the clause *cɛmídɪɛ tɔkɔbˀ* ‘while you were farming yesterday’ is adjoined to the figure clause predicate *en-* ‘see’. Therefore, *cɛmídɪɛ tɔkɔbˀ* ‘while you were farming yesterday’ is not a syntactic argument of *en-* ‘see’.

Ik (Kuliak)

(200) ***en****-ukot-í-á=bee* *bia* *cɛm-ídɪ-**ɛ*** *tɔkɔb-ˀ*.

see-and-1SG.SBJ-REAL=PST 2SG.SBJ fight-2SG-while farming-INSTR

‘I saw you while you farmed yesterday.’ (Schrock 2014: 508)

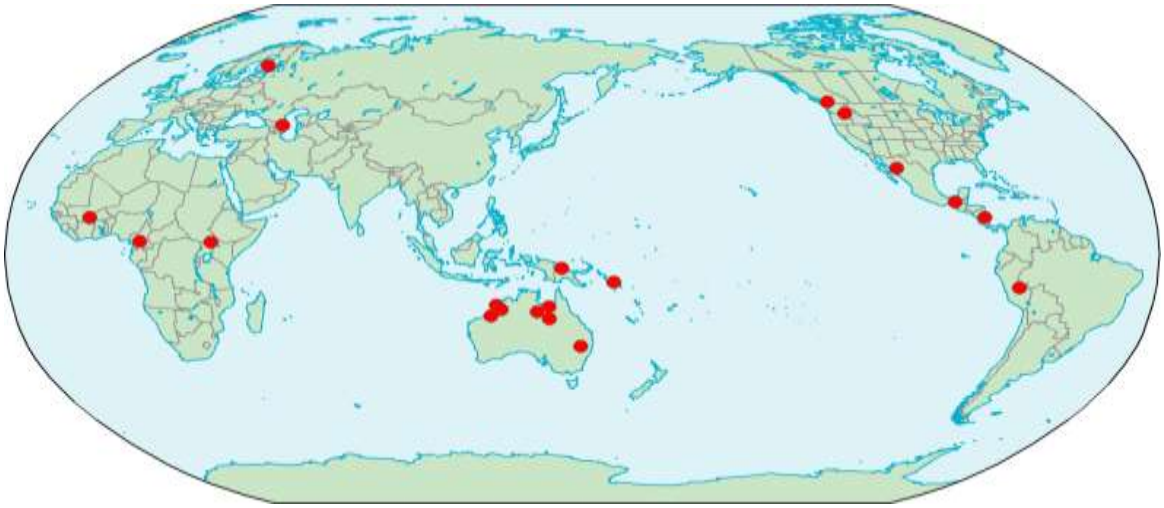
Schmidtke-Bode (2014: 262) shows that in many cases “it is the complement-taking verb that avails itself of a looser, adjunctive type of clause combination, and that we are hence dealing with an adjunct > complement pathway”. Accordingly, the Ik example in (200) should be considered a construction not (yet) fully grammaticalized into a complement clause. That is, it should be considered a construction still closely related to adverbial clauses. If we characterize the construction in (200) through Dixon’s (1995, 2006) lens, it does not qualify as a complement clause, but can be considered a complementation strategy.

This construction is common in various Australian languages of the sample. Note that it may also be used in many Australian languages for a relative function (e.g. ‘they saw the

two eagle hawks while they/who were sitting in the middle of their camp'). This has led researchers to apply the terms "adjoined relative clause" (Hale 1976: 78), "general subordinate clause" (Dixon 2002: 88), "general modifying clause", (Nordingler 2006: 36), and "relative clause complements clause constructions" (Hill 2011: 306). While the terms "adjoined relative clause", "general subordinate clause", and "general modifying clause" are generally applied to constructions that may be interpreted as adverbial clauses or relative clauses, the term "relative clause complement" is generally used for referring to constructions that are employed as a complementation strategy or as a relative clause. In this dissertation, I use the term 'immediate perception' *while*-clauses (Noonan 2007: 142) to refer to this construction.

An overview of the distribution of the languages investigated here with immediate perception constructions is given in Map 10. This construction is found in all macro-areas. However, as was mentioned above, they seem to be more common in the Australian languages of the sample (7/18=38.8%). This is found in Bardi, Gamilaray, Kalkatungu, Kayardild, Nyangumarta, Nyigina, and Wambaya. This construction is also attested in other Australian languages, not included in the sample, such as Kuku Yalanji (Patz 2002: 172), Warrongo, (Tsunoda 2011: 622), Muruwari (Oates 1988: 60), Ngiyama (Donaldson 1980: 287), Bilinarra (Meakins & Nordlinger 2014: 428), Kurrama (Hill 2011: 307), Martuthunira (Dench 1995: 256), Wangkajunga (Jones 2011: 284), and Yanyuwa (Kirton & Charlie 1996: 174).

Map 10. Immediate perception constructions expressing *while*-relations



In what follows, some examples are discussed to give a clearer idea of why these constructions should be considered complementation strategies and not complement clauses.

The example in (201) is one of the primary strategies used for conveying 'while' in Nyangumarta. In this construction, the figure clause and ground clause are linked by *-ja*. At first glance, this example looks like a complement clause construction. However, it is structurally distinct from a complement construction for the reason that the ground clause *wapakanaja* 'while it hopped' does not fill an argument slot. Instead, this argument slot is filled within the first clause by the noun phrase *kangkuru* 'kangaroo', while the ground clause merely provides information about the situation expressed in the first clause.

Nyangumarta (Pama-Nyungan)

(201)	*yija*	*manganya-lu*	*yirri-rni*	*kangkuru*	*wapaka-na-**ja***.
	truly	echidna-ERG	see-NON.FUT	kangaroo	hop-NMLZ-ABL

'Truly the echidna saw the kangaroo while it hopped.' (Sharp 2004: 379)

In Kuuk Thaayorre, *while*-relations are expressed by an immediate perception construction marked by the restricted deranking device *-marr* ‘while’, as in (202). This construction looks like a complement clause. However, close inspection reveals the complement clause analysis to be inappropriate. The object argument of the figure clause predicate *nhaath* ‘watch’ is not filled by the ground clause *kalmarr nhaathm* ‘while carrying it’, but rather by the noun phrase *pelnan* ‘them’. Gaby (2006: 535) mentions that it cannot be argued that the noun phrase *pelnan* ‘them’ forms part of ground clause since if this were the case it should receive ergative case marking as the subject of a transitive verb, viz. *ngali* ‘we two’. Instead, the noun phrase *pelnan* ‘them’ appears in the accusative.

Kuuk Thaayorre (Pama-Nyungan)

(202) *ngali* *pelnan* *kal-**marr*** *nhaath-m.*
1DU.ERG 3PL.ACC carry-while watch-IPFV
‘While they carried it, we two watched them.’ (Gaby 2006: 535)

Before I leave the present section, it may be worthwhile to consider the following. In almost all languages of the sample, the ground clause (i.e. the perceived situation) is the clause marked by a restricted deranking device. Interestingly, there is one language in the database where the figure clause is marked by a restricted deranking device. Wegener (2012: 276) notes that in Savosavo, the clause appearing with the perception predicate *-eghe* ‘to see’ is the clause encoded by the restricted deranking device *-a* ‘while’, as in (203). With this in mind, the construction in (203) should be read as follows: ‘he seeing the chief’s daughter, she was sitting.’ Wegener (2012: 276) and Evans (1995: 515) mention that while it is common for the ground situation to appear with a clause-linking device, it is rare for the figure clause to occur

with a clause-linking device. Wegener (2012: 276) shows that other languages where this pattern is attested are Kayardild, Mian, and Kolyma Yukaghir. Of the strategies analyzed in the present chapter, this is the only construction attested in the sample in which the figure clause appears with a clause-linking device. This indicates that ground clauses of *while*-constructions tend to be marked by a clause-linking device in the database.

Savosavo (Solomons East Papuan/Savosavo)

(203)	*lo=na*	*bua*	*lo*	*kaunga*	*lo-ma*	*adaki*	*gnuba*
	3SG.M=NOM	go.SIM	3SG.M	elder	3SG.M-GEN.SG.F	woman	child

*k-eghe-**a**=gho*	*te*	*epi-ale-i.*
3SG.F.OBJ-see-while=3SG.F.NOM	EMPH	sit-IPFV-FIN

'As he went, he saw the chief's daughter while she was sitting there.' (Wegener 2012: 278)

4.2.3 Temporal nouns

One option, characteristic of thirty-one sample languages (31/218=14.22%), is to express 'while' by temporal nouns, as a primary strategy. These temporal nouns may be generic, as in (204), where the ground clause occurs with *mpe* 'time', or non-generic, as in (205), where the *while*-relation is explicitly signaled by *tɛ́* 'duration'. Each of these temporal nouns is outlined in the following.

Hatam (West Papuan)

(204) ***mpe*** *di-no* *di-bong* *leu* *su*,

time REL-3SG 1SG.SBJ-sleep from already

'While I slept (lit. at the time I slept),

lene *tungwa* *gom* *kwei* *nggimang* *dit-de* *radio*.

then human one come steal 1SG-POSS steal

someone came and stole my radio.' (Reesink 1999: 130)

Eton (Atlantic-Congo/Bantu)

(205) *H-Ǹ-**tɛ́*** *mə-Ltɛ́* *L-jàŋà* *Ǹ-kúŋkúmá*,

AUG-3-duration 1SG.SBJ-PRS INF-wait 3-chief

'While I am waiting for the chief (lit. the duration I am waiting for the chief),

mə-à-láŋ *tʃətʃàd*.

1SG.SBJ-S.PRS-read a.bit

I am reading a bit.' (Van de Velde 2008: 359)

4.2.3.1 Generic temporal nouns

The number of languages with generic temporal nouns amounts to twenty-three (23/31=67.74%). The construction in (206) shows an example of a language that relies on a monofunctional generic temporal noun to signal a *while*-relation. On the other hand, example (207) from Toqabaqita illustrates the use of a polyfunctional generic temporal noun.

Makasae (Timor-Alor-Pantar/Makasae-Fataluku-Oirata)

(206) ***watu*** *a'a* *ani* *sirbisu* *ere,* *gi* na'u *au* *mi-mi.*
time REL 1SG.SBJ work DEM 3SG.SBJ just COMPL sit.SG-RDP
'He just sits about while I am working (lit. at the time I am working).' (Huber 2008: 112)

Toqabaqita (Austronesian/Oceanic)

(207) *qani-a* *alo* ***manga,*** *kai* *qaaqako.*
eat-3SG.OBJ taro time 3SG.FUT be.warm
'He eats the taro while it's warm (lit. at the time it's warm).' (Lichtenberk 2008: 1175)

Map 11 gives a survey of the distribution of languages with generic temporal nouns that are monofunctional and polyfunctional. The picture is relatively clear. Polyfunctional generic temporal nouns are more common than monofunctional generic temporal nouns. This cross-linguistic picture contrasts with the one uncovered for generic temporal nouns used in the expression of 'when'. As was shown in §3.2.3.1, monofunctional and polyfunctional generic temporal nouns used for forming *when*-constructions are almost equally common in the languages of the sample. Some comments on the macro-areal distribution of the sample languages are in order here.

Map 11. Generic temporal nouns encoding *while*-clauses

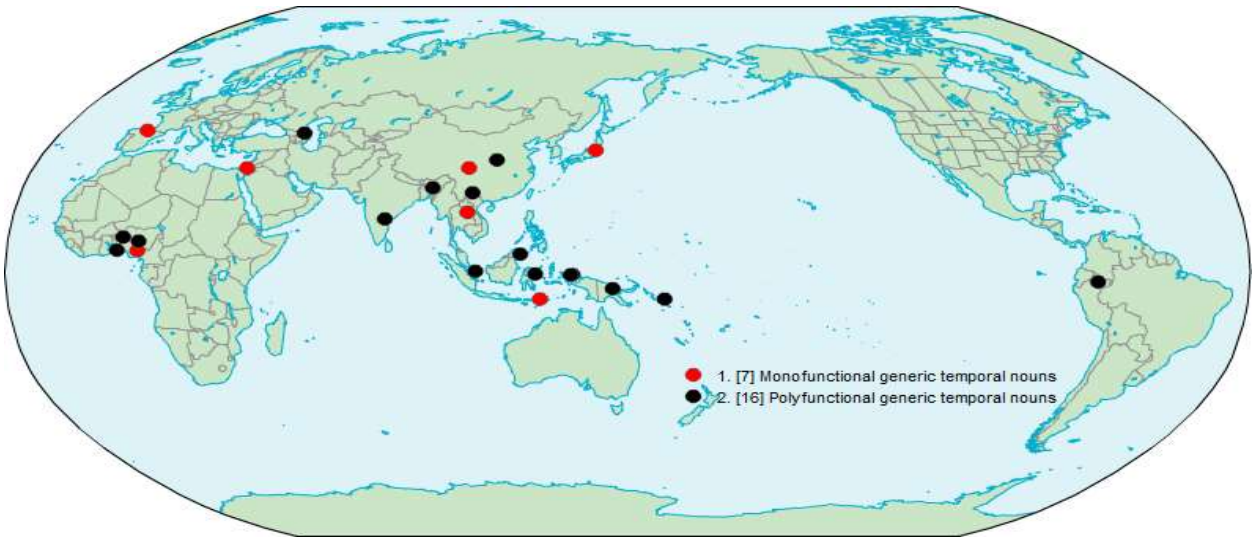


Figure 9. Generic temporal nouns encoding *while*-clauses per macro-area

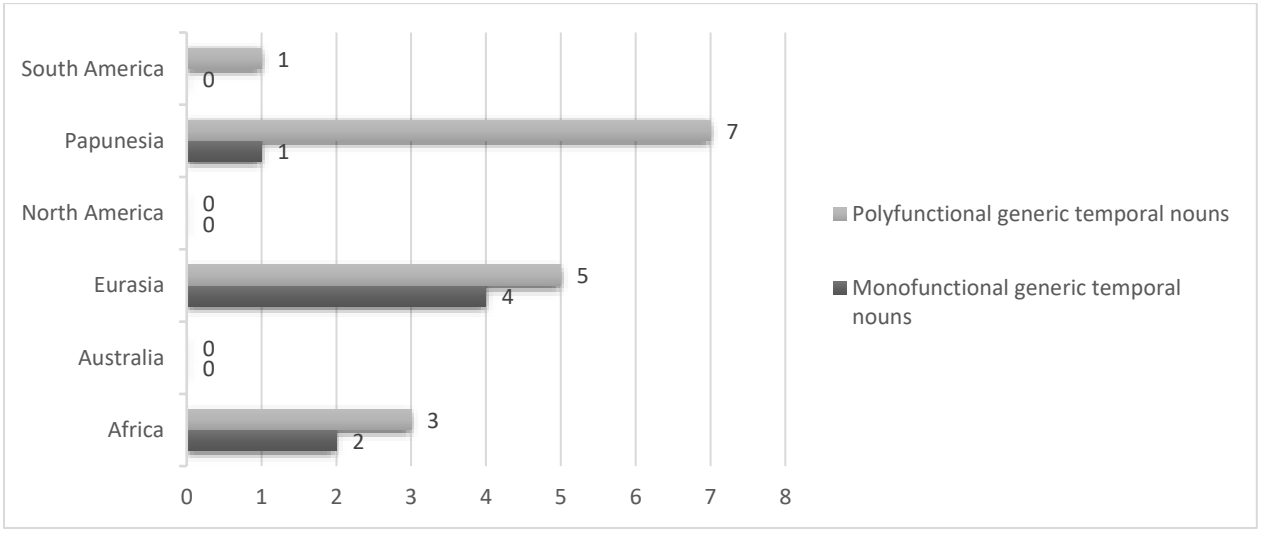


Figure 9 allows for several observations. The first and most important finding is that *while*-constructions realized by generic temporal nouns are more frequent in Eurasia and Papunesia than in other macro-areas. Polyfunctional generic temporal nouns are more common than monofunctional generic temporal nouns in both macro-areas, in particular in Papunesia.

Another observation is concerned with North America and Australia, where not a single language investigated uses generic temporal nouns for expressing ‘while’.

Generic temporal nouns may be bare or may appear with case markers or adpositions. Of the twenty-three languages that encode *while*-construction with generic temporal nouns, seventeen languages have bare generic temporal nouns (17/23=73.91%). In Lao, the generic temporal noun *vêlaa2* ‘time’ is bare in that it lacks flagging, i.e. case markers or adpositions, as can be seen in (208). The remaining languages have generic temporal nouns that occur with locative case markers or locative adpositions (6/23=26.09%). This indicates that there is a preference for not indicating the oblique function of the generic temporal noun. Recall that the generic temporal noun in attributive temporal constructions denoting ‘when’ also tends to be bare (see §3.2.3.1).

Lao (Tai-Kadai/Kam-Tai)

(208) ***vêlaa2*** *thiil* *kamlang2* *pam4* *kan3* *juul* *han5* *laø,*
time REL PROG wrestle COLL be.at DEM.DIST PERF
‘While they were wrestling there (lit. at the time they were wrestling there),

mèèn1 *taang1* *khon2* *kaø* *taaang1* *ngaagw4* *luut5* *qòòk5*…
COP other person TOP.LINK other sword slip exit
each of their swords slipped…’ (Enfield 2007: 210)

An interesting question not addressed in detail here is concerned with the following domain. As was shown above, generic temporal nouns used in the expression of ‘while’ tend

to be bare. The question is: do other relativized temporal nouns also tend to be bare? Since the sources of the sample do not contain information on the relativization of other temporal nouns, this study does not address the cross-linguistic distribution of languages in which generic temporal nouns are encoded in the same way as other temporal nouns or in a different way. A couple of examples should suffice to illustrate that this is a fruitful area for further research.[43]

In Boko, the generic temporal noun *gɔɔ* 'time' is bare, as in (209). In a similar fashion, other temporal nouns, such as *zɪ́* 'time', also lack flagging, as in (210). Therefore, the general rules seem to apply for encoding other types of relativized temporal nouns in this language (McCallum 1998: 255).

Boko (Mande/Eastern Mande)

(209) ***gɔɔ*** *pɔ́* *aa* *kú* *gbáá-ú,* *aa* *gɔ̄ɛ* *kù̀.*
time REL 3PL.STAT be wilderness-in 3PL.STAT man.certain catch.PFV
'While they were in the wilderness (lit. at the time they were in the wilderness), they caught a man.' (McCallum 1998: 254)

Boko (Mande/Eastern Mande)

(210) ***zɪ́*** *pɔ́* *málɛ́* *gɛ́* *we* *ɔ̀̃* *ma* *mlɛ̃̀* *ɛ̀.*
time REL 1SG.PROG go there OBJ.EMPH 1SG.PFV snake see.PFV
'It was while I was going there that I saw a snake' (McCallum 1998: 255)

[43] Another interesting aspect of attributive temporal clauses not addressed here due to the scarcity of data is concerned with the following question: if one has a given temporal noun used both for introducing a *while*-clause and in an ordinary temporal noun phrase, does it get the same flagging in both constructions?

Another example comes from Lao. In this language, attributive temporal clauses are encoded by the generic temporal noun *vêlaa2* 'time', as in (211). This generic temporal noun does not appear with any locative case marker or locative adposition. In a similar fashion, other relativized temporal nouns are also bare, such as *tòòn3* 'time', as is shown in (212).

Lao (Tai-Kadai/Kam-Tai)

(211) ***vêlaa2*** *thiil* *kamlang2* *pam4* *kan3* *juul* *han5* *laø,*
time REL PROG wrestle COLL be.at DEM.DIST PERF
'While they were wrestling there (lit. at the time they were wrestling there),

mèèn1 *taang1* *khon2* *kaø* *taaang1* *ngaagw4* *luut5* *qòòk5…*
COP other person TOP.LINK other sword slip exit
each of their swords slipped…' (Enfield 2007: 210)

Lao (Tai-Kadai/Kam-Tai)

(212) ***tòòn3*** *mùng2* *hêtl* *qanø-nan4,* *kuu3* *juu1* *bòòn1* *qùùn1.*
time 2SG.SBJ do INAN-DEM.NON.PROX 1SG.SBJ be.at place other
'At the time you did that, I was in another place.' (Enfield 2007: 235)

I have not come across any language in the sample in which generic temporal nouns used in the expression of 'while' are bare and other relativized temporal nouns appear with an overt marker (e.g. locative case marker or locative adposition).

Before I leave the present section, mention should be made of the following. Various Portuguese-based creole languages, not included in the sample, combine *while*-clauses by temporal nouns meaning 'hour' (e.g. Guinea-Bissau Kriyol, Angolar, Pichi). These temporal nouns are bare in that they do not appear with any locative case markers or locative adpositions. For a more detailed analysis the interested reader is referred to Kihm (1994: 205), Lorenzino (1998: 204), and Yakpo (2019: 496).

4.2.3.2 Non-generic temporal nouns

A less prominent way in which *while*-constructions are formed is by non-generic temporal nouns (8/31=32.26%). In keeping with the overall agenda of the present chapter, these nouns are classified into monofunctional and polyfunctional groups. As illustrative examples of these patterns, consider the following constructions. In Korean, the ground clause of the attributive clause construction is marked by the monofunctional temporal noun *tongan* 'duration', as in (213).

Korean (Koreanic)

(213) *llha-nun* ***tongan***, *tv-lul* *po-myen* *an* *toy-nta*.
work-ADNZ duration tv-OBJ see-if NEG become-SE
'While being at work (lit. the duration you are at work), you must not watch tv.' (Chang 1996: 154)

In Somali, the *while*-relation between the ground clause and figure clause is explicitly signaled by the polyfunctional non-generic temporal noun *intuu* 'amount', as in (214).

Somali (Afro-Asiatic/Lowland East Cushitic)

(214) ***intuu*** *raggi* *la* *haasaabayay,* *baana* *gabbalkii* *ku* *dhacay.*
amount man.DEF with chat.PROG FOC.and daylight.DEF on fell
'While he was chatting with the man (lit. the amount he was chatting with the man), night fell.' (Saeed 1999: 218)

Given that non-generic temporal nouns used in the expression of 'while' are rather scarce and fairly scattered, I will not provide a survey of their cross-linguistic distribution. Suffice it to say that the remaining languages where these constructions are attested in the present study are Eton, Apinajé, Tetun, Wooi, Basque and Moskona. Of these languages, three have monofunctional non-generic temporal nouns (3/8=37.50%) and five have polyfunctional temporal nouns (5/8=62.50%). This contrasts with the picture uncovered for non-generic temporal nouns used for denoting 'when', where monofunctional nouns are more common than polyfunctional ones (see §3.2.3.2).

For the sake of completeness, some comments on the morphological make-up of non-generic temporal nouns are in order here. Five languages show attributive temporal constructions in which the non-generic temporal noun is bare, as in the Korean example shown above in (213) (5/8=62.50%). In this example, the noun *tongan* 'duration' is bare in that it lacks case markers or adpositions. In three languages (3/8=37.50%), the non-generic temporal noun occurs with locative case markers or locative adpositions. In (215), the noun *ha* 'day' appears with the locative preposition *na*.

Wooi (Austronesian/South Halmahera-West New Guinea)

(215) *ra* *ma* *ho* *Andi* *ti-ne* *manu* *vai-i*

go HITH PERF Andi 3SG-POSS house NTR-SG

'I went to Andi's house

na ***ha*** *ve* *he-t-ang=pi* *va-i.*

LOC day REL 3PL-PL-eat=thing NEU-SG

while they were eating (lit. the day they were eating).' (Sawaki 2017: 355)

Due to the scarcity of information regarding the morphological make-up of other relativized temporal nouns, I do not explore in detail whether the languages of the sample that have bare non-generic temporal nouns also tend to have other relativized temporal nouns that lack flagging. However, some examples should suffice to show that this is a very promising area for future research.

In Eton, *while*-constructions are encoded by an attributive temporal construction that appears with the non-generic temporal noun *tɛ́* 'duration', as in (216). This non-generic temporal noun lacks locative case markers or locative adpositions. Instead, *tɛ́* 'duration' is preceded by *H*-. This is an affix called the "augment', used for marking a noun as an antecedent of a relative clause (Van de Velde 2008: 347). Van de Velde (personal communication) informs me that other relativized temporal nouns in Eton also do not appear with any locative case markers or locative adpositions. Rather they are preceded by the augment *H*-, as in (217), where the relativized temporal noun *jɔ̀ŋ* 'time' occurs with *H*-. Accordingly, the general rules apply for encoding other types of relativized temporal nouns in this language.

Eton (Atlantic-Congo/Bantu)

(216) ***H*-*Ǹ*-*tɛ́*** *mə̀-Ltɛ́* *L-jàŋà* *Ǹ-kúŋkúmá,*

AUG-3-duration 1SG.SBJ-PRS INF-wait 3-chief

'While I am waiting for the chief (lit. the duration I am waiting for the chief),

mə̀-à-láŋ *tʃətʃàd.*

1SG.SBJ-S.PRS-read a.bit

I am reading a bit.' (Van de Velde 2008: 359)

Eton (Atlantic-Congo/Bantu)

(217) *Ǹ-Bɛ̀ŋ* ***H*-*ì*- *jɔ̀ŋ*** *ù-nɛ̌* *á* *ùjòm* *ábaŋ* *ájǎd* *múlíà…*

3-good AUG-7-time 2SG-REL.be LOC Oyom Abang other.side there

'Right, at the time you are there, at the other side of Oyom-Abang…'(Van de Velde 2008: 358)

As was mentioned in §4.2.3.1, I did not find any language in the database in which generic temporal nouns are bare, while other relativized temporal nouns appear with an overt marker (e.g. locative case marker or locative adposition). In contrast, there are two languages in the sample in which non-generic temporal nouns are bare and other relativized temporal nouns appear with a locative case marker or locative adposition. In Moskona, the non-generic temporal noun *kus* 'span (of time)' indicates 'while'. As is shown in (218), this non-generic temporal noun is bare. On the other hand, when the head is a different temporal noun, such as

mona ‘time’, the temporal noun must appear with the locative preposition *jig*, as can been seen in (219) (Gravelle 2010: 349).

Moskona (East Bird’s Head)

(218) *ofa* *ec* *miyes*
3SG.SBJ buy clothes
‘He bought the clothes

kus *noga* *dif* *di-éysaha* *jig* *Jayapura.*
span REL 1SG.SBJ 1SG.SBJ-reach LOC Jayapura
while I arrived in Jayapura.’ (Gravelle 2010: 349)

Moskona (East Bird’s Head)

(219) ***jig*** ***mona*** *noga* *mas* *es* *oysa* *jog,*
LOC time REL rain spray finished already
‘At the time the rain stopped,

ofa *ek* *maw* *egak* *ed* *meren* *odog.*
3SG.SBJ see sun leg strike lake leg
he saw the sun’s rays strike the lake’s surface.’ (Gravelle 2010: 349)

Korean encodes *while*-constructions by an attributive temporal clause that occurs with the non-generic temporal noun *tongan* ‘duration’, as in (220) repeated here for convenience.

Note that *tongan* ‘duration’ does not appear with any locative case marker or locative adposition. This picture contrasts with the one shown by other relativized temporal nouns. Chang (1996: 154) mentions that other relativized temporal nouns are marked by the locative case marker *-ey*. In (221), the non-generic temporal noun *cek* ‘occasion’ is followed by the locative case marker *-ey*. Chang (1996: 154) points out that *-ey* cannot be suppressed from this construction. In a similar fashion, *cen* ‘prior time’ must be marked by the locative case marker *-ey* and cannot be deleted from this construction, as is shown in (222). Accordingly, the non-generic temporal noun *tongan* ‘duration’ is encoded in a different way than other relativized temporal nouns.

Korean (Koreanic)

(220) *llha-nun* ***tongan***, *tv-lul* *po-myen* *an* *toy-nta*.
work-ADNZ duration tv-OBJ see-if NEG become-SE
‘While being at work (lit. the duration you are at work), you must not watch tv.’ (Chang 1996: 154)

Korean (Koreanic)

(221) *Yong-i* *tochakhay-ss-ul* ***cel-ey***,
Yong-SBJ arrive-PST-ADNZ occasion-LOC
‘When Yong arrived (lit. the occasion Yong arrived),

keki-ey *amwu-to* *eps-ess-ta*.

there-LOC anybody-too not.exist-PST-SE

nobody was there.' (Chang 1996: 153)

Korean (Koreanic)

(222) *Pulaun-ssi-nun* *hankwuk-ey* *oki-**cen**-**ey***,

Brown-Mr-TOP Korea-to come-prior.time-LOC

'Before Mr. Brown came to Korea (lit. the prior time Mr. Brown came to Korea),

cwungkwuk-ey *sal-ass-eyo*.

China-at live-PST-POL

he lived in China.' (Chang 1996: 154)

4.3 Less common restricted devices

The discussion so far has focused on common restricted devices. Let us now turn to the less common restricted devices attested in the database. These devices show a low frequency in the sample. While some of them are scattered in different areas of the world showing no areal effects, others appear in areal clusters. In what follows, I distinguish four less common devices: correlative constructions (§4.3.1) verb-doubling (§4.3.2), adverb(ial)s meaning 'still' (§4.3.3), and verbs used as clause-linking devices (§4.3.4). In addressing the range and cross-linguistic distribution of less common *while*-devices, I pay close attention to their mono/polyfunctionality.

4.3.1 Correlative constructions

Recall that there are two types of correlative constructions (see §3.3.1). First, correlative constructions used as relative clause constructions are concerned with instances in which the head noun appears in a full form within the relative clause and appears again in the main clause in a pronominal or non-pronominal form (Keenan 1985: 164; Lipták 2009: 1). Second, correlative clause-linking devices refer to those instances where the first clause appears with a clause-linking device and the second clause appears with another one (Lipták 2009: 1). This is the sense in which grammars refer to "correlative (adverbs)" or "correlative subordinators" to describe pairs of words like 'if…then', 'although… yet/nevertheless', and 'either... or', etc. (Haspelmath 2004).

In the sample, there are no languages with correlative relative clauses used in the expression of 'while'. Rather, languages combine clauses by correlative clause-linking devices. In total, there are fourteen languages that have correlative clause-linking devices used for combining *while*-constructions (14/218=6.42%). Given that the correlative words belong to different types of devices, I present in what follows the range of devices that may appear in correlative constructions.

4.3.1.1 Correlative constructions with free adverbial subordinators

First, there are languages where the figure clause and ground clause are marked by a free adverbial subordinator. In Mandarin, *while*-constructions are encoded by a correlative pattern in which both clauses appear with *yībiān* 'while', as in (223). In a similar fashion, Upper Necaxa Totonac conveys *while*-relations by a correlative construction, in which both clauses

occur with a free adverbial subordinator. In (224), *liːwán* ‘while’ is placed at the beginning of each clause. These constructions are monofunctional.

Mandarin (Sino-Tibetan/Chinese)

(223)	*tā*	***yībiān***	*chī*	*píngguǒ,*	***yībiān***	*kàn*	*bào*.
	3SG	while	eat	apple	while	read	paper

‘S/He’s eating an apple while reading the paper.’ (Li & Thompson 1981: 639)

Upper Necaxa Totonac (Totonacan)

(224)	***liːwán***	*na-ik-páʃ-a,*	***liːwán***	*ka-łáwɻ̩*	*líːwɻ̩*.
	while	FUT-1SG.SBJ-bathe-IPFV	while	OPT-make.2SG.SBJ.PFV	food

‘While I bathe, you make the food.’ (Beck 2004: 102)

4.3.1.2 Correlative constructions with adverb(ial)s

In another pattern found in the database, correlative constructions are marked by adverb(ial)s. Examples illustrating these patterns follow. In Khatso, there is a construction involving the adverb(ial) *niɳɛ* ‘first’ specifically used for indicating *while*-relations, as in (225). Here the adverb(ial) is placed at the beginning of each clause (Donlay 2019: 564).

Khatso (Sino-Tibetan/Burmese-Lolo)

(225) *tɕɛ33tɕɛ33 ko55 ni31 **ni31ɳɛ323** thi31 tsɤ31*

straw.tip PL TOP first weave CONT

***ni31ɳɛ323** tɕhɛ31xa33 tsɤ31.*

first drop CONT

'As for the straw tips, (you) weave and push (it in) at the same time.' (Donlay 2019: 564)

The second correlative construction marked by adverb(ial)s occur with 'still'. To express 'while', Xong speakers employ a correlative construction where both clauses appear with the adverb(ial) *deit* 'still', as in (226).[44]

Xong (Hmong-Mien)

(226) *wel **deit** puk daut, beul **deit** gaond wel.*

1SG still speak speech 3SG still bother 1SG

'He's bothering me while I am trying to speak.' (Sposato 2015: 570)

The last construction comes from Maybrat. In the example in (227), correlative constructions encoded by *si* 'also' are used for conveying 'while'. Note that the constructions discussed so far are monofunctional in that they are only used for expressing 'while'.

[44] Xong speakers use another construction where *biank* appears in both clauses. It is not entirely clear whether this form is a free adverbial subordinator. However, in various parts of the grammar, this form is homophonous with *biank* 'side' (Sposato 2015: 570).

Maybrat (West Papuan)

(227) *tuo* *tutup* *kios* ***si***, *ana* *tutup* *amah* *kiyam* ***si***.
1SG close store also 3PL.SBJ close house ill also
'While I close the store, they close the hospital.' (Dol 1999: 266)

As has been shown above, Mandarin, Khatso, and Xong express 'while' by a similar pattern. The forms of the correlative markers are not the same. However, the correlative patterns are very similar. Sposato (2015: 570) mentions that the Xong correlative construction seems to be a calque from either Mandarin or from another Sinitic variety in which the same facts apply. The same also seems to hold for Khatso in that this pattern may have been copied from Mandarin or from another Sinitic variety. As will be seen in Chapter 5, speakers of these languages have a similar pattern in the expression of 'as soon as', which seems to indicate that language contact may have played a role. Before I proceed, one remark is in order here. Zhuang, a Tai-Kadai language spoken in China, expresses 'while' by a correlative construction similar to one found in Mandarin, Khatso, and Xong. In (228), the free adverbial subordinator *peŋ4* 'while' occurs in the first clause and the second clause. It is interesting to observe that Zhuang speakers may also have copied the correlative constructional schema from Mandarin for expressing 'while'.

Zhuang (Tai-Kadai/Kam-Tai)

(228) *lau4* ***peŋ4*** *kun1* ***peŋ4*** *ta3ɕua6.*
1PL.SBJ while eat while talk
'Let's eat while talking.' (Luo 2008: 370)

4.3.1.3 Correlative constructions involving para-hypotaxis

The term para-hypotaxis refers to a construction showing the following schema: restricted device + ground-clause + Coordinator + figure-clause (see §3.3.1). A couple of languages found in the database employ a para-hypotactic pattern for encoding *while*-constructions.

In Namia, *while*-constructions are formed by a para-hypotactic pattern in which the ground clause is marked by the free adverbial subordinator ***e*** 'while' and the main clause occurs with the general coordinating device *iya* 'and', as in (229).

Namia (Sepik/Yellow River)

(229)	*olirawomi-ka*	*lwae*	*lomo-ma*	*p-eleli-nak-e*	***e***,
	morning-of	pig	3SG-TOP	PFV-follow-INCOMPL-PRS	while

'In the morning, while we two were following the pig,

iya	*one*	*lwae*	*nowaki*	*lomo-ma*	*p-ka-enakir-e*.
and	1SG	pig	body	3SG-TOP	PFV-TRANS-see-PRS

I saw the pig's body.' (Feldpausch & Feldpausch 1992: 49)

Another example is found in Alacatlatzala Mixtec. In (230), the ground clause is introduced by the free adverbial subordinator *āmā* 'while' and the figure clause occurs with the general coordinator device *tā* 'and'. Another Mixtec language, not included in the sample, with a similar construction is Diuxi-Tilantongo Mixtec (Kuiper & Oram 1991: 376).[45] Note that these constructions are monofunctional.

[45] Note that Mixtec languages may also employ other correlative patterns for expressing 'while'. Coatzospan Mixtec uses a correlative construction in which both clauses occur with the device *ni dukwan* 'lit. whole thus' for

Alacatlatzala Mixtec (Oto-Manguean/Mixtecan)

(230) ***āmā*** *kwahan rā yūku,* ***tā*** *ni shihi yīvā rā.*
while go.CONT 3SG.SBJ mountain and COMPL die father 3SG.POSS
'While he was going to the mountain, his father died.' (Zylstra 1991: 148)

Before I leave the present section, it should be noted that Supyire has a correlative construction formed by two general coordinating devices meaning 'and'. In (231), the *while*-relation is signaled by a construction in which the general coordinating device *ma* 'and' appears in the ground clause and the general coordinating device *kà* 'and' occurs in the figure clause (lit. 'and…and').

Supyire (Atlantic-Congo/Senufo)

(231) ***mà*** *pì yàha tire nàkaanté na,*
and them leave this discussion.DEF on
'While they were engaged in this discussion,

kà *nàŋi wàbɛ́rɛ̀ sì m̀-pà nɔ̀ àní.*
and man.DEF another NARR INTR-come arrive there
another man arrived there.' (Carlson 1994: 559)

denoting 'while' (Small 1990: 437) and Ocotepec Mixtec conveys 'while' by means of a correlative construction where the figure clause and ground clause appear with *xūnī* 'while' (Alexander 1988: 279).

4.3.2 Verb-doubling

In four languages of the sample (4/218=1.83%), *while*-relations are expressed by a construction in which the verb of the ground clause is doubled. As an illustrative example of this phenomenon, consider (232). While the first verb *ʈunɖ* 'to see' bears no morphological make-up, the second verb appears with the present tense marker *-n* and the deranking device *-i*. Note that the deranking device *-i* is optional and can be omitted. Recall that verb-doubling may appear either as an exact copy of the verb, or as a partial copy of it, and the verbs do not have to appear adjacent to one another (Lefebvre & Brousseau 2002: 504) (see §1.4.1.1). As will be shown in Chapter 5, various languages of the database also use verb-doubling for expressing 'as soon as'.

Malto (Dravidian/Northern Dravidian)

(232) *eːn* ***ʈunɖ*** ***ʈunɖ-n-i***, *aːh* *muluh-ɾ-aːh*.
1SG.NOM see see-PRS-CVB 3SG.NOM.M drown-PASS-3SG.M
'While I was looking, he drowned.' (Puttaswamy 2009: 206)

One important parameter relevant to the analysis of verb-doubling is concerned with the marking of the doubled verbs. In some languages, both verbs may be bare in that they do not occur with any TAM markers or any restricted devices. In the Kharia example in (233), the verb *ɖoko* 'sit down' is doubled. However, Peterson (2011: 331) notes that sometimes both doubled verbs may be marked by the imperfective converb *-na*.

Kharia (Austro-Asiatic/Munda)

(233) *Raʈa=te* ***ɖoko*** ***ɖoko*** *lemeʔɖ* *laʔ=ki*.

Rata-OBL sit.down sit.down sleep EMOT=MID.PST

'While he was seated, Rata became tired.' (Peterson 2011: 333)

Another scenario is shown in the example in (234). In Dhimal, the doubled verbs of the ground clause must appear with the restricted device *-pa* 'while'. In this construction, the restricted device *-pa* cannot be omitted.

Dhimal (Sino-Tibetan/Dhimalic)

(234) *ota* *hane-**pa*** *hane-**pa***, *belhaʔt-a* *wa*,

there go-while go-while be.dusk-FUT DED

'While going there, dusk may fall.' (King 2009: 115)

The last scenario attested in the sample is concerned with those instances in which only one of the doubled verbs is marked by TAM markers and/or a restricted device. The Malto example shown above in (232) illustrates this type of pattern. It is worth noting that Indo-Aryan languages have a similar pattern. Given that this pattern is very common in Indo-Aryan languages, it is likely that Malto and Kharia copied the verb-doubling construction schema from Indo-Aryan languages. Some hypotheses are proposed in Chapter 10.

4.3.3 Adverb(ial)s meaning ‘still’

As was shown in §4.3.1.2, there are languages that convey ‘while’ by a correlative construction in which clauses are marked by an adverb(ial) meaning ‘still’. The question at this point is: are there any languages in which *while*-constructions are formed by a construction in which only one of the clauses is marked by an adverb(ial) meaning ‘still’? The answer seems to be “yes”. There are two languages in the sample that denote *while*-relations by a construction in which an adverb(ial) meaning ‘still’ appears in the ground clause. Examples illustrating this pattern follow.

In the Inanwatan example in (235), the ground clause and the figure clause are linked by the adverb(ial) *-de* ‘still’. In a similar fashion, in Creek, *while*-constructions are realized by the adverb(ial) *mônk* ‘still’, as in (236).

Inanwatan (South Bird’s Head/Inanwatan)

(235) *gó-u-rita-**de*** *suqó-wai,* *mú-uwe-rita*.
1PL.INCL-fell-HAB-still sago-this.F.SG 3SG.SBJ-become.dark-HAB
‘While we fell the sago palm, it becomes dark.’ (de Vries 2004: 48)

Creek (Muskogean)

(236) *haya:tk-â:t* *yomóck-i:* ***mônk**-in* *a:y-ít…*
dawn.LGR-REF dark-DUR still-NON.THEM go.SG.LGR-THEM
‘He goes at dawn while it is dark....’ (Martin 2011: 321)

Cross-linguistically, as will be shown in Chapter 6, languages may connect *before*-clause constructions by temporal adverb(ial)s meaning ‘not yet’, which can be formed compositionally from a standard negative marker and an adverb(ial) meaning ‘still’ or ‘yet’. With this in mind, the question is: can *before*-constructions be formed in Creek and Inanwatan by adding a negative marker to the constructions discussed above?

In Creek, *before*-clauses can be realized by adding a negative marker to a construction encoded by *môNk* ‘still’. In this language, the *before*-meaning arises because the ground clause occurs with *môNk* ‘still’ and the negative marker *-iko* (Martin 2011: 321). Without the negative marker, the meaning of the construction is ‘while’. However, the same scenario does not hold for Inanwatan in that *-de* ‘still’ cannot occur with a negative marker for expressing ‘before’. Instead, the form *eri* ‘not be’ plus the negative marker *aigo* are used for denoting ‘before’ (de Vries 2004: 42) (see Chapter 6 for a more detailed discussion).

4.3.4 Verbs used as clause-linking devices

Of the languages of the sample, five have verbs used for combining *while*-clauses (5/218=2.29%). *While*-constructions are encoded in the sample by different types of verbs. In what follows, I focus on some selected constructions in order to discuss their morphosyntactic characteristics. In discussing these examples, I place emphasis on the fact that verbs used in the expression of ‘while’ are items that are not (yet) fully grammaticalized in that they still appear with verbal properties.

In Alto Perené, *while*-constructions are realized by the verb *kaNt* ‘to happen’, as in (237). The evidence that *kaNt* ‘to happen’ is a verb comes from the fact that it must appear with the irrealis marker *-ta*. Furthermore, the gender-sensitive verb shows regular grammatical

agreement with the actor participant carrying out an action or undergoing a state in the ground clause (Mihas 2015: 251). Accordingly, *kaNt* 'to happen' should be considered a restricted device that is weakly grammaticalized. This verb used a clause-linking device is polyfunctional in that it can also express other types of adverbial relations (Mihas 2015: 252).

Alto Perené (Arawakan/Pre-Andine Arawakan)

(237) ***i=kaNt-ta*** *i=shiNki-t-ak-i=ri*

3M.SBJ=happen-REAL 3M.SBJ=get.drunk-EP-PFV-REAL=3SG.OBJ

'While the men were getting him drunk,

ironyaaka *ashoshi=ra* *kiy-ak-i* *iroori*.

now armadillo=DEM dig-PFV-REAL 3SG.SBJ

the armadillo woman dug a hole.' (Mihas 2015: 252)

Another example of a verb used for clause linkage is found in Oksapmin. In this language, *while*-constructions are formed by the verb =*x* 'to do', as in (238). Note that the verb =*x* appears with the imperfective marker -*pat*. This seems to indicate that the verb =*x* 'to do' should be considered an item that is not (yet) fully grammaticalized in that it still appears with verbal properties. This verb is polyfunctional (Lough 2009: 445).

Oksapmin (Oksapmin)

(238) *nel* *mo-xon=ox* *su-t-pol=o* *li-m=a* *ix=**x**-**pat**-n*,
bird DEM.PROX-across=3SG kill-PFV-SG=QUOT say-SEQ=LINK like.that=do-IPFV-NMLZ
'While he was trying to shoot the bird,

nel *ox=a* *putut* *s-n-gop=li*.
bird 3SG=EMPH fly go-PFV-VIS.PST=REP
the bird flew away.' (Lough 2009: 444)

The other languages found in the database that also used verbs for denoting 'while' are Tamil (i.e. the verb *kol* 'to hold'; Lehmann 1993: 271), Kwaza (i.e. the verb *hedy* 'to mix, to put in'; van der Voort 2004: 652), and Komnzo (i.e. the verb *fiyok* 'to make'; Döhler. 2018: 377).

4.4 Summary

This chapter has presented a typology of the range of clause-linking strategies by which *while*-constructions are realized in the sample. I started out with the analysis of strategies without restricted devices. Special attention was paid to asyndetic constructions with a 'while' interpretation. It was shown that in this type of construction, various types of TAM markers, such as continuative, durative, or imperfective aspect markers, can conventionally convey a *while*-meaning. Subsequently, I provided a detailed description of the range of restricted devices found in the database. The most common subtypes of restricted devices tend to be polyfunctional (e.g. bound adverbial subordinators, restricted deranking devices, generic

temporal nouns, non-generic temporal nouns). One exception to this are free adverbial subordinators which tend to be monofunctional in the present study.

Regarding less common restricted devices, correlative clause-linking devices, verb-doubling constructions, adverb(ial)s meaning ‘still’, and verbs used as clause-linking devices showed a low frequency in the database. Intriguingly, some of these less common devices occur in areal clusters. In particular, Mandarin, Khatso, and Xong express ‘while’ by means of a correlative pattern (§4.3.1.1 and §4.3.1.2). Another less common pattern is found in Malto, Dhimal, and Kharia, in which ‘while’ is conveyed by a verb-doubling construction (§4.3.2). It was noted that various Indo-Aryan language have a similar pattern. I will return to the discussion of this less common strategy in more detail in Chapter 10.

CHAPTER 5

After-clauses

Temporally subsequent constructions (a.k.a. *after*-constructions) consist of a sequence of two clauses in which the situation of the figure clause happens after the situation expressed in the ground clause. In this chapter, I document and analyze the ways in which *after*-constructions are formed in languages in the database. These are the constructions I consider in most of this chapter. However, I also include a brief discussion of *as soon as*-constructions in §5.4. This stems from the fact that 'as soon as' constructions are encoded by strategies that merit special attention.

The chapter is structured as follows. In §5.1, I illustrate the range of strategies without restricted devices in the sample. As is shown in this section, the order of clauses in asyndetic constructions and general coordinating constructions used for conveying 'after' is always iconic in that they are presented in the order in which the situations occur. In §5.2, I turn my attention to restricted devices, which are classified into: restricted adverbial subordinators (§5.2.1), restricted deranking devices (§5.2.2), and 'and then' coordinating devices (§5.2.3). Of these devices, it is shown that constructions marked by 'and then' coordinating devices always follow an iconic order. In contrast, the order of the clauses in constructions encoded by restricted adverbial subordinators and restricted deranking devices may be presented in a different order than the one in which the situations occur (e.g. *we met her friend after we arrived there*). In this case, the functional parallelism fails, but the meaning expressed by the construction does not change (Mauri 2008: 84). In keeping with the agenda of the previous chapters, I pay close attention to less common restricted devices (§5.3). These are divided into: verbs used as clause-linking devices (§5.3.1), nouns used as clause-linking devices (§5.3.2),

adverb(ial)s meaning ‘already’ (§5.3.3), and correlative constructions (§5.3.4). As is demonstrated, some of these devices occur in areal clusters. In §5.4, I briefly introduce constructions encoding a specific time lapse range: immediate temporal subsequence, a.k.a. *as soon as*-clauses. Given that the analysis of *as soon as*-constructions is based on sixty-one languages, the results should be seen as a modest contribution which can promote further research. The range of strategies by which *as soon as*-constructions are realized is divided into: restricted adverbial subordinators (§5.4.1), restricted deranking devices (§5.4.2), adverb(ial)s meaning ‘immediately’ (§5.4.3), adverb(ial)s meaning ‘only’ (§5.4.4), correlative constructions (§5.4.5), similative ‘like’ markers (§5.4.6), universal quantifiers meaning ‘all’ (§5.4.7), verb-doubling (§5.4.8), and *or not*-constructions (§5.4.9). Finally, it is shown that many languages of the sample have more than one primary restricted device for expressing ‘after’ (§5.5). A brief discussion of the factors that may lead speakers to choose one primary strategy over the other is introduced. The discussion in this chapter is then summarized (§5.6).

5.1 Strategies without restricted devices

The first part of this chapter is dedicated to exploring constructions encoded by strategies without restricted devices. The semantically non-specific strategy that is by far the most frequent one in the database is that of asyndetic constructions. In this type of construction, the temporal subsequence relation arises by implicature, usually due to contextual or common knowledge and/or iconicity of sequencing.

By way of illustration, let us consider a typical asyndetic construction conveying ‘after’. In Lha'alua, the temporal subsequence interpretation is not directly encoded by overt linguistic material, but inferred instead from iconicity of sequencing (Pan 2012: 296), as in (239). The order of the ground clause and figure clause is always iconic in that they are

presented in the order in which the situations occur. Pan (2012: 296) mentions that this strategy is pervasive in his corpus and is considered the primary strategy for indicating *after*-relations.

Lha'alua (Austronesian/Tsouic)

(239) *m-ali-lepenge* *a* *Elengane* *nua* *Na'apu=na* *m-ari-sangilhi,*
AV-verbal.action-finish COR Elengane and Na'apu=DEF AV-verbal.action-BND
'(After) Elengane and Na'apu quarreled,

t<um>u-sa-sua=cu *t<um>angi.*
cry<AV>RDP-two=ASP cry<AV>
both of them cried.' (Pan 2012: 297)

In the Bangime construction in (240), the temporal subsequence relation is inferred from iconicity of sequencing. The sequence of linguistic forms reflects the sequence of experiences in the real world. That is, the order of the ground clause and figure clause is the order in which the situations have occurred. This is the primary strategy for specifying chronological sequencing of past events ('after S1, S2') in Bangime (Heath & Hantgan 2018: 507).

Bangime (Isolate)

(240) *nì* *ŋ̀* *pàárà,*
3PL.SBJ 3PL.SBJ gather.up.PFV
'(After) they gathered (it) up,

nì	*kóó*	*ŋ̀*	*wōrē*	*ŋ̀*	*sɔ̀w*.
3PL.SBJ	PFV	3PL.SBJ	go.PFV	3PL.SBJ	pound.PFV

they went to pound (it).' (Heath & Hantgan 2018: 507)

Another typical example of a language with asyndetic constructions is found in Zoulei. Li et al. (2014: 209) mention that *after*-relations are expressed in Zoulei by two clauses with no overt device. In the construction in (241), the *after*-relation arises from iconicity of sequencing.

Zoulei (Tai-Kadai/Kadai)

(241)

ke33	*ve13*	*ja31*	*zei31*	*ke33*	*ja31*	*tsən55*	*la55*	*a33…*
PART	3SG	take	PART	PART	take	whole	bend	well

'She picked it up (and then) bend it…' (Li et al. 2014: 210)

The remaining cases of asyndetic constructions which add up to a total of this category of 4.12% of the data (9/218), are found in Lele, Bininj Gun-Wok, Bardi, Wooi, Awtuw, and Baure.

In two languages of the sample, it is explicitly noted that the link between the two clauses is conveyed by intonation. It has been shown that intonation plays an important role in otherwise asyndetic constructions in languages from different areas of the world. In the Paumarí example in (242), the temporal subsequence relation is signaled in the following way. The ground clause has level or rising intonation and the figure clause has falling intonation (Chapman & Derbyshire 1991: 190).

Paumarí (Arauan)

(242) *a-oga-ʻi-hi,* *a-ki-ʻdama-ʻi-ʼhi…*

1PL.SBJ-flee-ASP-THEM 1PL.SBJ-canoe-embark-ASP-THEM

'We fled (and then) we embarked in the canoe…' (Chapman & Derbyshire 1991: 190)

The other example is attested in Barupu. In (243), the temporal subsequence relation is signaled by a slight rise at the end of the ground clause and a short pause before the beginning of the figure clause (Corris 2006: 332). Since most grammars do not sufficiently treat intonation in order to properly consider its role in clause combining, the general policy of this dissertation is to treat these instances as examples of asyndesis (see §1.4.1.1).

Barupu (Skou/Warapu)

(243) *poro* *k-e-ti,* *k-i-úte* *k-e-kô<p>e…*

canoe REAL-3PL.M-tie.up REAL-3PL.M-walk REAL-3PL.M-<3PL.M>go.up

'They tied up their canoes (and then) walked up…' (Corris 2006: 332)

Besides the examples shown above, the sources in the database do not provide information regarding the role of intonation. However, it has been noted that in many Oceanic languages, not included in the sample, intonation seems to play an important role in otherwise asyndetic constructions. Let me illustrate the workings of intonation by a few selected data points. In Toqabaqita, *after*-relations are denoted by a rise in intonation at the end of the ground clause, a slight pause before the figure clause, and a fall in intonation at the end of the figure clause (Lichtenberk 2008: 952), as in (244).

Toqabaqita (Austronesian/Oceanic)

(244) *…ka* *fale-a* *meresina* *qi* *a-ku,*

3SG.SEQ give-3SG.OBJ medicine LOC REC-1SG

'…He (the doctor) gave me medicine

kwa *kuqu-fi-a…*

1SG.SEQ drink-TRANS-3SG.OBJ

(and then) I drank it…' (Lichtenberk 2008: 952)

In Raga, temporal subsequence is indicated by a rise in intonation at the end of the ground clause followed by a pause. The intonation pattern of the figure clause ends in a falling intonation (Vari-Bogiri 2011: 251), as in (245).

Raga (Austronesian/Oceanic)

(245) *nu* *hao-e,* *nu* *sisi-a…*

3SG.PERF hold-3SG.OBJ 3SG.PERF tie-3SG.OBJ

'She held it (and then) tied it…' (Vari-Bogiri 2011 251)

In Tamambo, intonation plays an important role in the expression of the temporal subsequence relation. While the ground clause shows a rising intonation pattern followed by a pause, the figure clause shows a falling intonation pattern (Jauncey 2011: 390).

Tamambo (Austronesian/Oceanic)

(246) *na* *revei-a* *mo* *sahe,* *mo* *kakau*

3PL drag-3SG.OBJ 3SG go.up 3SG reach

'They dragged her up

mo *rasitaka* *ana* *rani…*

3SG poke.through PREP day

(and then) she poked through into the daylight…' (Jauncey 2011: 421)

Tirax expresses *after*-relations by a complex sentence construction in which clauses are combined by a specific intonation pattern. In (247), the ground clause has a rising or continuing intonation contour followed by a pause. The figure clause has a falling intonation contour, signaling the end of the construction (Brotchie 2009: 246).

Tirax (Austronesian/Oceanic)

(247) *nelaŋ* *i=hɛr=i,* *i=hlau* *trɛrɛr.*

stake 3SG.REAL=spear=3SG 3SG.REAL=arrive other.side

'The stake speared him (and then) it came out the other side.' (Brotchie 2009: 248)

The Lelepa example (248) shows two clauses realized by distinct intonation patterns. There is a rising intonation at the end of the first clause, followed by a pitch reset at the start of the figure clause. In this construction, the presence of a pause between the two clauses is

difficult to assess because this type of construction is found for the most part in fast speech (Lacrampe 2014: 459).

Lelepa (Austronesian/Oceanic)

(248) *ur=lopa=e,* *ur=saprae=s.*

3PL.SBJ=see=3SG.OBJ 3PL.SBJ=surprise=3SG.OBJ

'They saw it (and then) they were surprised with it.' (Lacrampe 2014: 459)

The above examples from Oceanic languages indicate that ground clauses tend to show a rising intonation pattern and figure clauses tend to show a falling intonation pattern. Accordingly, the different intonation contours involved in otherwise asyndetic constructions may function exactly like overt restricted devices (cf. Hopper & Traugott 2008: 180). As was mentioned before, this research can make only a modest contribution to the understanding of intonation. However, the discussion of the examples of Oceanic languages should serve to provide a glimpse of the workings of intonation in complex sentence constructions. It remains an open task to explore whether languages spoken in other areas of the world have the same intonation patterns for indicating temporal subsequence and other types of adverbial relations. Oceanic languages look like a very promising area for future research.

Unlike asyndetic constructions, constructions encoded by general coordinating devices and general deranking devices are not frequent in the database. Given the scarce occurrences of these devices, a couple of examples of each device should suffice to illustrate these patterns.

Four languages of the sample have general coordinating constructions, as a primary strategy, for indicating 'after' (4/218=1.83%), viz. Kisi, Nakkara, Ocotepec Mixtec, and

Teribe. Constructions marked by general coordinating devices always follow an iconic order in that the order of the figure clause and the ground clause conforms to the sequence of experience. The linkage in Ocotepec Mixtec in (249), involves only the general coordinating linker *dē* 'and'; the temporal subsequence relation is inferred from iconicity of sequencing. A closer look reveals that various Mixtec languages, not included in the sample, also denote temporal subsequence by general coordinating constructions. This is attested in Ayutla Mixtec (Hills 1990: 225), Jamiltepec Mixtec (Johnson 1988: 126), and Magdalena Peñasco Mixtec (Erickson de Hollenbach 2013: 360), among others.

Ocotepec Mixtec (Oto-Manguean/Mixtecan)

(249) *n-yaāxi* *de* *staa,* ***dē*** *xiīhī* *de* *nduūtē.*
COMPL-eat.COMPL 3SG.SBJ tortilla and drink.COMPL 3SG.SBJ water
'He ate tortillas and (then) drank water.' (Alexander 1988: 277)

Another example illustrating general coordinating devices is Teribe. In this language temporally subsequent constructions are encoded by general coordinating devices, as in (250), where the ground clause and the figure clause are linked by *ga* 'and'.

Teribe (Chibchan/Talamanca)

(250) *walë* *är* *u* *shko* ***ga*** *op* *ne-no.*
woman arrive house in and REFL hide-PFV
'The woman got home and (then) hid herself.' (Quesada 2000: 159)

General deranking devices used as primary strategies for denoting ‘after’ are not common in the sample. This semantically non-specific strategy is only attested in Turkish, Udmurt, Yaqui, Cupeño, Ute, Warihio, and Piro (7/218=3.21%). Recall that all general deranking devices are macrofunctional by definition in that they do not have a specific meaning and are semantically vague (see §1.4.1). Of the languages mentioned so far, four belong to the Uto-Aztecan language family. In the literature on Uto-Aztecan languages, general deranking devices are usually referred to as “general adverbial participles” (Zarina Estrada-Fernández, personal communication). In Warihio, the general deranking device *-ka* is semantically vague, as in (251), where the temporal subsequence relation is inferred from iconicity of sequencing. In a similar fashion, the Cupeño example in (252) appears with a general deranking device. In this construction, the general deranking device *-nuk* does not have a specific meaning. The *after*-relation is inferred from iconicity of sequencing in both examples.

Warihio (Uto-Aztecan/Tarahumaran)

(251) *kuu-é* *wepa-**ká*** *pu'-ká-é,*
stick-INSTR hit-PTCP DIST.DEM-ID-INSTR
‘Hitting him with the stick,

napawi-ré *pu'-ká* *aaróso.*
gather-PFV DIST.DEM-ID rice
they got the rice.’ (Félix-Armendáriz 2005: 369)

Cupeño (Uto-Aztecan/California Uto-Aztecan)

(252) *...pi='an-i-**nuk**,* *pi=pe-meq.*

3SG.OBJ=knock.down-in-CVB 3SG.OBJ=3SG.SBJ-kill

'…Knocking him down, he killed him.' (Hill 2005: 406)

5.2 Restricted devices

The range of restricted devices by which natural languages formally encode temporally subsequent constructions is diverse. Here my main concern is to map out the space of morphosyntactic variation in the expression of *after*-clauses across the world's languages. These restricted devices can be used irrespective of the extent of time lapse between the situations. First, I discuss three types of restricted devices which constitute large classes in the database: restricted adverbial subordinators (§5.2.1), restricted deranking devices (§5.2.2), and 'and then' coordinating devices (§5.2.3). Afterwards, a detailed description of less common trends in grammatical coding in this functional domain is given (§5.3). These comprise: verbs used as clause-linking devices (§5.3.1), nouns used as clause-linking devices (§5.3.2), adverb(ial)s meaning 'already' (§5.3.3), and correlative constructions (§5.3.4).

5.2.1 Restricted adverbial subordinators

Seventy-one languages of the database mark the ground clause of an *after*-construction by an adverbial subordinator (71/218=32.56%), as in the Haida example in (253), where the temporal subsequence relation is signaled by *saliyaa* 'after'. The order of the ground and figure clauses tends to be iconic (Enrico 2003: 1017).

Haida (Isolate)

(253) *'laa-sda 'la tawwlang 7ist'id-s* ***saliyaa****, sangyaa-yaa-n.*

3SG-from 3SG lineage.mates leave-PRS after be.evening-EVID-PST

'After her lineage mates left her, evening fell.' (Enrico 2003: 1020)

In all the examples used in this section, the order of the ground and figure clauses is presented in the order in which the situations have occurred. However, the authors of various sources of the sample explicitly indicate that the ground clause and the figure clause may also be presented in a different order than the one in which the situations occur. Patz (2002: 178) mentions that in Kuku Yalanji, the device *wawu-* indicates that the situation of the figure clause happens after the situation expressed in the ground clause. The temporal order tends to be iconic, as in (254). However, the situations expressed in the ground and figure clauses may also be presented in an order different from their occurrence in the real world, as in (255). I have not found any languages in the sample where the only option is for the ground clause to follow the figure clause 'X does Y after having done Z'.

Kuku Yalanji (Pama-Nyungan)

(254) ***wawu****-janji-nya-muny, jana wunana-y.*

after-bathe-SUB-ABL 3PL.NOM lie.RDP-NON.PST

'After bathing, they have a rest.' (Patz 2002: 178)

Kuku Yalanji (Pama-Nyungan)

(255) *nganjin* *jalbu* *nyaji-ny* ***wawu**-wala-nya-muny*.
1PL.EXCL.NOM woman.ABS see-PST after-enter-SUB-ABL
'We saw the woman after she had come in.' (Patz 2002: 178)

Adverbial subordinators may be free or bound devices. Example (256) illustrates the use of a free adverbial subordinator. In (256), the ground clause appears with *mas šemdeg rac* 'after'. A bound adverbial subordinator is shown in (257). In this example, the temporally subsequent construction is marked by =*cánihuaaca* 'after'.

Georgian (Kartvelian)

(256) ***mas šemdeg rac*** *šen* *ga-x-ved-i*,
after 2SG.NOM PREV-2SG.exit-AOR-IND
'After you went out,

masc'avlebel-s *sul-i* *c'a-u-vid-a*.
teacher-DAT soul-NOM PREV-OV-depart-it
the teacher fainted.' (Hewitt 1995: 592)

Iquito (Zaparoan)

(257) *quí=ináani=**cánihuaaca*** *iina* *asúraaja* *cusi=jinacuma*,
1SG=put.NMLZ=after ART manioc pot=inside
'After I put this manioc in the pot,

quí=un=inata-rɨi *iinami=jina*.

1SG=3SG.IRR=put.upright-MOM fire-LOC

I will put it on the fire.' (Michael 2009: 154)

In the sample, while forty-five languages have free adverbial subordinators expressing temporal subsequence, fifteen languages have bound adverbial subordinators encoding *after*-constructions. This indicates that free adverbial subordinators outweigh bound adverbial subordinators considerably. In what follows, I provide a detailed discussion of the cross-linguistic distribution and mono/polyfunctionality of free and bound adverbial subordinators.

Free adverbial subordinators tend to be monofunctional (45/56=80.35%), as is shown in Map 12. A typical example of a monofunctional free adverbial subordinator can be found in Amuzgo. In this language, *after*-relations are expressed by *jnda na* 'after', as in (258). This device is monofunctional (Buck 2015: 228). Unlike monofunctional free adverbial subordinators, only a small number of languages have polyfunctional free adverbial subordinators (11/56=19.65%). A single example should suffice to illustrate this pattern. In Meryam Mir, temporally subsequent constructions are marked by *kéwbu* 'after', as in (259). This device is polyfunctional in that it is found not only in context expressing temporal subsequence, but also other adverbial relations (Piper 1989: 199).

Amuzgo (Oto-Manguean/Amuzgoan)

(258) ***jnda na*** *s'aan* *naan,* *tquiaan* *na* *nlcwa'* *jnaan.*

after 3SG.SBJ.prepare broth 3SG.SBJ.give that eat 3SG.POSS.son

'After she prepared the broth, she gave it to her son.' (Buck 2015: 272)

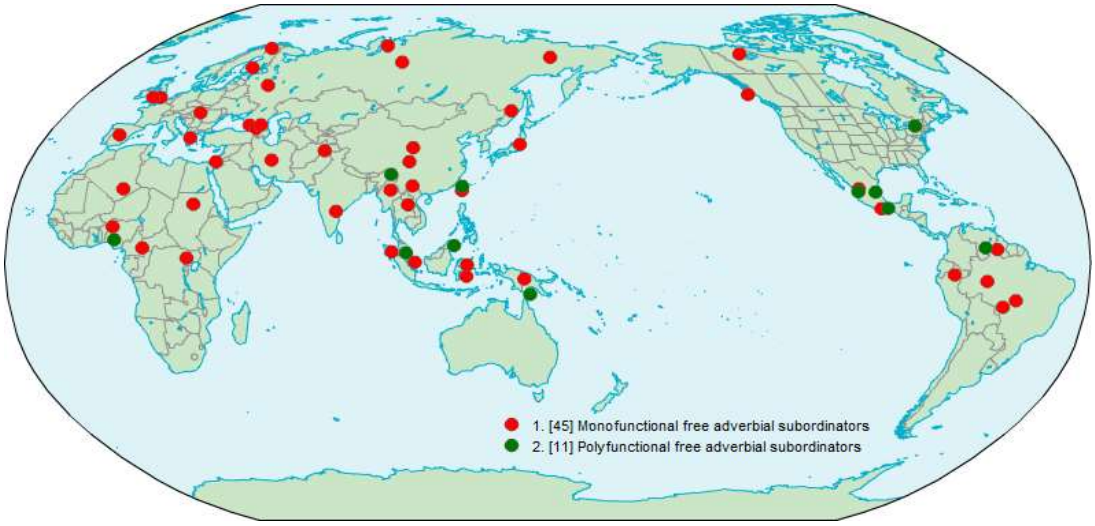
Meryam Mir (Western Fly)

(259) ***kéwbu*** *ya* *ikay-ø,* *ni* *epaytered-ø…*

after DEIX do-FUT water pour.SG-FUT

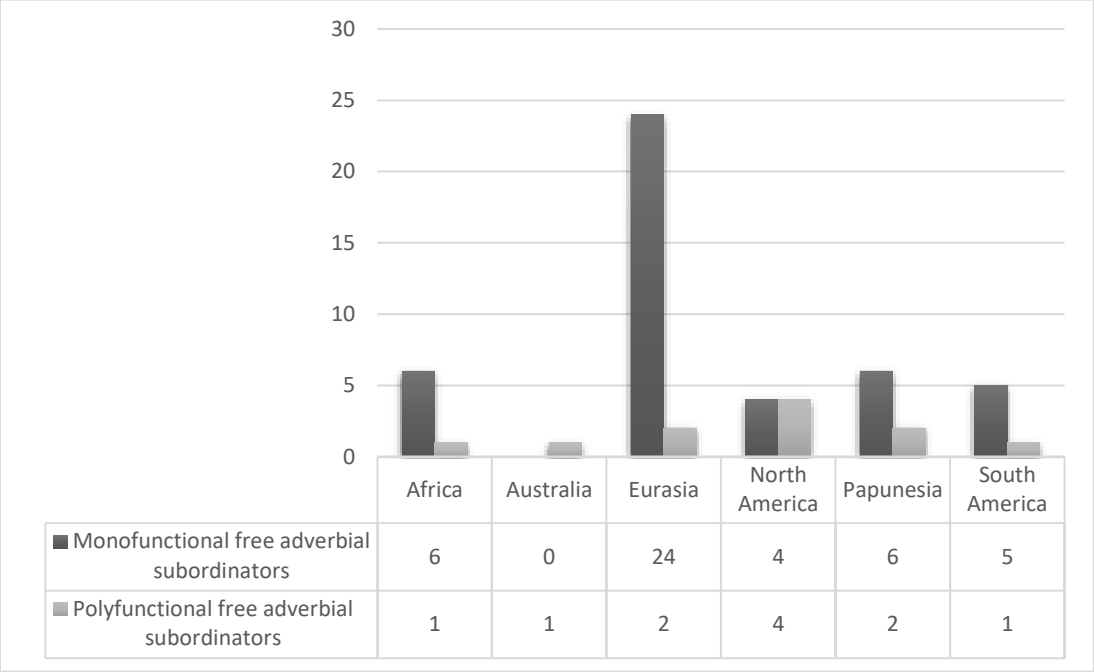
'After you have done that, pour in the water...' (Piper 1989: 199)

Map 12. Free adverbial subordinators encoding *after*-clauses



As Figure 10 shows, the bulk of languages with free adverbial subordinators cluster in Eurasia. Australia only displays one language that employs a free adverbial subordinator for encoding *after*-constructions. Instead of free adverbial subordinators, I mention in §5.2.2 and §5.2.3 that the Australian languages of the sample tend to use deranking devices and 'and then' coordinating devices. One interesting observation to be gleaned from Figure 10 is that monofunctional free adverbial subordinators are more common than polyfunctional adverbial subordinators in almost all macro-areas. The only exceptions are Australia, where the only language attested in the sample has a polyfunctional device, and North America, where both types of devices are equally frequent in the database.

Figure 10. Free adverbial subordinators encoding *after*-clauses per macro-area



Of the fifteen languages that form temporally subsequent constructions with bound adverbial subordinators, seven have monofunctional bound adverbial subordinators (7/15=46.66%) and eight have polyfunctional bound adverbial subordinators (8/15=53.34%). The *after*-construction in (260) is realized by a monofunctional bound adverbial subordinator. In Rama, temporal subsequence is denoted by the bound adverbial subordinator *-su*.

Rama (Chibchan/Rama)

(260) *nais* *tum-ting-atkut-**su**,* *y-aakir-i.*

right dark-happen-ASP-after 3SG.SBJ-stay-TNS

'After it gets dark, he stays.' (Craig 1990: 217)

An example that illustrates a polyfunctional device is attested in Ottawa. *After*-relations in this language are expressed with the bound adverbial subordinator *shkwaa-* attached to the verb in the ground clause, as in (261). This device is polyfunctional (Valentine 2009: 203). Note that the past tense marker *gaa-* shows a changed conjunct in that the first vowel has mutated from /i/ to /a/ (unmutated form *gii-*). Furthermore, the ground clause shows a conjunct order in that it appears with specialized person markers (i.e. *-yaang* in the ground clause; see §3.2.1 for a more detailed discussion concerned with changed conjunct and conjunct order).

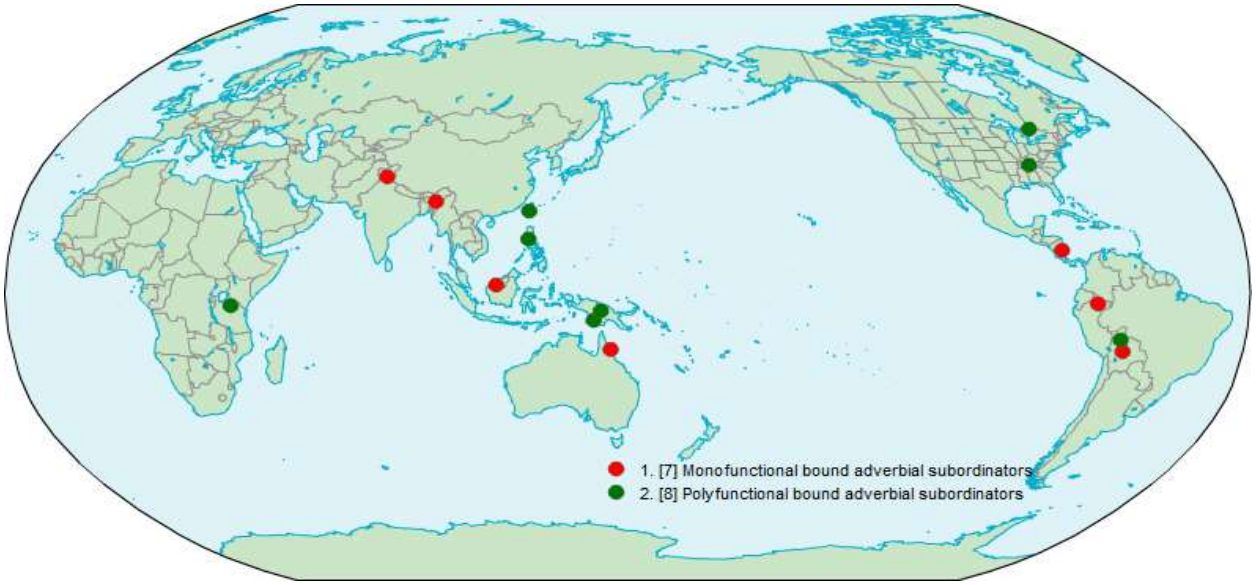
Ottawa (Algic/Algonquian)

(261) *gaa-**shkwaa**-maawnjihdi-yaang, n-gii-gchi-wiisnimi.*

PST-after-meet.together-1PL.CNJ IND-PST-greatly.eat-1PL.IND

'After our meeting, we had a big meal.' (Valentine 2009: 203)

Map 13. Bound adverbial subordinators encoding *after*-clauses



If we take a look at the cross-linguistic distribution of bound adverbial subordinators displayed in Map 13, it is worth noting that they seem to be attested in all macro-areas. One observation that strikes the eye is that bound adverbial subordinators are almost non-existent in Africa and Australia in the languages of the sample.

5.2.2 Restricted deranking devices

Temporally subsequent constructions encoded by restricted deranking devices are very frequent in the database. These devices have been given different names. For instance, they have been called "specialized converbs" in Altaic languages (Haspelmath 1995: 23), as is shown in (262); "restricted dependent moods"[46] in Eskimo-Aleut languages (Miyaoka 2012: 115), as is illustrated in (263); "situative tense markers" in Bantu languages, as in (264) (see §3.2.2); and 'consecutive markers' in Bantu languages (Bennett 1975:58), as can be seen in (265).[47]

[46] The term dependent mood comes from the description of Eskimo-Aleut languages (Mithun 2008c: 86; Berge 2016: 287). Martowicz (2011: 32) explains that they owe their name due to the fact that they appear in slots in which indicative mood affixes occur. Miyaoka (2012: 115) notes that these dedicated dependent moods have been variously called in Eskimo linguistics, i.e "relative mood" (Bergsland 1955), "oblique mood" (Woodbury 1981), and "connective mood" (Reed et al. 1977).

[47] Another restricted deranking device attested in many Bantu languages has been called the "resumptive infinitive marker". This is a verb form signaling temporal subsequence. In particular, this verb form is a discourse device which consists of restating or resuming the situation described in the previous clause (Guérois 2015: 408; Nicolle 2015: 40; Wilhelmsen 2018: 203). That is, this form is attested for the most part in tail-head linkage constructions (e.g. Cuwabo, Kwaya, Mbugwe).

Udihe (Altaic/Tungusic)

(262) *in'ei-we* *tindaŋi-ge-**si**,* *ŋene:-ti* *caixi*.

dog-ACC let-PERF-PFV.CVB.SS go.PST-3PL.SBJ further

'Having loosened the dogs, they went further.' (Nikolaeva & Tolskaya 2001: 740)

Central Alaskan Yup'ik (Eskimo-Aleut/Eskimo)

(263) *qulig-tu-**nr**-akun* *kuik,* *qera-ngnaq-saaq-aa*.

crack-have.much-QC-3SG river.ABS.SG cross-CONAT-IND-3SG.3SG

'After the river already had wide cracks, he tried to cross it.' (Miyaoka 2012: 1412)

Makhuwa (Atlantic-Congo/Bantu)

(264) ***a**-khúúr-ale* *ehópá,* *oo-rúpa*.

SBJ.SIT-chew-PFV 9.fish SBJ.PFV.DISJ-sleep

'(After) having eaten fish, she went to sleep.' (Van der Wal 2014: 52)

Eton (Atlantic-Congo/Bantu)

(265) *à-Ltɛ́* *L-ɲɔ̀ŋ* *ndɔ́gà,* *à-dí-**H***.

AGR-PRS INF-take mango I-eat-CONS

'After he takes a mango, he eats it.' (Van de Velde 2008: 269)

Of the restricted devices mentioned above, consecutive markers show an interesting property in that they always appear in the figure clause, as in (265), where the consecutive marker appears in the figure clause *àdíH* 'he eats it'. The other restricted devices always appear

in the ground clause, as in (262), (263), and (264). The temporal order of the situations expressed in the ground clause and figure clause, in constructions encoded by restricted deranking devices, tends to be iconic. The authors of the sources consulted, for the most part, do not mention whether the order of clauses encoded by restricted deranking devices may also be presented in a different order than the one in which the situations occur.

In spite of the fact that these devices have been given different names in different linguistic traditions, I consider them the same thing for the following reasons. First, the restricted deranking devices introduced above appear in clauses with reduced finiteness (Haspelmath 1995: 13; Miyaoka 2012: 1385; Van der Wal 2014: 51-52). Second, the restricted deranking devices discussed in the previous examples are part of the inflectional paradigm of verbs and are thus in paradigmatic contrast to other inflectional morphemes (Haspelmath 1995: 4). Third, the restricted deranking devices show above do not have the degree of autonomy associated with the status of lexemes (Haspelmath 1995: 4).

However, it should be noted that there seem to be two differences, not affecting my analysis, among the restricted deranking devices listed in the preceding discussion. First, as was outlined above, consecutive markers always appear in the figure clause while specialized converbs, restricted dependent moods, and situative markers always occur in the ground clause. Second, while clauses with specialized converbs, restricted dependent moods, and situative markers show a variable position with respect to their figure clause, consecutives have a fixed position in that they appear after a formally independent initial clause (Creissels et al. 2008:140; Hyman 1971: 29). Another difference is the following. While specialized

converbs[48], restricted dependent moods, and situative tense markers are overtly marked, consecutive markers may be either overt or not. In this regard, Nurse & Philippson (2006: 165) note that in many Bantu languages, zero forms are used as consecutives: "we went (marked for past) to the market, we buy bananas, we go home, we eat, etc.", in which the first verb is marked for tense while the rest are unmarked.[49]

This discussion should suffice to justify the decision of grouping together the various types of restricted deranking devices mentioned before. Now, I turn my attention to their cross-linguistic distribution and mono/polyfunctionality.

Restricted deranking devices may be monofunctional or polyfunctional. An example that illustrates a monofunctional device is attested in Beja. In this language, the restricted deranking device *-e:ti:t* is fairly common in the expression of 'after', as in (266). The Yuchi example in (267) appears with the restricted deranking device *-he*. This device has a value marking a succession of situations. However, it can also be found in contexts expressing other adverbial relations. Accordingly, this device is polyfunctional (Linn 2000: 503).

[48] Haspelmath (1995: 9) notes that converbs tend to be marked by an affix attached to the verb stem. However, he shows that one exception to this tendency comes from Ge'ez (Afro-Asiatic/Semitic), in which converbs are formed by a vowel pattern.

[49] The consecutive function is marked in several ways in Bantu languages. One is by the use of *-a-*. Since this is the commonest marker of past tense in Bantu, and since most narratives have to do with past situations, it is unsurprising that *-a-* should have been generalized to all narrative reference (Nurse 2008: 121). The use of *na-* is also found in the expression of the consecutive function in Bantu languages (Nurse 2008: 121). A third way of expressing the consecutive function is by means of the marker *ku-* (Nurse 2008: 122). A fourth way is via null marking. This appears to be common in Northwestern Bantu languages (Nurse 2008: 122). The fifth, and the most common way of encoding consecutive constructions is by means of the deranking device *ka-* (Derek Nurse, personal communication). The device ∗*ka* has been reconstructed for Proto-Bantu (Nurse 2008: 123). Note that it is possible that the consecutive *ka-* in Bantu languages has developed from itive markers. The itive meaning 'go and' extends via distal 'there/then' to a function involving temporal subsequence (Nurse & Philippson 2006; Ström 2013: 269). Another consecutive marker found in Bantu is *la-* (Koni Muluwa & Bostoen 2019: 440). This device is normally preceded by a subject prefix, but it may also occur without a subject prefix. Koen Bostoen (personal communication) informs me that the consecutive marker *la-* is also a common future marker across Bantu. Note that in some Bantu languages, the consecutive markers mentioned before may appear with a comitative case marker. These constructions are known as comitative-marked consecutive constructions (Crane 2019: 676).

Beja (Afro-Asiatic/Beja)

(266) *ti=gʷʔanaːti* *jhak-s-**eːtiːt**,*

DEF.F=goatskin get.up-CAUS-after

'After I take the goatskins,

i=meːk-i *jad=eːb* *a-ndiːf.*

DEF.M=donkey-GEN.SG behind=LOC 1SG-leave

I leave right behind the donkey.' (Vanhove 2014: 28)

Yuchi (Isolate)

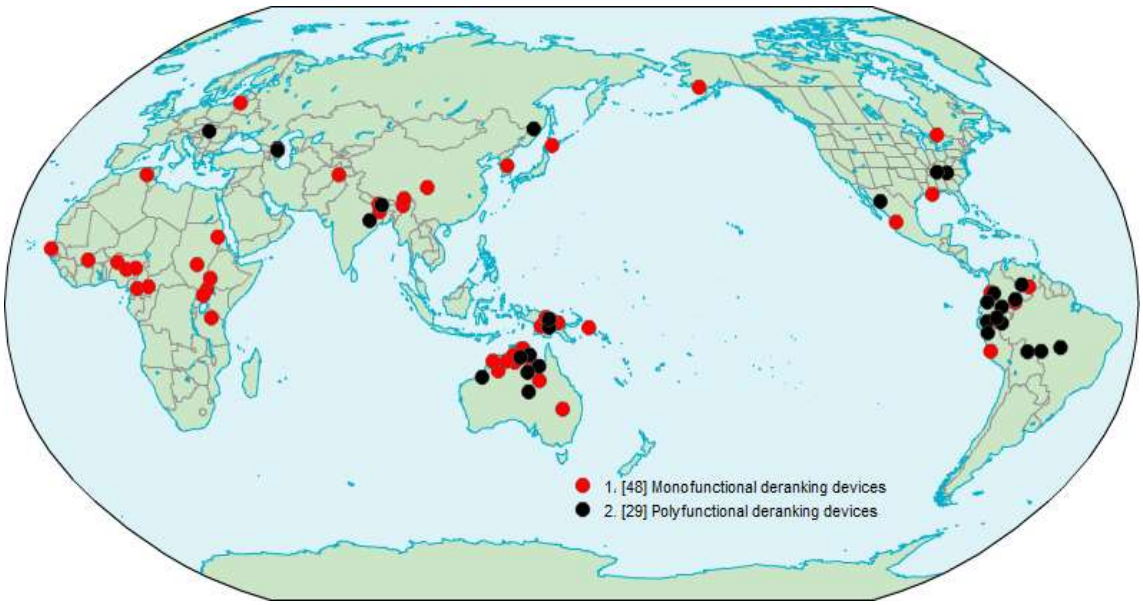
(267) *wedzādane-ha* *hẽ-thlæ-de-**he**,* *hõ-dane* *thla.*

pork.fat-CL.PL.INAN 3SG.ACT-eat-COMPL-after 3SG.P-fat go

'After he ate the salt meat, he got fat.' (Linn 2000: 504)

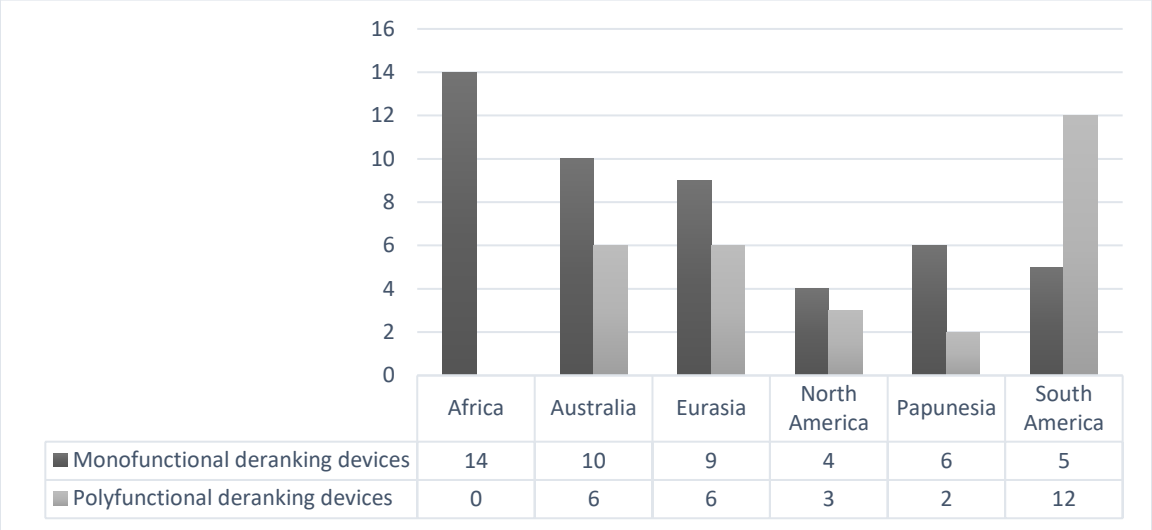
An overview of the distribution of the above-mentioned patterns is given in Map 14. Monofunctional restricted deranking devices outnumber polyfunctional restricted deranking devices. Their distribution is not homogenous in that there are macro-areas in which monofunctional devices are more common than polyfunctional devices and other macro-areas that show the opposite picture.

Map 14. Restricted deranking devices encoding *after*-clauses



The distribution of restricted deranking devices used per macro-area is displayed in Figure 11. The most important information can be summarized as follows. First, while South America hosts the majority of languages with restricted deranking devices in the database, North America shows scarce occurrences of restricted deranking devices. Second, monofunctional restricted deranking devices are the globally preferred coding strategy in almost all macro-areas. The only exception is South America, where polyfunctional restricted deranking devices are more common than monofunctional restricted deranking devices. Third, all restricted deranking devices encoding *after*-clauses are monofunctional in the African languages of the sample.

Figure 11. Restricted deranking devices encoding *after*-clauses per macro-area



After-constructions are also encoded by oblique case markers in various sample languages. In total, five languages employ ablative case markers for denoting 'after' (5/77=6.49%). In Mangarrayi, the ablative case marker -*wana* denotes 'after', as can be seen in (268). Interestingly, ablative case markers are for the most part attested in the Australian languages of the sample (e.g. Anindilyakwa, Nyangumarta, Mangarrayi, and Wambaya). These devices are polyfunctional in the database. The fact that ablative case markers can convey 'after' has not gone unnoticed. This is in line with Martowicz (2011: 92), who shows that in three languages of her sample (Lepcha, Maale, and Quechua Huallaga), *after*-constructions are formed by ablative case endings. Ablative markers in simple clause constructions express motion away from, that is, ablative case applies to an entity that, from the speaker's or protagonist's viewpoint, is moving away from. Therefore, ablative case makers expressing 'after' appear to be part of a more general process whereby spatial concepts are used for also indicating temporal concepts (Haspelmath 1997: 66; Kuteva et al. 2019a: 43).

Mangarrayi (Mangarrayi-Maran/Mangarrayi)

(268) *ya-ø-yaŋ-gu-**wana**,* *(w)a-ŋa-naya-wu.*

IRR-3SG-go-DES-ABL IRR-1SG.3SG-cook-DES

'After he goes, I want to cook it.' (Merlan 1982: 21)

The brief discussion of consecutive markers provided above does not do justice to the complexity of this phenomenon. Given that consecutive markers have not been addressed in most typological work related to clause combining, they may be unknown to the wider audience. Therefore, I provide, in what follows, a more detailed discussion of consecutive markers.[50]

5.2.2.1 Consecutive markers

As mentioned earlier, the term consecutive refers to constructions in which only the first clause shows the formal characteristics of an independent clause, and the following clause or clauses are characterized by a reduction or lack of verbal inflection, and/or by the use of a restricted deranking device called 'the consecutive' (Creissels et al. 2008:140; Dumestre 2003: 385-386; Vydrin 2019: 422-424; Vydrin 2020: 85).[51] This is illustrated in the Manda example in (269). In this language, temporal subsequence is conveyed by the consecutive marker *ka-*. In this construction, the temporal frame of the discourse is initially anchored by the past tense marker *-a-*, and the second clause appears with the consecutive marker *ka-*. It has been proposed that

[50] Many thanks to Koen Bostoen, Derek Nurse, and Mark Van de Velde for fruitful discussions on consecutive constructions.

[51] Bambara shows an interesting scenario in that the first clause has a verb full-fledged for TAM and polarity, and the following verb or verbs are non-finite. However, they are not marked by a deranking device. Instead, they appear with the general coordinating device *àní* 'and' and the infinitive marker *kà* (Vydrin 2020: 85)

this type of construction is common in languages with VO word order (Longacre 2007: 417). However, Vydrin (2020) shows that Bambara, and other Manding languages, contradict the rule (taken by Longacre for granted) of a strong correlation between the VO basic order and consecutive constructions. In this regard, the basic word order all over the Mande family is OV.

Manda (Atlantic-Congo/Bantu)

(269) *va-**a**-l-ili* *va-**ka**-wɔk-a…*

3PL.SBJ-PST-eat-PST 3PL.SBJ-CONS-depart-FI

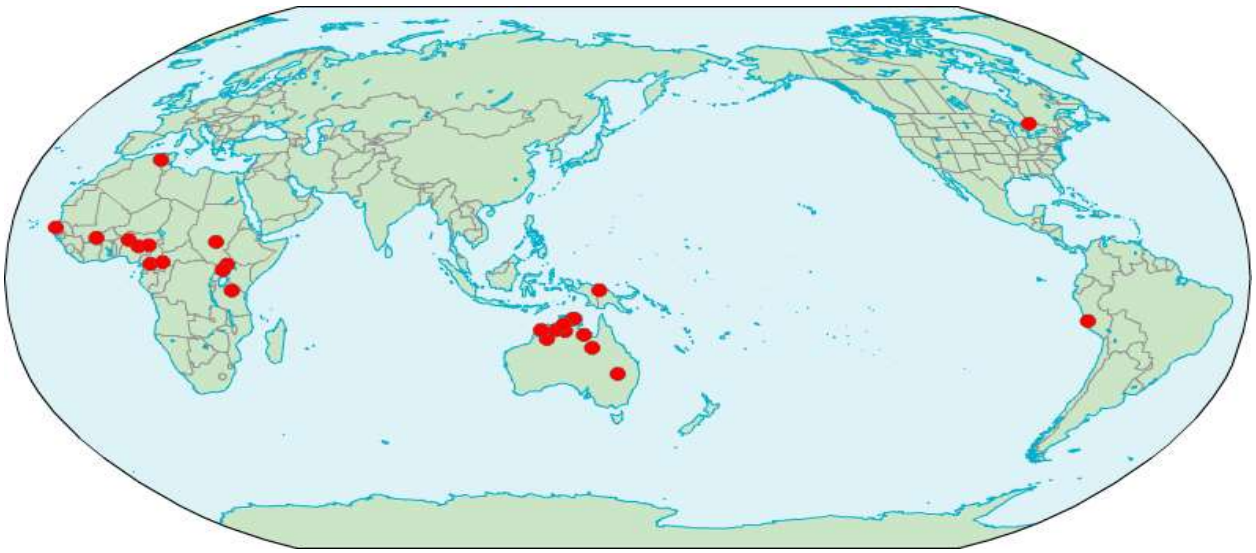
'They ate and then they went from there…' (Bernander 2017: 196)

Consecutive markers have been called different things, e.g. "narrative", "sequential" (Hyman & Watters 1984: 258; Persohn 2017: 210). These terms are not used consistently by different authors (Nurse 2008: 121). Accordingly, I follow Nurse (2008: 121) and adopt the term consecutive.[52]

As is shown in Map 15, twenty-five languages of the sample express temporal subsequence by consecutive markers (25/77=32.46%). Unsurprisingly, they tend to be found for the most part in African languages. However, these devices seem to be attested in other areas where they have not received a great deal of attention. In particular, various Australian languages of the database seem to have consecutive constructions. Some more specific comments on their geographical distribution merit discussion here.

[52] Khachaturyan (2021: 154) adopts the term "conjoint construction" to refer to consecutive constructions in Mano (Mande). She mentions that consecutive constructions in this language are employed not only for representing *after*-relations but also *while*-relations.

Map 15. Consecutive markers in the world's languages



With respect to consecutive markers in African languages, recall that they have been described mainly in Bantu languages (Creissels et al. 2008: 140). It has been noted that many Bantu languages use a restricted deranking device in narratives for expressing temporal subsequence (Creissels et al. 2008: 140; Hyman & Watters 1984: 258; Longacre 1990; Nicolle 2015: 42; Nurse 2008: 120; Rose et al. 2002:25; Satre 2010;).[53] This interpretation is consistent with the frequent occurrence of other clause-linking devices in this type of construction (e.g. consecutive devices may appear with temporal adverb(ial)s meaning 'later'). This reinforces the sequential reading (Emanatian 1990: 201). As was mentioned above, the time of the situation is first established, either explicitly in the first verb of the string, or implicitly, because the participants know the context, which therefore does not need mentioning. The following verb is then marked by a restricted deranking device, which replaces the tense marker appropriate to the time established by the first verb (Emanatian 1990: 193; Hyman 1971). With

[53] This deranking device tends to be used in past narratives (Persohn 2017: 222), less frequent in timeless situations, followed by futures (Nurse 2008: 120). While consecutive markers are most typically found in past temporal contexts and often described as past tenses in the literature for specific Bantu languages, Nurse (2008: 120) claims that this distribution is discourse-related.

this in mind, this device seems to be a dependent conjugation, as it is dependent by an established frame of temporal reference. This has led Nurse (2008:120) to call it a "relative tense" (in contrast to absolute tenses anchored in the "here and now" of the moment of speaking). Welmers (1973: 365) says that this device is found not only in Bantu languages, but also in many Atlantic-Congo languages. Although this is a very general claim and needs quantifying, it suggests that this device is probably not a Bantu innovation but inherited from Atlantic-Congo.

Interestingly, many Bantu languages not included in the database have a consecutive construction which, in addition to its regular consecutive use, can also be used after the verb 'to go' for expressing a 'motion-cum-purpose construction'. An example is attested in Mbugwe, where the consecutive prefix *ká-* signals temporal subsequence, but also purposive relations after 'to go', as in (270) (Wilhelmsen 2019: 555).

Mbugwe (Atlantic-Congo/Bantu)

(270)	*fét-á*	*ó-ká-rem-a*	*i-onda*	*r-áákó*.
	go-IMP	2SG-CONS-cultivate-FI	5-field	PP-2SG.POSS

'Go to cultivate your farm.' (Wilhelmsen 2019: 555)

In Mbugwe, the verb meaning 'to go' must appear in this construction and cannot be elided (Wilhelmsen 2019: 186). However, in Swahili and some other Bantu languages, this type of consecutive construction expressing purpose does not have to appear with a verb meaning 'to go' (Almasi et al. 2014), as in the Kagulu example in (271). This is known as the "consecutive subjunctive" (Wilhelmsen 2019: 555), the "itive subjunctive" (Guérois 2015:

389; Maganga & Schadeberg 1992: 107) or the "subsecutive" (Devos 2008; Van der Wal 2009).

Kagulu (Atlantic-Congo/Bantu)

(271) *aseye* *chi-**ka**-tambul-a* *ma-sina.*
1PL.SBJ 1PL.SBJ-CONS-mention-FI 6-name
'We will (go to) mention names.' (Petzell 2008: 114)

Although consecutive markers are attested for the most part in Bantu and other Atlantic-Congo languages of the sample (e.g. Noon, Mbodomo, Duka, Mbembe), they are also found in various Afro-Asiatic languages in the database, such as in Awjila Berber, Iraqw, and Pero. Regarding Berber languages, it seems that other languages not included in the sample also have consecutive constructions, e.g. Ghomara Berber, Tashelḥiyt Berber, and Middle Atlas Berber (Bentolila 1981:153-154; Mourigh 2015: 401). This construction is known as the "consecutive aoristic" in Berber languages and is used after an initial verb which has the perfective or imperfective aspectual form. The second clause takes over the aspectual interpretation of the preceding verb (Taine-Cheikh 2010: 370). Galand (2002: 261) mentions that the consecutive in Berber languages from the Center and South of Morocco tends to be used after an initial clause encoded by a perfective marker.

Another language included in the database where consecutive markers are attested is Lopit. In this Eastern Nilotic language, the deranking device *x-* is employed when the verb is used sequentially, as in (272) (Moodie & Rosey Billington 2020: 269).[54]

[54] See Dimmendaal (2008) and Schröder (2013) for a discussion of consecutive constructions in Nilotic languages.

Lopit (Eastern Nilotic)

(272) *e-ìyánì* *xíwarɔ́* *ŋàmà,* ***x*-o-ìsìérè** *dè=xùróxó.*
3SG-bring leopard.NOM sorghum.ABS SEQ-3SG-give to=goat.kids.ABS
'The leopard brought the sorghum and then gave it to the young goats.' (Moodie & Rosey Billington 2020: 269)

A closer look reveals that other Eastern and Southern Nilotic languages also have a similar construction marking temporally subsequent constructions (Barasa 2017; Dimmendaal 1983; Tucker & Mpaayei 1955). However, the form of the consecutive markers is not the same across Eastern and Southern Nilotic languages.[55] In Maa, the marker *n-* has been described as a "narrative tense marker" (Tucker & Mpaayei 1955: 65). Other Eastern Nilotic languages with a consecutive marker are Teso-Turkana languages. Dimmendaal (1983) mentions that these languages denote *after*-relations by *to-* or *ki-*. He calls these markers "subsecutive mood markers".

The remaining African languages of the present study with consecutive constructions are Ik and Lumun. In Ik, consecutive markers indicate that the situation of the figure clause follows in sequence after the situation encoded in the ground clause, as in (273). The consecutive construction in this language is marked in two concurrent ways: (1) a floating high tone (in all but the third person singular and third person plural paradigm members) and (2) a handful of suppletive suffixes making up an irregular paradigm (Schrock 2014: 361). Schrock (2014: 366) mentions that it is likely that because of the long-term contact between Ik and Teso-Turkana languages (Eastern Nilotic), the Ik consecutive marker is a grammatical

[55] This marker has been called the "subsecutive" or "narrative marker" in the description of consecutive markers in Eastern Nilotic languages.

replication of the Teso-Turkana consecutive marker. This stems from the fact that the two have similar functions, but the morphological resources are quite different.

Ik (Kuliak)

(273) *ɪtsʊ́ŋ-ḱɔ-ɛsɛ* *ríj-ík-a* *ɔkɔ́b-ɪma-**kᵒ′**.*

burn-COMPL-SPS forest-PL-NOM cultivate-1PL.EXCL-SEQ

'The forest areas are burned and then we cultivate.' (Schrock 2014: 395)

In Lumun, temporal subsequence is indicated by a marker called the "dependent perfective aspectual marker" (Smits 2017: 364). This deranking device is a consecutive marker used for telling what happened after the situation encoded in the first clause, as in (274). In this type of construction, the first clause sets the time anchor and it usually appears in the completive aspect (Smits 2017: 364). The construction below states that the man saw the hyena in the well, but does not present this as the purpose for which the man was taken along; it is just something that happened next.[56]

Lumun (Kordofanian/Narrow Talodi)

(274) *m-p-ɔnɛkɔ́t* *pól* *a-p-ɔ́n̪-**ɔ́kɔ́n̪akat*** *ŋaŋkɔ́r* *ɪ-rɔ́k.*

1SG-CONC-take.COMPL person CONJ-CONC-look.at-DEP.PFV hyena in-well

'I took the man along and then he saw the wild dog in the well.' (Smits 2017: 364)

[56] Dagik, another language genetically related to Lumun, also has a formally similar construction. However, this construction indicates 'while' and 'as a result' (Vanderelst 2016: 222).

In Chapter 10, I propose several hypotheses regarding the areal distribution of consecutive markers in the languages mentioned above. The fact that the Ik consecutive marker seems to be a grammatical replication of the Teso-Turkana consecutive marker should give an initial flavor of the role of language contact in the spread of this deranking device.

As was illustrated above in Map 15, various Australian languages of the sample also seem to have consecutive constructions that convey temporal subsequence. The Wangkajunga example in (275) shows a consecutive construction. The first clause shows the formal characteristics of an independent clause while the second clause is characterized by the use of the consecutive marker *-lta*.

Wangkajunga (Pama-Nyungan)

(275) *yu-ngun-pa-jananya* *kartiya-lu,* *mintim-ma-nun-pa-**lta**-ya*.
give-PST-?-3PL.OBJ European-ERG sew-CAUS-PST-?-SEQ-3PL.SBJ
'After the European gave it to them, they sewed it.' (Jones 2011: 270)

Interestingly, other Australian languages of the sample, not genetically related, also encode *after*-clauses by consecutive markers. One of the primary strategies for signaling temporal subsequence in Gooniyandi is the consecutive marker *-rni*, as in (276).

Gooniyandi (Bunuban)

(276) *billycan* *jidiblimi* *babaabiddi-**rni*** *milala*.
billycan 1SG.SBJ.lifted.3SG inside-SEQ 1SG.SBJ.saw.3SG
'I lifted the billycan lid and then looked inside.' (McGregor 1990: 428)

Another language where consecutive markers are attested is Garrwa, as can be seen in (277). In this language, temporally subsequent constructions are formed by the consecutive marker *-jiwa*. Note that the initial clause in a narrative sets the tense-aspect stage by the present tense clitic *=ngka*. After that the narration is carried forward by a clause that appears with the consecutive marker *-jiwa* (Mushin 2012: 193).

Garrwa (Garrwan)

(277) *...walajba=ngka* *ja-**jiwa*** *wada*.
get.up=PRS eat-SEQ food
'…(He) gets up and then eats food.' (Mushin 2012: 193)

Wagiman, a language isolate spoken in the Northern Territory, encodes *after*-clauses by consecutive constructions, as in (278). In this example, the consecutive construction begins with a clause that gives full tense specification and subject marking. The second clause is not marked for tense and subject and only appears with the consecutive marker *-wi*. The remaining Australian languages of the database with consecutive constructions are Miriwung (Jarrakan; Kofod 1978: 68), Marrithiyel (Western Daly/Bringen; Green 1989: 185), and Bining Gun-Wok (Gunwinyguan; Evans 2003: 26).

Wagiman (Isolate)

(278) *munybaban* *ŋa-di-nya* *borabora*, *bew'-**wi***.
other.side 1SG.SBJ-come-PST river cross-SEQ
'I came along the river on the other side and then I crossed over.' (Cook 1987: 259)

The Australian languages shown above are spoken in the same region. Given that this strategy is not common cross-linguistically, the parallelism cannot be explained by chance. Therefore, diffusion through language contact is most likely to have taken place. Some hypotheses are proposed in Chapter 10.

Before I proceed, some remarks on Algonquian languages are in order here. In Ottawa, one of the primary strategies for indicating temporal subsequence is a construction in which the first clause shows independent order and the second clause shows conjunct order, as in (279). This seems to match the definition of a consecutive construction adopted in the present study in that the first clause (i.e. ground clause) shows the formal characteristics of an independent clause and the second clause (i.e. figure clause) is characterized by the use of a specialized person marking system prototypical of dependent clauses (see §3.2.1). Look-alike construction are also attested in other Algonquian languages not included in the sample of the present study (e.g. Innu-aimun; Oxford 2007: 268).[57]

Ottawa (Algic/Algonquian)

(279) *o-gii-gwaashm-aan* *zhiishiibeny-an*

3SG.IND-PST-take.out.of.water-3SG.3.OBV.IND duck-OBV

'She took the duck out of the kettle

[57] A similar construction is also attested in Formosan languages and Macro-Je languages. With respect to Formosan languages, this is attested in languages such as Rukai (Zeitoun 2007: 40) and Paiwan (Chang 2006: 310). Regarding Macro-Jê languages, consecutive constructions are mainly found in Je Setentrional languages, such as Canela, Apinajé, Kayapó, Suyá/Kĩsêdjê (Rodrigues 1999: 197; Nikulin & de Castro Alves 2021). In these languages, the first clause has the properties of an independent clause and the second clause is a nominalized clause (Nikulin & de Castro Alves 2021). The ground clause and figure clause are linked by a general coordinating device meaning 'and' that functions as a switch-reference marker. This marker is reconstructed to Proto-Je Setentrional **mə̃* (André Nikulin, personal communication).

mii *dash* *gii-bgashzhw-**aad***

and then PST-carve.up-3SG.3.OBV.CNJ

and then she carved it up.' (Valentine 2009: 202)

Consecutive constructions can also be found in languages spoken in other areas of the world. Longacre (2007: 417) shows that various languages spoken in Southern Vanuatu (Oceanic) express temporal subsequence by consecutive constructions. Although not explicitly mentioned by Longacre, this phenomenon seems to be attested in Anejom̃ (Lynch 2000: 99), Sye (Crowley 1998: 247), Ura (Crowley 1999: 216), Kwamera (Lindstrom & Lynch 1994: 10-11), South-West Tanna (Lynch 1982: 16), North Tanna (Sverredal 2018: 27), and Whitesands (Hammond 2015: 36). In Lenakel, the initial clause in a narrative sets the tense-aspect stage by the past tense marker *-i̶m*. After that the narration is carried forward by a clause that appears with the marker *-ep*, as in (280).

Lenakel (Austronesian/Oceanic)

(280) *k-**i̶m**-a-i̶ni* *peti̶mw* *netg-nil-ar* *miin* *ka*, *m-**ep**-a-li̶s* *io.*

3-PST-PL-say all name-3-PL PL that and-SEQ-PL-take 1SG

'They told me all their names and then they took me away.' (Lynch 1978: 50)

Another example is found in Sye. In this language, temporal subsequence is indicated by *m-*, as in (281). In this example, the time of the situation is first established by *y-*. The following verb is marked by *m-*, which replaces the tense marker appropriate to the time established by the first verb.

Sye (Austronesian/Oceanic)

(281)	*menuc*	***y**-ocep,*	***m**-tasi*	*ra*	*ndogo-n*	*nei.*
	bird	3SG.DIST.PST-fly	SEQ-alight	LOC	branch-CONST	tree

'The bird flew and then alighted on the branch of the tree.' (Crowley 1998: 247)

The markers illustrated above are known in Southern Vanuatu languages as "sequential aspect-markers" (Lynch 1978: 50; Lynch 2000: 99) or "echo-subject markers" (Crowley 1998: 247). With respect to echo-subject markers, a comment is in order here. Echo subject markers are only employed in various languages for indicating a same-subject relation between clauses (Lichtenberk 2014; Lynch 1983). However, echo-subject markers, in various languages of Southern Vanuatu, have developed an additional function (Bril 2004: 28). In this regard, Crowley (1999: 216) mentions that echo verb construction encoded by *m-* in Ura express a same-subject relation between clauses. Interestingly, echo subject markers can also be used for expressing a sequential relationship between clauses. In a similar fashion, Crowley (1998: 247) notes that the Sye echo subject markers *m-* is not only used for indicating same-subject, but also temporal subsequence.

Not only Southern Vanuatu languages, but also Central Vanuatu languages seem to have a look-alike construction signaling temporal subsequence, in particular, South Pentecost languages (e.g. Abma, Ske; Schneider 2010: 218; Johnson 2014: 84), Malakula languages (e.g. Ahamb, Big Nambas; Fox 1979: 83; Rangelov 2020: 243), and Epi-Efate languages (e.g. Lelepa; Lacrampe 2014: 425). Of the languages mentioned earlier, Ahamb shows an interesting scenario in that it has a set of consecutive markers that simultaneously index the subject and express temporal subsequence (Rangelov 2020: 243). These markers are described

as "sequential event subject indexes". In (282), the second clause appears with *dre-*, which indicates first person dual inclusive and a temporal subsequence relation. There is no room to present here each of the consecutive markers of the paradigm. The interested reader is referred to Rangelov (2020: 243).[58]

Ahamb (Austronesian/Oceanic)

(282) *…na-kaykay hayug, dra-r-jumrah…* ***dre****-r-van.*
1SG-call 2SG 1DU.INCL-SEQ-get.up 1DU.INCL.SEQ-SEQ-go
'…(Tomorrow morning) I will call you, we will get up, and then will leave' (Rangelov 2020: 372)

5.2.3 'And then' coordinating devices

'And then' coordinating devices represent another device that is quite common in the languages of the sample. Eighty-eight languages (88/218=40.36%) employ this device as a primary strategy for encoding temporally subsequent constructions. Recall that 'and then' devices are coordinating morphemes specifically used for expressing the temporal

[58] The Ahamb "sequential event subject indexes" are similar to the "sequential subject indexers" attested in some Southeast Solomonic languages (Oceanic), such as Toqabaqita, Lau, Kwaraqae, and Wala (Lichtenberk 2014). In Toqabaqita, temporal subsequence is conveyed by sequential subject indexers that belong to a paradigm of preverbal grammatical elements that simultaneously index the subject and indicate temporal subsequence, as in the Toqabaqita example in (i), where *kwa* indicates first person subject and a temporal subsequence relation between clauses.

Toqabaqita (Austronesian/Oceanic)

(i) *qaaqaq-ku e ubu,* ***kwa*** *lae qi sa-na doketa.*
leg-1SG 3SG.NON.FUT swell 1SG.SEQ go LOC goal-3SG doctor
'My leg was/got swollen, and then I went to the doctor.' (Lichtenberk 2014: 64)

subsequence relation, as can be seen in the Bilua example in (283) where the temporal subsequence relation is signaled by *ti* 'then'.[59]

Bilua (Solomons East Papuan/Bilua)

(283) *ko=ta* *surai=va*,
3SG.SBJ.M=SCM heal=PRS
'It healed,

ti *ko=ta* *po=da=ka*.
and.then 3SG.SBJ.M=SCM come.out=3SG.OBJ.F=PRS
and then it came off.' (Obata 2003: 239)

Clauses linked by 'and then' devices always follow an iconic order. This is confirmed in the languages of the sample in that all languages having 'and then' devices do not allow the order of clauses to be changed. 'And then' devices tend to introduce clauses that appear with the same properties as independent declarative clauses, as in the Bilua example (283), where each clause is marked for its own independent time reference and shows overt person marking.

[59] There are languages in the sample in which 'and then' coordinating devices may function both intra-sententially and inter-sententially (i.e. they play an important role in discourse structuring; Brody 2011: 10). In this case, it has not been possible to determine whether 'and then' coordinating devices made their appearance first as discourse-level units and only later became sentence-level units, or vice versa, because the grammars of the sample do not provide information on this matter. Frajzyngier (1996: 77) shows, based on data from Chadic languages, that it is more likely that 'and then' coordinating devices emerge first as a sentential category and later develop as a discourse category. The author proposes that a functional extension from sentence-level units to discourse-level units is a more likely direction since it is an extension from a more concrete to more abstract level. This requires further research.

‘And then’ coordinating devices may be monofunctional or polyfunctional. In the Semelai example in (284), *pon* ‘then’ is a coordinating device that can be found only in sequential contexts.

Semelai (Austro-Asiatic/ Aslian)

(284)	*ʔareʔ*	*prhntiʔ*	*dak*	***pon***	*ʔyot*	*sar*.
	rain	stop	water	then	return	descend

‘The rain stopped and then the floodwaters receded.’ (Kruspe 2004: 493)

An example of a polyfunctional ‘and then’ coordinator is found in Ngiti, as in (285). In this language, the polyfunctional device *ndɨrɔ̀* ‘and then’ expresses temporal subsequence and other adverbial relations.

Ngiti (Central Sudanic/Lendu)

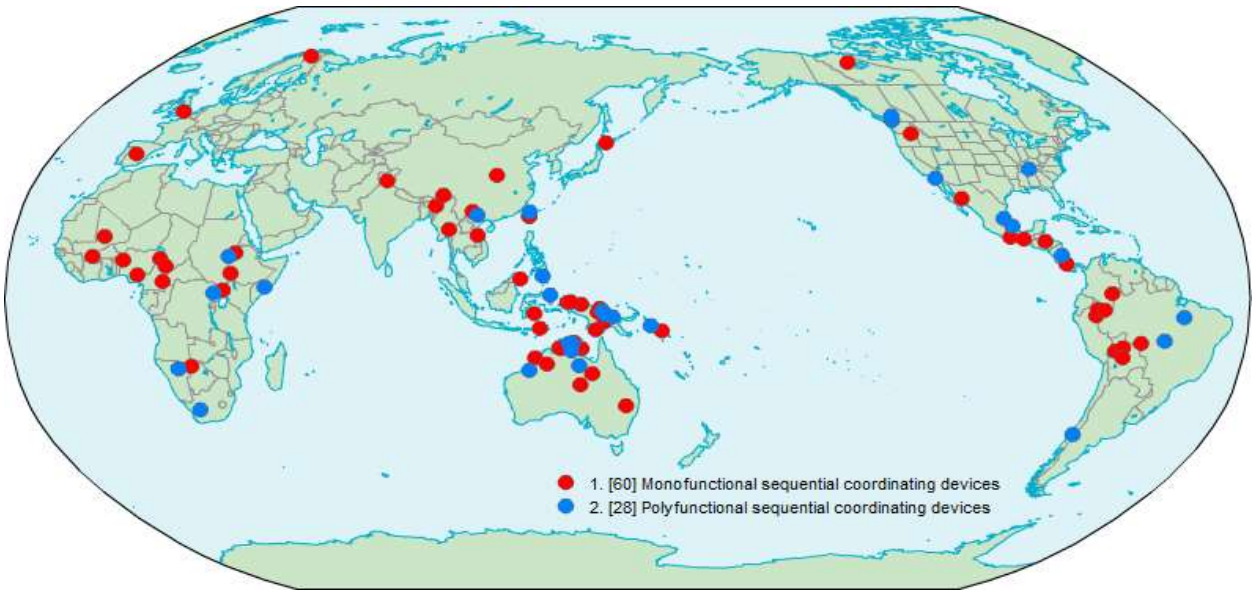
(285)	*ngbángba*	*nɨ́-òbhì*	*ɨ̀nga*,
	child	RES-cultivate.PFV.PRES	field

‘The child cultivated the field,

	ndɨ-rɔ̀	*nd-àdù*	*ìtò*	*nɨ̀-ózò*.
	DEM-SUB	3SG.LOG-AUX	vegetables	RES-plant.NOM

and then planted vegetables.’ (Kutsch Lojenga 1994: 394)

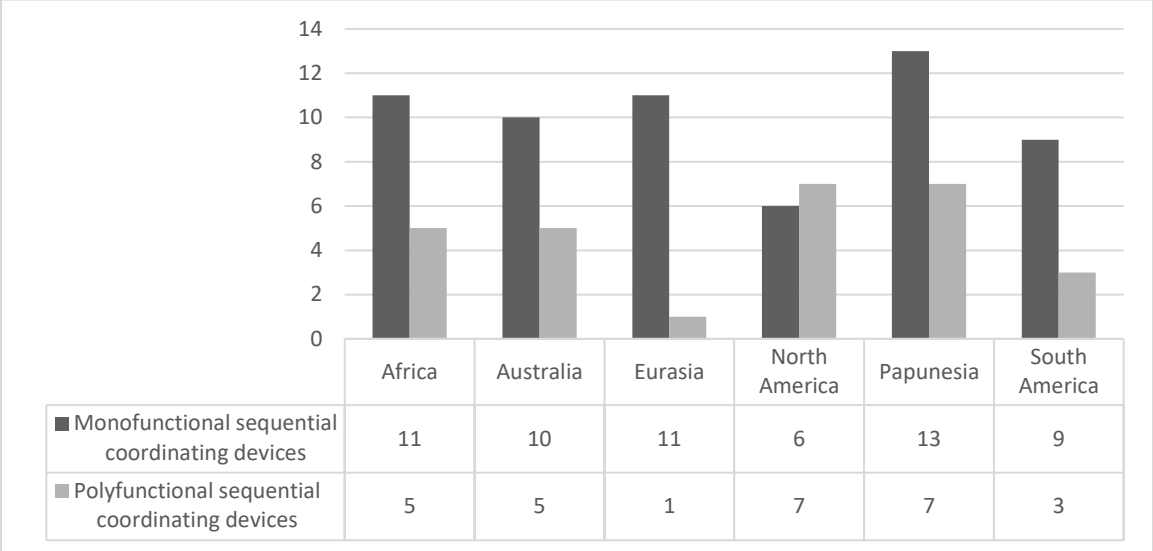
Map 16. ‘And then’ coordinating devices in the world’s languages



The cross-linguistic distribution of ‘and then’ coordinating devices is displayed in Map 16. As can be observed, monofunctional ‘and then’ coordinators (60/88=68.18%) are more frequent than polyfunctional ‘and then’ coordinators (28/88=31.82%) in the database. These devices are scattered in all macro-areas. However, their distribution is not the same across macro-areas.

As can be seen in Figure 12, monofunctional ‘and then’ coordinators are more frequent than polyfunctional ‘and then’ coordinators in all macro-areas. The only exception to this tendency is North America where polyfunctional ‘and then’ coordinators slightly outnumber monofunctional devices. Note the monofunctional ‘and then’ coordinators are more frequent in Papunesia than in other macro-areas in the sample, and polyfunctional ‘and then’ coordinators are almost non-existent in Eurasia.

Figure 12. ‘And then’ coordinating devices per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional sequential coordinating devices	11	10	11	6	13	9
Polyfunctional sequential coordinating devices	5	5	1	7	7	3

The use of demonstratives as clause-linking devices has not gone unnoticed. However, Kuteva et al. (2019a: 136) mention that a more detailed treatment of the usage of demonstratives as linking devices across genetic and areal boundaries is needed. In the present study, six languages (6/218=2.75%) have demonstratives used as clause-linking devices to mark *and then*-constructions.[60] These demonstratives expressing ‘and then’ are only weakly grammaticalized in that they can still appear with nominal properties (Diessel & Breunesse 2020: 305). Therefore, they can be considered items that are not (yet) fully grammaticalized. For instance, in Kokota, the ground clause and the figure clause are linked by the demonstrative *an* ‘that’ (286). This demonstrative is anaphoric, referring to the situation described in the preceding clause. *An* ‘that’ appears with the suffix *-lau*. This is a pragmatic marker primarily

[60] Demonstratives expressing ‘and then’ are found in many Oceanic languages (e.g. Big Nambas; Fox 1979: 122; Sio; Clark & Clark 1987: 83; Vaeakau-Taumako; Næss & Hovdhaugen 2011: 355) and Mesoamerican languages (e.g. Comaltepec Chinantec; Anderson, 2018: 49; Sochiapan Chinantec; Foris 2000: 191; Jamiltepec Mixtec; Johnson 1988: 128; Ocotepec Mixtec; Alexander 1988: 278; Yosondúa Mixtec; Farris 1992: 149). These languages are not included in the sample.

(and very commonly) suffixed to demonstratives and deictic locatives in noun phrases, and its function is to provide emphasis in a way that indicates that the referent is exactly the entity at issue (Palmer 2009: 77). What this seems to indicate is that *an* 'that' is a demonstrative that is not (yet) fully grammaticalized.

Kokota (Austronesian/Oceanic)

(286) *friñhe=ni* *ia* *sug̃a* *n-e* *nhigo=u*
work=3SG the house REAL-3SG be.finished=CONT
'The house is finished

an-lau *ge* *kata* *n-e=u* *suli* *ana.*
that-SPEC SEQ bite REAL-3SG=be.thus child that
and then the child starts biting.' (Palmer 2009: 351)

The question is: why do speakers of many languages around the world employ demonstratives as *and then*-devices? Demonstratives tend to develop a discourse-deictic use, in which they refer to an adjacent clause or situation (Webber 1991; Diessel 2006: 480). Accordingly, the fact that many languages employ this strategy for expressing 'and then' is not arbitrary. Rather, it is motivated by factors associated with language use.

There are languages in the database in which 'and then' devices are formed from a demonstrative and an ablative marker (6/218=2.75%). This is only attested in South American and Australian languages in the present study. In (287), temporal subsequence is conveyed

ukata ‘and then’. This device consists of the demonstrative marker *uka* ‘that’ and the ablative marker *-ta*.

Muylaq' Aymara (Aymaran)

(287) *sawadu* *pur-t’ani-wjw-i-w,*
saturday come-MOM-BFR-3SG-DECL
‘He comes Saturday,

uka-ta *dumingu-x* *sara-wja-ni-rak.*
that-ABL sunday-TOP go-BFR-FUT-AD
and then he will go Sunday’ (Coler 2014: 680)

And then-devices consisting of demonstratives and ablative markers seem to be common in different Australian languages not genetically related, as can be observed in the Gooniyandi example in (288), the Wardaman example in (289), the Waray example in (290), and the Limilngan example in (291).

Gooniyandi (Bunuban)

(288) *yoowooloo* *garndiwangooddoo-ngga* *gardboowooddarni,*
men many-ERG they.fought.together
‘Many men fought together,

niyi-nhingi *nardawooddarni* *thiddi-nhingi-ngga*.

that-ABL they.cried.together fight-ABL-ERG

and then they cried together afterwards.' (McGregor 1990: 428)

Wardaman (Yangmanic)

(289) *wurr-ngu-ndi-wiya* *girdibun* ***nan-ba-****wan* *wurr-bu-yi-rri-wuya*.

3-eat-PST-DU finish that-ABL-DEF 3-hit-REFL-PST-DU

'The two of them ate it all up and then they fought.' (Merlan 1994: 190)

Waray (Gunwinyguan)

(290) *tjim* *Beatrice* *litawi-lik* *tjul-tj-ang*,

come Beatrice hill-LOC go.down-AUX-REAL

'She came to Beatrice Hill and went down,

kati-yang *tiri-tjim* *punji* *angilak.*

that-ABL crawl-come banyon over.here

and then she came crawling to this Banyon tree over here.' (Harvey 1986: 267)

Limilngan (Darwin Region/Limilngan)

(291) *ngaykgi* *bangi* *lakgarni* *m-adlingi*,

1MIN tree LOC III-small.of.back

'I sat at the roots of the tree,

*da-ya-**k-ulang*** *daklambangi* *ng-ayung*.

DEF-IV-DEM-ABL town I-go.PST.REAL.PFV

and then I went to town.' (Harvey 2001: 115)

Given that this type of pattern is for the most part attested in Australian languages, diffusion through language contact is most likely to have taken place. I return to this pattern in more detail in Chapter 10.

Before I leave the present section, it should be noted that in various languages of the sample, the etymology of an *and then*-device is a "linking clause" organized around a demonstrative and a proverb such as 'be' or 'do' (cf. Diessel & Breunesse 2020: 305). This is a type of summary tail-head linkage construction (see §3.4.2). These include the Jamul Tiipay sequential coordinating device *nya-puu-m* 'when-do.that-DS (Miller 2001: 253-254), the Kewa sequential coordinator *gu-pu-maa* 'that-do-SEQ' (Yarapea 2006: 292), the Mongsen Ao sequential coordinating device *tə̀-ʧhà-əɹ* 'that-do-SEQ' (Coupe 2006: 381-382), and the Atong sequential coordinator *ətək-əy-məŋ* 'do.like.this/that-ADV-SEQ' (van Breugel 2014: 247).

5.3 Less common restricted devices

The previous section provided an extensive discussion of the most common restricted devices used irrespective of the extent of time lapse between the situations. In this section, I turn my attention to a detailed treatment of less common restricted devices forming temporally subsequent constructions.

5.3.1 Verbs used as clause-linking devices

As has been shown in Chapter 3 and Chapter 4, verbs may be used as clause-linking devices. Of the languages of the database, twenty-five languages have verbs signaling 'after' (25/218=11.46%). Verbs employed as clause-linking devices can be considered items that are not (yet) fully grammaticalized in that they still appear with verbal properties. In Tamambo, *after*-constructions are formed by the verb *turu* 'stand'. This verb is not (yet) fully grammaticalized in that it appears with the third person plural marker *na-*, as in (292). Note that *turu* 'stand' may appear with other person markers, such as the first person plural marker *ka*, as in (293) or the third person singular marker *mo* (Jauncey 1997: 427).

Tamambo (Austronesian/Oceanic)

(292)	*…na*	*tau-a*	*aie,*	*mo-iso*	***na***	***turu***	*na*	*mule…*
	3PL	put-3SG.OBJ	there	3SG-finish	3PL	stand	3PL	head.home

'…They put it there and then they headed home… (Jauncey 1997: 427)

Tamambo (Austronesian/Oceanic)

(293)	*..ka*	*lasi-a*	*mo*	*iso,*	***ka***	***turu***	*ka-ta*	*uli-a*	*aulu…*
	1PL	tie-3SG	3SG	finish	1PL	stand	1PL-REP	unwind-3SG	up.direction

'…We finished tying it and then we unwinded it again from the top …' (Jauncey 1997: 427)

Only certain types of verbs used as clause-linking devices are attested in the database. Verbs meaning 'to finish' may be routinely used for combining clauses denoting 'after'. This

is the most common verb used as a clause-linking device in the sample (18/25=72%). In all languages in the sample, these devices are monofunctional. An example illustrating this pattern comes from Puyuma. In this language, *after*-constructions are realized by the verb *piya* 'to finish'. This verb is only weakly grammaticalized in that it can still appear with verbal properties. In (294), the verb *piya* 'to finish' occurs with the intransitive infix *-en-* plus the perfective clitic *=la* (Teng 2008: 411). The remaining languages with this pattern are Bininj Gun-Wok, Gurr-Goni, Kayah Monu, Khmer, Kasong, Puyuma, Muna, Tagalog, Toqabaqita, Tetun, Maybrat, Oksapmin, Urim, Chitimacha, Crow, Chontal, Kakua, and Mako.

Puyuma (Austronesian/Puyuma)

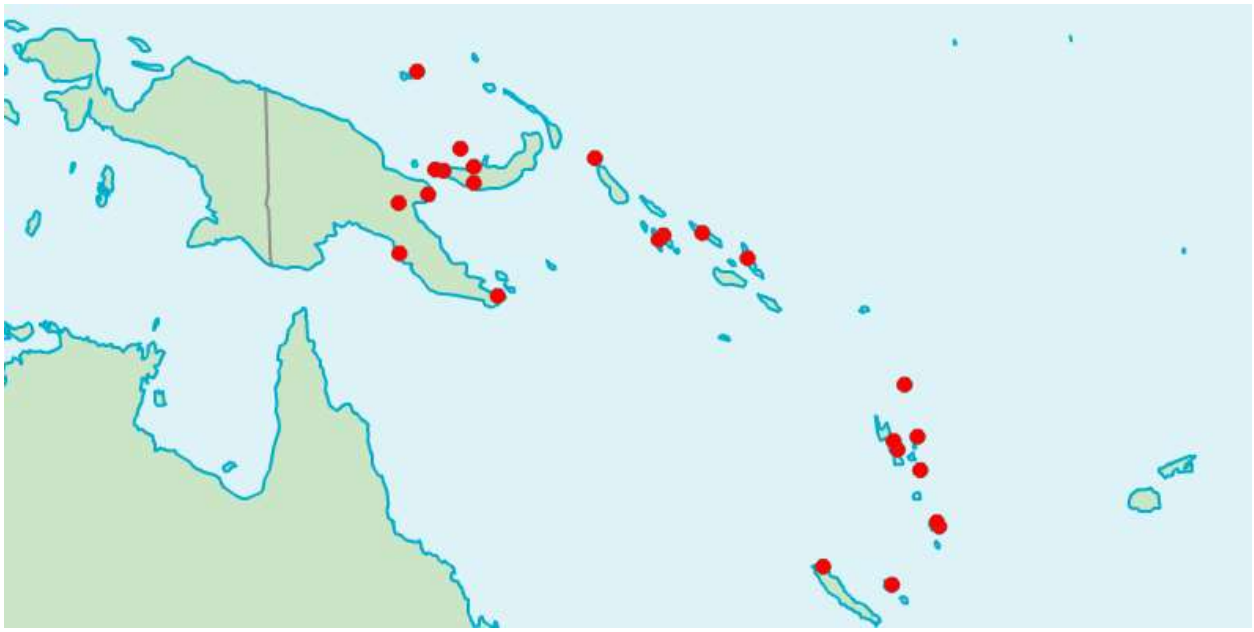
(294) ***p<en>iya=la*** *pa-ragan* *i* *maka-dare'* *i*,
<INTR>finish=PFV CAUS-up LOC along-earth TOP
'After they built (the thing) below,

pa-ragan=la *i* *maka-sat.*
CAUS-up=PFV LOC along-above
they built (the thing) above.' (Teng 2008: 411)

Various Austronesian languages of the sample tend to use verbs meaning 'to finish' for indicating temporal subsequence. A closer look reveals that this phenomenon is pervasive in Oceanic languages. It has been shown that in many Oceanic languages, *after*-constructions are realized by verbs meaning 'to finish' (Jonsson 2012: 237). This pattern is attested in Ura (Crowley 1999: 218), Tamambo (Jauncey 2011: 218), Raga (Vari-Bogiri 2011: 249), Tawala

(Ezard 1997: 241), and Ughele (Frostad 2013: 272), among many others, as is shown in Map 17. As for Oceanic languages spoken in Vanuatu, they show an interesting scenario in that verbs 'to finish' denoting 'after' can also be used in tail-head linkage constructions (Olguín Martínez 2021b).

Map 17. Verbs meaning 'to finish' expressing 'after' in Oceanic languages (Olguín Martínez 2021b)



Verbs meaning 'to finish' have grammaticalized into 'and then' coordinating devices in various languages around the world (Jonsson 2012: 145; Kuteva et al. 2019: 177-178). Kuteva et al. (2019a: 177-178) mention that this grammaticalization pathway seems to be an instance in which process verbs are grammaticalized to markers structuring narrative discourse. Jonsson (2012: 145) proposes that a series of clauses, such as 'I cleaned the house, (that) finished, I went for a walk' may be the starting point in grammaticalization processes resulting in a clause combining construction equivalent to that in (295).

(295) *I cleaned the house*, (***that***) ***finished***, *I went for a walk* ('I cleaned the house, **and then** I went for a walk').

Motion verbs may also encode *after*-constructions. Four languages of the sample show this pattern (4/25=16%). These devices are monofunctional. In the Ts'ixa example in (296), the ground clause appears with *ky'oà* 'to exit'. This verb is weakly grammaticalized in that it can still occur with the imperfective marker *kò* (Fehn 2016: 274). The remaining languages with this pattern are African languages (i.e. Lele, Tommo So) and Eurasian languages (i.e. Tamil). With respect to African languages, Bourdin (2008: 40) shows, based on a sample of sixty-four languages, that the grammaticalization of verbs meaning 'to come' and 'to go' into clause-linking devices expressing 'after' is widespread.

Ts'ixa (Khoe-Kwadi)

(296) *xúá=m̀* *gérè* *ǀ'urí*
place=SG FUT be.dirty
'The place will be dirt

kyxoà=mà *ʔé‖ù* ***kò*** *ǀáá=m̀* *ʔà* ***ky'òa***.
elephant=SG.M 3PL.M IPFV skin=SG.M LOC exit
after they have skinned the elephant there.' (Fehn 2016: 274)

The third, and less frequent verb denoting 'after' is 'to pass'. In three languages of the sample, *after*-constructions are formed by verbs meaning 'to pass' (3/25=12%). These devices

are monofunctional. An example illustrating this pattern is found in Japhug. In this language, temporal subsequence is expressed by the verb *tsu* 'to pass', as in (297). This verb appears with the perfective marker *tɤ* which indicates that it is not (yet) fully grammaticalized. The other languages with this pattern are Semelai and Muna.

Japhug (Sino-Tibetan/rGyalrong)

(297) *nɯnɯ* *tɤ-wɣrum* *nɯ* *tɯ-sŋi* *ʁnɯ-sŋi* ***tɤ-tsu*** *tɕe*,
DEM PFV-be.white DEM one-day two-day PFV-pass LINK
'After one or two days that it turned white,

tɕe *nɯnɯ* *tu-zga* *ɲɯ-ŋu*.
LINK DEM IPFV-be.ripe TESTIM-be
it ripens.' (Jacques 2014: 284)

5.3.2 Nouns used as clause-linking devices

Nouns may also play a role in the expression of temporal subsequence cross-linguistically. In the database, three languages convey 'after' by nouns (3/218=1.37%). These devices are monofunctional.

The range of nouns indicating *after*-relations is limited to those meaning 'back'. Let me illustrate the use of this device in the languages of the sample. The example in (298) is interesting in that the nominalized clause functions as a modifier of the head noun *ǹkˈóng* 'back', and the whole noun phrase functions as a temporal adverbial clause. The temporal

subsequence relation is made possible by the lexical semantics of the spatial noun *ǹkˈóng* ‘back’ (Hellwig 2011: 416).

Goemai (Afro-Asiatic/West Chadic)

(298) ***ǹkˈóng*** *gòe-yóól* *gòe,* *ní* *dóe* *bˈák.*
back NMLZ-rise.SG 2SG.POSS 3SG.SBJ come here
‘After you had risen, he came here.’ (Hellwig 2011: 416)

Another example is attested in Eton. In this language, one of the primary strategies denoting ‘after’ is the spatial noun *mbùz* ‘back’, as in (299).

Eton (Atlantic-Congo/Bantu)

(299) *à-sɔ́-gà-H* *L-pám* ***á*** ***mbuz*** *mə̀-lá* *nâ* *ísă* *à-H-kɛ̀.*
I-VEN-G-NF INF-arrive LOC back VI-three COMP father I-PST-go
‘He arrived three days after his father left.’ (Van de Velde 2008: 362)

The third and last example is found in Korean. As can be seen in (300), the ground clause appears with the spatial noun *twi* ‘back’. The temporal subsequence relation is made possible by the lexical semantics of this noun (Sohn 2009: 293).

Korean (Koreanic)

(300)	*Kiho*	*ka*	*ka-n*	***twi***	***ey***,	*Mia*	*ka*	*ka-ss-eyo.*
	Kiho	INTR.SBJ	go-REL	back	LOC	Mia	INTR.SBJ	go-PST-POL

'After Kiho went, Mia went.' (Sohn 2009: 293)

One interesting observation to be gleaned from the examples shown above is that spatial nouns may be bare or may appear with locative case markers or locative adpositions. In Goemai, the spatial noun *ǹkˈóng* 'back' is bare in that it lacks "flagging", i.e. case markers or adpositions. Note that the Eton and Korean constructions show the opposite scenario in that the spatial nouns appear with locative markers. The Eton spatial noun *mbùz* 'back' occurs with *á* and the Korean spatial noun *twi* 'back' appears with *-ey*. However, due to the scarcity of data, it is not possible to determine whether one pattern is more frequent than the other one. Accordingly, this is a very promising area for future research.[61]

Kuteva et al. (2019a: 68) note that clause-linking devices expressing *after*-relations may derive from nouns meaning 'back'. They note that this is common in African languages. Furthermore, they show that this grammaticalization appears to be an instance of a more general process whereby certain body parts, on account of their relative position, are first used as structural templates for expressing deictic location and then develop further into temporal markers (Kuteva et al. 2019a: 68).

[61] Recall that another interesting aspect not addressed here due to the scarcity of data is concerned with the following question: if one has a given temporal noun used both for introducing an *after*-clause and in an ordinary temporal noun phrase, does it get the same flagging in both constructions?

5.3.3 Adverb(ial)s meaning ‘already’

Another device that also should be taken into account is adverb(ial)s meaning ‘already’. Olsson (2013: 39) shows that in several Southeast Asian languages, this device appears as a marker of sequentiality, as can be seen in the Thai example in (301), where the ground clause appears with *lέɛw* ‘already’.

Thai (Tai-Kadai/Kam-Tai)

(301) *prachu* *sèt* ***lέɛw***,
meeting finish already
‘(After) the meeting is over,

khôy *pay* *sɯ́ɯ* *khɔ̂ɔŋ* *dii* *máy*.
softly go buy thing good Q
shall we go shopping?’ (Iwasaki & Ingkaphirom 2005: 277; cf. Olsson 2013: 39)

After-constructions realized by adverb(ial)s meaning ‘already’ are common in various Austronesian languages (e.g. Coastal Konjo, Indonesian, Mbula; cf. Jonsson 2012: 238). In particular, they seem to be attested in Malayo-Polynesian languages (Olsson 2013: 39). In the sample, Tetun is the only language that indicates ‘after’ by an adverb(ial) meaning ‘already’. In this language, the form *ti’a* ‘already’ is a monofunctional device primarily used in clause-sequencing constructions, as in (302). This device indicates that the situation described in the figure clause will occur after that referred to in the *ti’a*-marked clause is complete (van Klinken 1999: 236).

Tetun (Austronesian/Central Malayo-Polynesian)

(302) *kawen* ***ti'a,*** *túr* *iha* *ne'e* *dei.*

marry already sit loc this only

'(I agree to marry you so long as we will live near my family). After (we) are married, (we) must live here.' (van Klinken 1999: 236)

5.3.4 Correlative constructions

The last less common device in the sample of the present study is that of correlative clause-linking devices. Recall that a correlative construction is one in which the first clause appears with a clause-linking device and the second clause appears with another one (see §3.3.1). It has been shown that *when*-constructions (§3.3.1) and *while*-constructions (§4.3.1) employ various types of correlative patterns. In contrast, there is only one language in the database with a correlative pattern expressing 'after'. Mandarin denotes 'after' by the free adverbial subordinator *yìhòu* that appears in the ground clause and the sequential coordinating device *jiu* 'and then' that occurs in the figure clause, as in (303).

Mandarin (Sino-Tibetan/Chinese)

(303) *xià* *kè* ***yìhòu*** *wǒ,* ***jiù*** *qù* *yóuyǒng.*

descend class after 1SG.SBJ then go swim

'After I get out of class, I go swimming.' (Li &Thompson 1981: 634)

Before I leave the present section, mention should be made of the following correlative construction. In many languages of the database, there are constructions which include both an

after-clause and a *before*-clause (see §1.2). These constructions have a double figure/ground, as in the Waray example in (304) in that they convey an *after*-relation and a *before*-relation. The example in (304) expresses an *after*-relation in that the second *putawan iyatjinj* 'we went to Darwin' can be understood as a situation that occurred after the situation expressed in the first clause *perima iyatjinj* 'we went to Berrimah' (e.g. *after we went to Berrimah, we went to Darwin*). Note that this example also conveys a *before*-relation in that the second clause *putawan iyatjinj* 'we went to Darwin' can be understood as a situation that occurred before the situation expressed in the first clause *perima iyatjinj* 'we went to Berrimah' (e.g. *we went to Berrimah before we went to Darwin*). These constructions will not be discussed here, but in Chapter 6. However, they have been introduced very briefly at this point to give an initial flavor of the analysis adopted in the present study.

Waray (Gunwinyguan)

(304)	*perima-**minj***	*i-yatjinj*	***katji-yang***	*putawan*	*i-yatjinj*.
	berrimah-first	1PL.SBJ-go	and-then	Darwin	1PL.SBJ-go

'First we went to Berrimah, and then we went to Darwin.' (Harvey 1986: 266)

5.4 *As soon as*-constructions

The strategies discussed above can be used irrespective of the extent of time lapse between the situations. However, in this section, I briefly discuss one specific time lapse: immediate temporal subsequence constructions, a.k.a. 'as soon as' clauses, as is illustrated in the Daga example in (305), where the immediate temporal subsequence is indicated by *boge* 'immediately'.

Daga (Dagan)

(305) *tapunea* *bo-en,* ***boge*** *gear-e* *aenagaet…*
mother.in.law die-3SG immediately fall-3SG.SBJ.SS away
'His mother-in-law died, (and) immediately he left (her house)…' (Murane 1974: 241)

'As soon as' constructions have been traditionally neglected in the typology of adverbial clauses. For instance, Cristofaro (2003: 159) and Martowicz (2011) only concentrate on constructions signaling temporal subsequence irrespective of the extent of time lapse. Thompson et al. (2007: 246), in their typological study of different semantic types of adverbial clauses, only mention the notion of 'as soon as' when explaining that English has a rich array of subordinating morphemes introducing temporal clauses. Hetterle (2015: 202) does not take into account immediately temporally subsequent constructions in her typological study on the grounds that there is usually a shortage of quantitatively sufficient published data on this topic. Two other recent studies (i.e. Bril 2010; Dixon & Aikhenvald 2009) dedicated to exploring clause-linkage only contain a few case studies that briefly mention how particular languages express immediate temporal subsequence. For instance, Akkadian (Afro-Asiatic/Semitic) signals immediate subsequence by *kīma* 'as soon as' (Deutscher 2009: 62) and Axaxdərə Akhvakh (Nakh-Daghestanian/Avar-Andic-Tsezic) encodes *as soon as*-constructions by the converb *-ik'ena* 'as soon as' (Creissels 2010: 118). One exception to this lack of research is Kortmann's (1997) study on adverbial subordinators in the languages of Europe. However, the author only takes into account free standing clause-linking devices, such as Spanish *tan pronto como* 'as soon as', German *sobald* 'as soon as', and Catalan *tan aviat com* 'as soon as'. One

question that arises at this point is: do languages from other areas of the world also use free adverbial subordinators for expressing ‘as soon as’? This section should make it clear that there may be more to the story in that languages may use a large range of devices for indicating ‘as soon as’.

The discussion is based on only sixty-one languages from the 218-language sample. Accordingly, this research can make only a modest contribution to the understanding of this type of construction. The range of devices by which *as soon as*-constructions are encoded is divided into: restricted adverbial subordinators (§5.4.1), restricted deranking devices (§5.4.2), adverb(ial)s meaning ‘immediately’ (§5.4.3), adverb(ial)s meaning ‘only’ (§5.4.4), correlative constructions (§5.4.5), similative ‘like’ markers (§5.4.6), universal quantifiers meaning ‘all’ (§5.4.7), verb-doubling (§5.4.8), and *or not*-constructions (§5.4.9). Since the grammars of the sample do not usually contain information on whether the clause-linking device denoting ‘as soon as’ is either monofunctional or polyfunctional, I do not further pursue this issue in this section. Various devices are scattered in different macro-areas showing no effects of areal grouping. Accordingly, the areal distribution of ‘as soon as’ devices is only addressed when necessary.

5.4.1 Restricted adverbial subordinators

One of the most common devices encoding ‘as soon as’ constructions in the database is free adverbial subordinators. Fourteen languages (14⁄61=22.95%) have free adverbial subordinators indicating immediate temporal subsequence, as in (306), in which the ground clause appears with *gìlāā* ‘as soon as’.

Bangime (Isolate)

(306) ***gìlāā*** *nɛ̄* *ŋ̄* *būrà,*

as.soon.as 1PL.SBJ 1PL.SBJ come.out.PFV

'As soon as we came out,

à *ɥɔ̀wⁿ* ∅ *kóó* *ń* *tììndà* ∅ *ɥúwⁿɔ̀.*

DEF rain 3SG.SBJ PFV 3SG.SBJ begin.PFV 3SG.SBJ rain.fall.IPFV

it started to rain.' (Heath & Hantgan 2018: 514)

5.4.2 Restricted deranking devices

Another common device is restricted deranking devices. Seventeen languages (17⁄61=27.86%) have restricted deranking devices as a primary strategy for expressing 'as soon as'. In the Khwarshi example in (307), the immediate temporal subsequence relation is expressed by *-učˇ* 'as soon as'. In a similar fashion, the Lezgian example in (308) is encoded by a restricted deranking device. The ground clause is marked by *-waldi* 'as soon as'.

Khwarshi (Nakh-Daghestanian/Avar-Andic-Tsezic)

(307) *učitel* *∅-ot'up'-**učˇ**,* *dac* *k'ez* *baybikid-i.*

teacher I-come-as.soon.as lesson you.DAT begin-PST

'As soon as the teacher came, the lesson started.' (Khalilova 2009: 403)

Lezgian (Nakh-Daghestanian/Lezgic)

(308) *Širinbala* *rak'-at-aj* *ataj-**waldi**,*

Širinbala door-PL-INEL lesson-as.soon.as

'As soon as Širinbala came through the door,

Cükwer *k'wače-l* *aq'alt-na*.

teacher foot-SRESS rise-AOR

Cükwer rose to her feet.' (Haspelmath 1993: 385)

5.4.3 Adverb(ial)s meaning 'immediately'

Languages may also use temporal adverb(ial)s meaning 'immediately' for expressing 'as soon as'. In the languages of the sample, five languages (5⁄61=8.19%) display temporal adverb(ial)s meaning 'immediately' as a primary strategy. In Urim, immediate temporal subsequence is conveyed by *am* 'immediately', as in (309).

Urim (Torricelli/Urim)

(309) *walkipman* *al-kil* *pa* *atning* *kolpa*,

grandson GEN-3SG DEF hear.REAL DEF

'The grandson heard this,

am *kaino*.

immediately go.up

and immediately went (to do it).' (Hemmilä & Luoma 1987: 220)

5.4.4 Adverb(ial)s meaning ‘only’

Another device attested in the languages of the sample is that of adverb(ial)s meaning ‘only’. Interestingly, this device is only found in three languages spoken in Mali, though from different language families (3/61=4.91%). First, in Tamashek, the adverb(ial) *táŋ* ‘only’ encodes immediate temporally subsequent constructions, as is illustrated in (310).

Tamashek (Afro-Asiatic/Berber)

(310) *Ø- ɛ̀ba-t* ***ɤ́s***, *n-ə̀gla.*
3SG.SBJ.M-be.lost.PFV-3SG.OB.M only 1PL.SBJ-go.PFV
‘As soon as he died, we went away.’ (Heath 2005: 668)

Second, Humburu Senni denotes ‘as soon as’ by the adverb(ial) *táŋ* ‘only’, as in (311). Third, in Jamsay, *as soon as*-constructions are realized by the adverb(ial) *tán* ‘only’, as in (312). With respect to Songay and Dogon languages, Heath (2017: 327) points out that they have borrowed this device from Fulfulde, an Atlantic-Congo language spoken in Mali.

Humburu Senni (Songhay)

(311) *ì* *náŋ* *tó:* ***táŋ***, *gá* *ì* *kání.*
1SG.SBJ PERF arrive only REL 1SG.SBJ go.to.sleep
‘As soon as I had arrived (home), I went to sleep.’ (Heath 2014b: 379)

Jamsay (Dogon)

(312) *íné-m* *yɛ̀rɛ́* *mɔ̌y-yɛ̀-bà* ***tán***…
person-PL come be.together-PFV-3PL.SBJ only
'As soon as they gather together… (Heath 2008: 582)

A closer look reveals that the pattern mentioned above is common in various Songhay languages. However, the forms are not the same. This seems to indicate that speakers of these languages may have copied this device using native material. To give an initial flavor, consider the Koyraboro Senni example in (313), in which the ground clause appears with *hinne* 'only'. This device indicates that the situation of the figure clause immediately happens after the situation expressed in the ground clause. Chapter 10 provides a more detailed discussion about this pattern.

Koyraboro Senni (Songhay)

(313) *...ya* *ŋka* *zumbu* *lol-aa* *ra* ***hinne***…
1SG MAN descend street-DEF LOC ony
'…As soon as I had gotten out in the street…' (Heath 1999b: 268)

There are other languages that have free adverbial subordinators encoding immediate temporally subsequent constructions whose diachronic origin seems to be derived from an adverb(ial) meaning 'only'. This is mainly found in Baltic and Slavic languages (e.g. Latvian; Praulinš 2012: 182; Polish; Swan 2002: 184; Russian; Wade 2011: 504).

5.4.5 Correlative constructions

Various languages use correlative constructions for expressing immediate temporal subsequence (e.g. ***No sooner*** *had I left home* ***than*** *the phone rang*). In total, eleven languages denote 'as soon as' by a correlative pattern (11/61=18.03%). The correlative words may belong to different types of devices. For instance, in the Copala Trique example in (314), the universal quantifier *nuh* 'all' functions as the correlative device in the ground clause and figure clause.

Copala Trique (Oto-Manguean/Mixtecan)

(314)	***nuh***	*kahnah*	*zoh*,
	all	COMPL.come	3SG.SBJ

'As soon as he came,

nuh	kahanx	*nika*	*zoh*	*a*.
all	COMPL.go	spouse	3SG.POSS	DECL

his wife went away.' (Hollenbach 1992: 394)

In the Kharia example in (315), both correlative words are free adverbial subordinators. The subordinator *caṭ* 'as soon as' appears in the ground clause and the subordinator *paṭ* 'as soon as' occurs in the figure clause.

Kharia (Austro-Asiatic/Munda)

(315) *Modi=yaʔ* ***caṭ*** *mãgni,*

Modi=GEN as.soon.as water.ceremony

'No sooner had Modi's water ceremony taken place,

paṭ *biha* *hoy=ki.*

as.soon.as marry become=MID.PST

than the wedding took place.' (Peterson 2011: 392)

There are languages in which both clauses are marked by adverb(ial)s. In Musqueam, *as soon as*-constructions are realized by a correlative pattern, as in (316). In this example, the adverb(ial) *ʔalə̓* 'just' functions as the correlative device in the ground clause and figure clause (Suttles 2004: 438).

Musqueam (Salishan/Central Salish)

(316) *...c̓ə* ***ʔalə̓*** *xʷí-əθət,* *s-wəl-m̓* ***ʔalə̓*** *c̓ís-əm.*

QUOT just shake-self NMLZ-already-AUX.come just grow-INTR

'…As soon as it shook itself, it began to grow.' (Suttles 2004: 438)

There are languages in which the ground clause is marked by a numeral meaning 'one' and the figure clause occurs with an 'and then' device. In the Mandarin example in (317), the ground clause is marked by the numeral *yī* 'one' and the figure clause is marked by the sequential coordinating device *jiù* 'then'. Other languages with a similar pattern are Khatso

(*tei31* ‘one’…*tɕo* ‘and then’; Donlay 2019: 575) and Xong (*aod* ‘one’…*doub* ‘and then’; Sposato 2015: 570). Note that the forms of the correlative markers are not the same. However, the correlative pattern is very similar.

Mandarin (Sino-Tibetan/Chinese)

(317) *lǎoshī* ***yī*** *zǒujìn* *jiàoshì*,
teacher one walk.into classroom
‘As soon as the teacher came into the classroom,

jiù *náchū* *diǎnmíngbù* *diǎnmíng*.
then take.out register call.roll
(s)he took out the register to do the roll-call.’ (Yip & Rimmington 2004: 239)

Sposato (2015: 570) points out that the Xong form *aod* ‘as soon as’ is a numeral meaning ‘one’. Standard Mandarin also features a marker of immediately subsequent action *yī* which is homophonous (and homographic) with the numeral *yī* ‘one’. He mentions that this, along with the structural similarities between Standard Mandarin’s ‘as soon as’ construction and the equivalent Xong construction, suggests that the Xong construction in question is a calque from either Standard Mandarin or from another Sinitic variety in which the same facts apply.

Before I leave the present section, note that a couple of Tai-Kadai languages included in the sample of the present study show a similar pattern indicating ‘as soon as’. In Zhuang, immediate temporal subsequence is signaled by a construction in which the ground clause

occurs with *lian4* ‘just’ and the figure clause is marked by *ɕi4* ‘and then’ (Luo 2008: 373). In a similar fashion, Zoulei has a correlative construction in which the ground clause appears with *ka55* ‘just’ and the figure clause occurs with *jəu31* ‘and then’ (Li et al. 2014: 203). However, unlike the Mandarin, Khatson, and Xong pattern, the ground clause in Zhuang and Zoulei is marked by an adverb(ial) meaning ‘just’ and not by a numeral meaning ‘one’.[62]

5.4.6 Similative (‘like’) markers

Similative markers are markers that express sameness of manner (Haspelmath & Buchholz 1998: 278).

Kambaata (Afro-Asiatic/Highland East Cushitic)

(318) *qoomaax-í* *móos-u* *yoo-ssá* *ann-iichchí-i*
leprosy-M.GEN disease-M.NOM COP-3PL.OBJ.REL father-M.ABL-ADD

am-aachchí-i *qal-an-táa* *ciil-l-áta*
mother-F.ABL-ADD bear-PASS-3F.IPFV.REL infant-PL-F.ACC

*qal-an-tóo=**g**-a-n* *qal-antáa* *ass-éen*.
bear-PASS-3.PFV.REL=as.soon.as-M.OBL-NTR separate-M.ACC do-3SG.HON
‘Infants are separated from their leprous father and mother as soon as they are born.’
(Treis 2017: 109)

[62] Mark Donohue (personal communication) informs me that Indonesian and many other languages of Western and Central Indonesia have a subordinating prefix derived from a numeral meaning ‘one’. This device is used for indicating ‘as soon as’.

Interestingly, in one language of the sample, the use of similative expressions has been extended to also mark ‘as soon as’ constructions. In the Ethiopian Cushitic language Kambaata, the similative enclitic morpheme =*g* expresses immediate temporal subsequence, as in (318) (Treis 2017: 108).

Table 3. ‘Like’ markers expressing ‘as soon as’ (Treis 2017: 91-133)

Genus	**Language**	**Clause-linking device**
Central Cushitic	Xamtanga	*-ŋä*
	Awngi	*-ta ~ -sta*
Highland East Cushitic	Alaaba	*-ga*
	K’abeena	*-gga*
	Hadiyya	*-is-a*
Lowland East Cushitic	Afar	*ínna*
Semitic	Tigre (Mensa dialect)	*kəm*
	Gə’əz	*kama*
	Amharic	*ənd(ä)-*
	Argobba	*ama-*
	Harari	*-kut*
	Wolane	*-kō*
	Zay	*-hum*
	Gumer	*-xäma*
North Omotic	Yemsa	*-nē/-(y)sē*

Other northeastern African languages also employ similative markers for expressing ‘as soon as’ (Treis 2017: 91-133), as is illustrated in Table 3. It is likely that language contact may have played a role here. This is because the languages are spoken in the same region and the probability of chance resemblance is low given the rarity of the strategies. Kuteva et al. (2019a: 402) mention that presumably this is the result of contact-induced grammaticalization.

5.4.7 Universal quantifiers meaning ‘all’

As was mentioned in §5.4.5, among the correlative categories that languages may use for expressing ‘as soon as’ are universal quantifiers meaning ‘all’. There is one language in the sample that does not employ a correlative construction, but only a quantifier meaning ‘all’. In Tommo So, immediate temporally subsequent constructions are encoded by the quantifier *kɛ́m* ‘all’ that appears in the ground clause, as can be seen in the example in (319).

Tommo So (Dogon)

(319) *émmé* *yɛ̀láa* ***kɛ́m***,
1PL.SBJ turn all
‘As soon as we arrived,

ànáge *tɔ̀l-ɛ̀*.
rain=DEF start-PFV
it started to rain.’ (McPherson 2013: 452)

Other Dogon languages, not included in the database, also employ quantifiers meaning ‘all’ for denoting ‘as soon as’, as is illustrated in the Ben Tey example in (320), and the Nanga example in (321).

Ben Tey (Dogon)

(320) *bû:* *yɛ́=ǹ* ***cɛ̂m***,
3PL.SBJ come=and.DS all
‘As soon as they (locusts) came,

kɔ̀sɔ̌y *wó* *lò-ỳ:*.
harvest in go.PFV-1PL.SBJ
we went to the harvest.’ (Heath 2015a: 239)

Nanga (Dogon)

(321) *ň* *ǐ:ⁿ* *kɔ̀:-sɛ̀ᴸ* *gù* ***bú***, *ǹnɛ̀-yⁿ*.
meal 1SG.SBJ eat-PTCP.PFV DEF.INAN.SG all go.PFV-1SG.SBJ
‘As soon as I had eaten the meal, I went away.’ (Heath 2016a: 344)

5.4.8 Verb-doubling

In four languages (4/61=6.55%), immediate temporal subsequence can be expressed by constructions in which the verb of the ground clause is doubled (cf. Fiedler 2014). This pattern is found in West African languages. In the Fongbe example in (322), the sense of immediate subsequence is conveyed by verb-doubling.

Fongbe (Atlantic-Congo/Kwa)

(322) ***wá*** *Kɔ̀kú* ***wá*** *bɔ̀* *Àsíbá* *yì***.**

arrive Koku arrive and Asiba leave

'As soon as Koku arrived, Asiba left.' (Lefebvre & Brousseau 2002: 172)

The Cameroonian Bantu language Eton has a construction used for immediate temporal subsequence in storytelling. It involves a construction-specific nominalization of the verb of the first situation that heads a relative clause in which the first situation is repeated. The whole, head noun plus relative clause, translates as an 'as soon as' clause. The example in (323) would translate literally as something like this: '*the little squirrel cleared the path*. *The clearing that the little squirrel cleared the path, they were under the foliage*'.[63]

Eton (Atlantic-Congo/Bantoid)

(323) *dɔ̂* *vɔ́* *m-ɔ̀nH=ù-ʤàm* *à-ŋgá-kpàgì* *zɛ̌n*.

DP then I-DIM=3-squirrel I-REM.PST-clear 9.path

'The little squirrel cleared the path.'

[63] A similar example is found in Cuwabo. In this language, a verb in the infinitive must be followed by a relative form of the same verb in the perfective aspect for expressing immediate temporal subsequence (Guérois 2015: 488). Another Bantu language with a similar construction is Makwe (Devos 2008: 136). It remains to be explored whether other Bantu languages have a similar construction.

Cuwabo (Atlantic-Congo/Bantu)

(i) ***ōrúmééélá*** ***o-ruméél-íle*** *ólle* *ókúle* *odhúlú,*

15.disappear 15-disappear-PFV.REL 1.DEM.III 17.DEM.III 17.TOP

'As soon as that one above disappeared from the place above (lit. the disappearing which that one disappeared from the place above),

a-mott-él-á *mu-baárúku=ní*.

2-fall-APPL-SEQ 1-boat=LOC

he fell in the boat.' (Guérois 2015: 488)

*H-lè-**kpàgì*** *m-ɔ̀nH=ù-ʤàm* *à-ŋgá-mà* ***L-kpàgì*** *zɛ̌n,*

AUG-5-clearing I-DIM=3-squirrel I-REM.PST-TERM INF-clear 9.path

'As soon as the little squirrel finished clearing this path (lit. the clearing that the little squirrel cleared the path),

bé-ŋgɛ́nâ *á* *lè-jɔ̀mì*.

II-be.already LOC 5-foliage

they were under the foliage.' (Van de Velde 2008: 101)

Verb-doubling constructions occur widely in West African languages to mark information structure. In particular, they are employed for encoding predicate-center focus constructions (e.g. A: *What did the princess do with the frog*? B: *She **KISSED** him*; A: *I cannot imagine that the princess kissed the slippery frog*. B: *Yes, she **DID** kiss him*; Güldemann 2009). Güldemann (2018) notes that in many Bantu languages, a major formal mechanism of dissecting the predicate of a focus construction is the apparently tautological double use of the same verb called variously "predicate-cleft" and "cognate object construction" (e.g. *He **REPAIRED** the car*, lit. 'it is repairing the car that he repaired'). This type of construction has been called the "advance verb construction" in the Bantu linguistic tradition (Meeussen 1967: 121) and has been reconstructed for Proto-Bantu (Güldemann et al. 2014). A detailed treatment of this information marking strategy is beyond the scope of the present study. Suffice it to say for the purposes of the present study that this information marking strategy has been extended in various Bantu languages and other West African languages to mark 'as soon as' constructions, as has been shown above. Note that this clause-linkage pattern has also been

extended to mark adversative clause constructions in various Bantu languages (e.g. *John is tall but Mary is short*; Güldemann 2018). The question is: why are 'as soon as' construction marked by this focus strategy? Fiedler (2014) explains that this complex construction is marked by this focus strategy because focusing the assertion that the situation of the ground clause is accomplished increases its importance and triggers the implicature that there must be a very tight and a close temporal relationship between the situation of the ground clause and figure clause.

Outside Africa, there are two languages spoken in India that seem to have a similar strategy. Bunan possesses a type of temporal adverbial clause that indicates that the situation of the figure clause immediately happens after the situation expressed in the ground clause, as in (324). Widmer (2017: 679) mentions that "these adverbial clauses are remarkable with regard to their syntactic structure, as the verb root on which they are based occurs twice, once with the conjunction clitic =*naŋ* 'when' and once with the adverbial clitic =*den* 'immediately'." In Kashmiri the reduplicated predicate of the ground clause expresses immediate temporal subsequence, as in (325).

Bunan (Sino-Tibetan/Bodic)

(324) *jartok=tɕi* ***ra=naŋ*** ***ra=den***, *sa=tok* *dat-dʑi=na*.
above=ABL come=when come=IMMED ground=DAT fall-PST.INFER.SG=HS
'Having come from above, he immediately fell on the ground, it is said.' (Widmer 2017: 774)

Kashmiri (Indo-European/Indo-Aryan)

(325) *Mohnan* *lo:y* *bə:yis* ***beha:n*** ***beha:niy***.
Mohan.ERG hit brother.DAT sit.PTCP sit.PTCP.EMPH
'Mohan hit his brother as soon as he sat down.' (Koul & Wali 2006: 159)

Interestingly, it has been noted that 'as soon as' constructions realized by verb-doubling occur in various Atlantic creoles (Michaelis et al. 2013), indicating a highly probable West African substrate influence on these creoles. The following examples illustrate this pattern. In the Haitian creole example in (326), the verb *parèt* 'appear' is doubled and it indicates 'as soon as'.

Haitian creole

(326) ***parèt*** *pwofesè* *ki* *mabyal* *la* ***parèt***,
appear professor REL strict DEF appear
'As soon as the strict professor appears,

tout *elèv* *pè.*
all student be.afraid
all students are afraid.' (Michaelis et al. 2013)

A similar example can be found in Martinican creole. In this language, 'as soon as' constructions are formed by verb-doubling, as in (327). The verb *fini* 'finish' that occurs in the ground clause is doubled.

Martinican Creole

(327) ***fini*** *i* ***fini***, *i* *chapé.*

finish 3SG.SBJ finish 3SG.SBJ escape

'As soon as he finished, he left.' (Michaelis et al. 2013)

In Berbice Dutch, immediate temporal subsequence is conveyed by verb-doubling. In (328), the verb *drai* 'turn' is doubled indicating 'as soon as'.

Berbice Dutch

(328) *di* ***drai*** *wat* *ju* ***drai****-tɛ*,

the turn REL 2SG.SBJ turn-PFV

'As soon as you turn around,

o *ku-tɛ* *ju*.

3SG.SBJ catch-PFV 2SG.SBJ

it catches you.' (Michaelis et al. 2013)

In the languages of the sample in which *as soon as*-constructions are realized by verb doubling, there seems to be a constraint on the type of predicate that allows verb-doubling, that is, in all languages of the sample that express 'as soon as' by verb-doubling, the verbs have to be stage-level predicates (e.g. verbs denoting a temporary property, e.g. to eat, to speak, to sit; Lefebvre & Ritter 1993; Lefebvre & Brousseau 2002: 509). In particular, motion verbs seem to be preferred in this type of construction.

5.4.9 *Or not*-constructions

As was pointed out in the previous section, various languages of the sample encode immediate temporally subsequent constructions by verb-doubling. Interestingly, there are a number languages in the database in which the verb of the ground clause is doubled but the second component is negated. In total, five languages show this pattern (5/61=8.19%). Let us discuss some constructions illustrating this pattern.

Turkish expresses immediate temporal subsequence by a construction in which the verb of the ground clause is doubled but the second component is negated, as in (329).

Turkish (Altaic/Turkic)

(329)	*su*	***kayna-r***	***kayna-maz***,	*alt-ın-ı*	*kıs*
	water	boil-AOR	boil-NEG.AOR	bottom-3-ACC	reduce.IMP.2SG

'As soon as the water boils, turn down the heat (under it).' (Göksel & Kerslake 2005: 416)

A similar construction is also attested in Lezgian. Haspelmath (1993: 386) notes that in Lezgian "a peculiar type of immediate-anterior clause uses a reduplicated converb form where the second component is negated", as in (330), literally 'having become, not having become.' Timur Maisak (personal communication) informs me that the same construction has been described for Kryz, another Lezgic language (spoken in Azerbaijan).

Lezgian (Nakh-Daghestanian/Lezgic)

(330) *xweši* *feq'i* *näni*

happy mullah evening

'The happy mullah appeared

x̂a-na=ta-x̂a-na *q̄at-na*.

become-AOR.CVB=NEG-become-AOR.CVB appear-AOR

as soon as it became evening.' (Haspelmath 1993: 386)

Haspelmath (1993: 386) mentions that the Lezgian 'as soon as' construction may have been copied from the neighboring Turkic languages. Timur Maisak (personal communication) mentions that the Kryz 'as soon as' construction has been copied from Azerbaijani, a Turkic language spoken in Azerbaijan.

Another language in the sample with a similar pattern is Georgian. However, in this language the verb of the ground clause is not doubled. Rather, it must be followed by the words *tu ara* 'or not' (Hewitt 1995: 591), as in (331). Given that this pattern is rare and the languages are spoken in the same area, it is likely that language contact may have played a role here.

Georgian (Kartvelian)

(331) *šen-i* *c'eril-i* *mo-m-i-va* ***tu*** ***ara***,

you-AGR letter-NOM PREV-1SG.OBJ-OV-come.FUT.3SG.SBJ or not

'As soon as your letter reaches me,

ma-s *cˈa-v-(Ø)-i-k'itx-av*.

it-DAT PREV-1SG.SBJ-(it)-SV-read-THEM

I shall read it.' (Hewitt 1995: 591)

A similar construction is also found in Japanese. In this language, 'as soon as' may be expressed by a construction in which the verb of the ground clause is doubled and one of the verbs is marked by a negative marker, as in (332).

Japanese (Japonic)

(332) ***tu-ita*** ***ka*** ***tuk-ana-i*** *ka* *no* *usi* *ni*,

arrive-PST Q arrive-NEG-PRS Q LINK after in

'We no sooner got there,

moo *kaet-te* *ki-tyat-ta*.

soon return-CVB come-complete-PST

than we turned around and came back.' (Martin 1988: 927)

Yeon & Brown (2019: 334) outline a parallel phenomenon in Korean. However, in this language the verb of the ground clause is not doubled. In (333), the verb *nwup* 'lay down' is not doubled. Instead, this verb is followed by *camaca* '(or) not' to denote 'as soon as' (Hye Kyeong Ceong, personal communication).

Korean (Koreanic)

(333) ***nwup-ca-ma-ca*** *cam-i* *tul-ess-eyo.*

lay.down-COMPL-NEG-COMPL sleep-NMLZ enter-PST-POL

'I fell asleep as soon as I lay down.' (Yeon & Brown 2019: 334)

5.5. The decision-making process

I now move on to explore the decision-making process of speakers. Many languages of the sample have more than one primary device expressing 'after'. This raises the following question: if *after*-constructions are realized in a particular language by two primary devices, what are the factors that lead speakers to choose one device over the other one? Special attention is paid to the role of mono/polyfunctionality and the role of discourse factors in the decision-making process. I restrict my attention to devices used irrespective of the extent of time lapse between the situations.

5.5.1 Mono/polyfunctionality in the decision-making process

In the sample, thirty-seven languages have more than one primary device for expressing 'after', one of which is monofunctional and the other polyfunctional (37/218=16.97%). I argue that mono/polyfunctionality seems to be the most common factor that influences speakers' choice of either of the primary strategies. This factor also seems to be the most common for *when*-devices (§3.4.2). In what follows, I discuss the role of this factor. There is no room here to present each of these cases. Accordingly, a couple of examples should suffice to illustrate this factor.

‘After’ is expressed by two primary devices in Gaagudju. In (334), the ground clause and figure clause are linked by the sequential coordinating device *garrmaarna* ‘and then’. The second primary device is illustrated in (335). In this example, the temporal subsequence relation is indicated by *baleeru* ‘and then’. Harvey (2002: 374) mentions that *garrmaarna* ‘and then’ and *baleeru* ‘and then’ are similar in that both denote temporal subsequence. However, there are also significant differences in their ranges. There are no examples where *baleeru* ‘and then’ has a non-future reference, as *garrmaarna* ‘and then’ does. Furthermore, while *garrmaarna* ‘and then’ is monofunctional, *baleeru* ‘and then’ is polyfunctional in that it is employed not only for indicating temporal subsequence, but also *lest*-meanings.

Gaagudju (Isolate)

(334) *yaarr-bu* *maarrgi=nu* ***garrmaarna*** *arr-ga-wagaa-y…*
1SG-went clever=3SG and.then 1SG-here-go.back-PST.PFV
‘I went to the doctor and then I came back… (Harvey 2002: 374)

Gaagudju (Isolate)

(335) *…**baleeru*** *ma-rraa-ma* *djaamu.*
and.then 1SG-get-FUT tucker
‘…And then I will get some tucker.’ (Harvey 2002: 377)

Another example can be found in Crow. In this language, *after*-constructions are realized by the verb *koow* ‘to finish’ and by the determiner *-sh*. These devices are weakly grammaticalized and are the primary strategies for denoting ‘after’ in this language. The

ground clause in (336) appears with *koow* ‘to finish. This device is monofunctional in that it is only employed for encoding temporally subsequent constructions. The example in (337) is marked by the determiner *-sh*. This device is polyfunctional in that it indicates ‘after’ and ‘when’.

Crow (Siouan/Core Siouan)

(336) *hinne bishkée-sh bahó* ***koow****-ii-ak, hawass-biláat-aachi-k.*
this dog-DET bark finish-CAUS-SS around-moan-APPROX-DECL
‘After this dog barked, it just sort of moaned.’ (Graczyk 2007: 347)

Crow (Siouan/Core Siouan)

(337) *ákiom koowát-ee-ak iláa-attuua-****sh****, dúu-laa.*
those get.together-CAUS-SS speak-continue-DET come.PL-and
‘After those ones got there and discussed it, they came.’ (Graczyk 2007: 339)

The question is: when do speakers choose monofunctional devices over polyfunctional devices? There may be scenarios in which the speakers employ monofunctional devices because they want to express an *after*-relation unambiguously. In this case, there is a desire to be understood quickly and without special effort or disruption. There may be scenarios in which speakers use polyfunctional devices because they have good reasons to believe that their addressees can readily identify the intended denotation uniquely on the basis of their common ground (Clark & Murphy 1982: 294).

5.5.2 Discourse factors in the decision-making process

Various languages in the database contain primary devices for expressing ‘after’ that have developed additional functions. In what follows, I discuss the additional functions of *after*-devices and how they may play a role in the decision-making process of speakers.

5.5.2.1 Tail-head linkage

Twelve languages have more than one primary strategy for expressing ‘after’, one of which tends to be used in tail-head linkage constructions (12/218=5.50%). The reader is referred to §3.4.2 for a discussion related to tail-head linkage constructions.

Kakua contains two primary devices for expressing ‘after’: the sequential coordinating device ***tɨtimaʔ*** ‘and then’, as in (338), and the verb *pêa* ‘to finish’, as in (339). The former can only occur in biclausal constructions signaling *after*-relations, as in (338); the latter tends to occur in tail-head linkage constructions, as in (339) (Bolaños 2016: 358). It seems reasonable to propose that this discourse factor may lead speakers to choose one device over the other.

Kakua (Kakua-Nukak)

(338) *…kănʔ=tiʔ* *mi=kûʔ-at* ***tɨtimaʔ***

3SG.F=INT 3SG.F=give.medicine-NMLZ and.then

‘…After she gave (me) her medicine,

bɨ *wã=tɨj-beʔ-ep* *bɨka.*

today 1SG=be.good-grow-PST last

I am better finally.’ (Bolaños 2016: 365)

Kakua (Kakua-Nukak)

(339) *bûd-hênaʔ=buh=nit* *mĭʔ=wãw-jùk* *newĕʔ* *ʔã=daʔ*

cut-count=DIR=SS 3SG.F.POSS=head-hair man 3SG.M.POSS=CL

ʔĩ=t-tʃãh-ãp=wɨt=h. ***ʃãh-pêa=nit****…*

3PL=EVID-bath-PST=REP.EVID=REM.PST do-finish-SS

'(They) cut her hair like a man's head they did. Finishing doing it…' (Bolaños 2016: 358)

5.5.2.2 Amount of time between situations

There are languages which have a set of 'and then' coordinating devices that express different amounts of time between situations. Khwe has different 'and then' coordinating devices, as can be observed in Table 4.

Table 4. 'And then' coordinators in Khwe (Kilian-Hatz 2008: 292)

Clause-linking device	**Time lapse**
Sequential coordinator *tàtánò* 'and then'	A short period of time has passed
Sequential coordinator *tà//ómńnò* 'and then'	One or two days have passed
Sequential coordinator *tàxúá//tĩnò* 'and then'	More than two days have passed

Murane (1974: 241) outlines a parallel phenomenon in Daga. For instance, the sequential coordinating device *boge* ‘then’, in the example in (340), indicates that the second situation immediately follows the first situation.

Daga (Dagan)

(340) *tapunea* *bo-en,* ***boge*** *gear-e* *aenagaet* *a-en.*
mother.in.law die-3SG.SBJ then fall-3SG.SBJ.SS away go-3SG.SBJ
‘His mother-in-law died, (and) immediately he left (her house) and went away.’ (Murane 1974: 241)

The sequential coordinating device *amba* ‘then’, in the example in (341), indicates that the second situation does not immediately occur after the first situation.

Daga (Dagan)

(341) *ve-an,* *pa* ***amba*** *am-on.*
leave-3PL.SBJ house then go-3PL.SBJ
‘They left and then went home’ (Murane 1974: 240)

Finally, the sequential coordinating device *evi* ‘then’ in (342) indicates the longest time lapse between situations in comparison to the other two sequential coordinating devices. Accordingly, amounts of time between situations is another discourse factor that may lead speakers to choose one type of device over the other one. The fact that languages may have various devices used depending on the amounts of time between situations can be explained

by a cognitive process known as ‘schematization’, that is, a construal of a situation by adjusting the granularity of the temporal dimension (Croft & Cruse 2004: 52).

Daga (Dagan)

(342) *kaewa* *wa-ini* *uno-taia,* ***evi*** *sia* *anan* *uno*.
greeting say-3SG.SBJ.HAB finish-3SG.SBJ.PRS then again war NEG
‘The peace-maker causes (the fighting) to finish, and then (there is) no war.’ (Murane 1974: 241)

5.5.2.3 Same-subject vs. different subject

Van Gijn (2016: 2) notes that there are languages in which switch-reference markers are not an inflectional category of the verb, but rather free conjunction markers, as in the North American language Kiowa (Watkins 1984: 237), in which *gɔ̀* ‘and’ indicates same-subject and *nɔ̀* ‘and’ indicates different-subject. In the present study, three languages have ‘and then’ coordinating devices expressing temporal subsequence, but also same-subject and different-subject relations (3/218=1.37%). Abau has two sequential devices: *nok* ‘and then’ and *sa* ‘and then’. While *sa* ‘and then’ is used when there is a change of subject, the sequential coordinator *nok* ‘and then’ can only be used for describing a series of situations when there is no change of subject, as is illustrated in (343).

Abau (Sepik/Upper Sepik)

(343) *how* *hom* *loum* *menkin,*

taro 3PL.SBJ burn when

'When the taros were cooked,

ine-ih *hok* *or* *m-e* *lowr* *say,*

sister-KIN 3SG.SBJ.F blackness PL-OBJ scrape off

the sister scraped off the black (burned parts),

nok *liwak* *a,* ***sa*** *sok* *hiy* *lousne.*

then sit eat then snake 3SG.SBJ.M appear

and then sat down to eat, and then a snake appeared.' (Lock 2011: 346-347)

5.5.2.4 Change of scene

Another factor that may play a role in the decision-making process of speakers is the following. In Barupu, 'and then' coordinating devices may indicate a change of scene. The sequential device *ya* 'and then' denotes temporal subsequence and also conjoins situations that take place at the same scene (i.e. activities to do with preparing and then eating dinner or catching fish), as in (344). The sequential coordinator *kope* 'and then' is used when there is a change of scene (i.e. going from having dinner to going to bed) (Corris 2005: 332-334), as in (345). This is the only language in the sample in which this factor seems to play a role in the decision-making process.

Barupu (Skou/Warapu)

(344) *n-o-râivi* ***ya*** *n-ĕ-ná.*

IRR-3SG.SBJ.F-cook and.then IRR-1SG.SBJ.M-eat

'She will cook it and then will eat it.' (Corris 2005: 332)

Barupu (Skou/Warapu)

(345) *bĩ* *k-e-vĭri* *k-e-nopi,*

ancestor REAL-3PL.SBJ.M-die REAL-3PL.SBJ.M-3PL.SBJ.M.go

'Ancestors died and left,

kope *reke* *k-e-tai-p-ari.*

then sheddable.skin REAL-3PL.SBJ.M-shed-AGR-SEP

then they shed their skins.' (Corris 2005: 334)

5.6 Summary

This chapter has shown that *after*-constructions and *as soon as*-constructions have a range of possible linguistic realizations, from asyndetic constructions to various types of restricted devices.

The first part of the chapter was dedicated to the study of strategies used irrespective of the extent of time lapse between the situations. It has been shown that restricted devices are more common than semantically non-specific strategies. With respect to restricted devices, the discussion has made it clear that they vary with respect to their mono/polyfunctionality.

It was briefly pointed out that the order of clauses in asyndetic constructions and general coordinating constructions conveying 'after' is always iconic in that they are presented in the order in which the situations occur. In a similar fashion, 'and then' coordinating devices always follow an iconic order. In contrast, the order of the clauses in constructions encoded by restricted adverbial subordinators and restricted deranking devices may be presented, in many languages, in a different order than the one in which the situations occur. It has been noted that various devices seem to have spread through language contact. Some of these are consecutive markers in African and Australian languages, and 'and then' devices consisting of a demonstrative plus an ablative marker in Australian languages.

The second part of the chapter explored the range of devices expressing one specific time lapse: 'as soon as'. Although it has not been possible to address the mono/polyfunctionality of devices indicating 'as soon as', some interesting observations have been uncovered. First, most languages employ restricted devices for expressing 'as soon as'. Second, the most common devices indicating immediate temporal subsequence are restricted adverbial subordinators and restricted deranking devices. Third, various 'as soon as' devices seem to appear in areal clusters suggesting that language contact has played a role: adverb(ial)s meaning 'only' in languages spoken in Mali, though from different language families, correlative constructions in which the ground clause is marked by a numeral meaning 'one' and the figure clause is marked by an 'and then' coordinating device (e.g. Chinese, Khatso, Xong), and *or not*-constructions in Caucasian languages.

The third, and last part, was concerned with the decision-making process. I have shown that there are various factors that play a role in the decision-making of processes of speakers (e.g. mono/polyfunctionality of devices). Of these, the mono/polyfunctionality of devices

seems to be the most important one leading speakers to choose one device over the other in specific communicative scenarios.

CHAPTER 6

Before-clauses

Temporal constructions expressing precedence (a.k.a. *before*-constructions) consist of a sequence of two clauses in which the situation of the figure clause happens before the situation expressed in the ground clause (Kortmann 1997: 84-85). That is, a ground clause involves a situation that has not yet been realized when the figure clause situation takes place (Declerck 2009: 37; Hetterle 2015: 48; Thompson et al. 2007: 247). The ground clause situation in a *before*-construction may take place at a subsequent time point or may not take place at all (Cristofaro 2003: 62). There are a couple of languages in the sample which formally distinguish whether the ground clause situation takes place or not. In Russian, there are three restricted devices meaning 'before' used with a finite clause: *do togo kak* 'before', *pered tem kak* 'before', and *prežde čem* 'before' (*prežde čem* 'before' can also take an infinitive). The three restricted devices can be used when the ground clause situation takes place. However, of these devices, only *prežde čem* 'before' can be employed when the ground clause situation did not take place (Bernard Comrie, personal communication). A similar phenomenon is attested in Japanese. This language expresses 'before' by *mae ni* 'in advance, in front' and *uti ni* 'in the interval' (see §6.3.1). While *mae ni* 'in advance, in front' is used when the ground clause situation takes place, *uti ni* 'in the interval' is employed when it is not clear whether the ground clause situation actually takes place or not (Kuno 1973: 154-155). In this chapter, I cite, for the most part, *before*-constructions in which the ground clause situation takes place. This stems from the fact that the sources of the present study do not systematically discuss *before*-constructions where the ground clause situation did not take place.

It has been noted that *before*-clauses tend to be encoded by restricted devices, as is illustrated in the Lezgian example in (346), where the *before*-relation is expressed by the restricted deranking device *-nmaz*.

Lezgian (Nakh-Daghestanian/Lezgic)

(346) *hele* *mes.e-laj* *q̃araǧ* *t-awu-**nmaz**,*
still bed-SREL get.up NEG-do-before
'Before I got up,

zi *rik'e-l* *q´aq´an* *dağ-lar* *xta-na-j.*
1SG.GEN heart-SRESS high mountain-PL return-AOR-PST
'I remembered the tall mountains.' (Haspelmath 1993: 385)

Interestingly, even when languages employ a restricted device for expressing temporal precedence, negative markers may play an important role in this type of complex sentence construction (cf. Jin & Koenig 2021: 66). This stems from the fact that, as explained by Thompson et al. (2007: 248), the situation of the ground clause is always incomplete with respect to the figure clause situation. Therefore, this is reflected in many languages in the way negation shows up in the *before*-clause. Hetterle (2015: 136) provides quantitative evidence for the claim that negative markers may interact in multiple and complex ways in *before*-clauses. She mentions that in as many as 16 of her 45 sample languages, negative markers are part of the constructional properties of the *before*-clause. The languages to which this applies in her sample are Abun, Barbareño Chumash, Burmese, Crow, Evenki, Hausa, Japanese,

Khwe, Krongo, Lango, Lezgian, Semelai, Somali, Toqabaqita, Turkish, and West Greenlandic.[64]

In many languages, negative markers are optional in the *before*-clause (i.e. they can be omitted without affecting the *before*-interpretation; Delfitto 2013; Espinal 1992; Krifka 2010; Prete 2008) or are not allowed in the *before*-clause. In the Mandarin example in (347), the negative marker *mei* is optional in *before*-clauses marked by *yiqian* 'before'.[65] This negative marker can be omitted without affecting the *before*-interpretation of the complex sentence construction.

Mandarin (Sino-Tibetan/Chinese)

(347)	*ta*	***(mei)***	*lai*	***yiqian***,	*women*	*yijing*	*hui*	*jia*	*le.*
	3SG.SBJ	NEG	come	before	1PL.SBJ	already	return	home	ASP

'Before he arrived, we had already gone home' (Thompson et al. 2007: 248)

However, there are other languages in which negative markers are obligatory in the *before*-clause. In Eudeve, *before*-clauses are formed by *-do* and *cáque* 'not yet', as in (348). In this construction, *cáque* 'not yet' is obligatory in the *before*-clause. When *cáque* 'not yet' is omitted from the ground clause, the meaning is not that of 'before', but that of 'when'.

[64] Negative markers may also interact in various ways in other types of clause-combining constructions. Jin & Koenig (2021: 45-47) mention that in many languages around the world complement clauses of *fear*-verbs, *forbid*-verbs, and *regret*-verbs tend to appear with negative markers (see also Dobrusina 2021 and Yoon 2013, where they show that complement clauses of *fear*-verbs often contain expletive negation, which is negative marking without negative meaning).

[65] This pattern is known in the Chinese linguistic literature as "semantically vacuous negation" or "redundant negation" (see Lin 2016; Wiedenhof 1994; Xiao & McEnery 2008).

Eudeve (Uto-Aztecan/Cahita)

(348) *nap* ***cáque*** *has-**do**,*
2SG.SBJ not.yet come-before
'Before you came,

nee *vínu* *ivide-eni-tud*.
1SG.SBJ already here-be-IPFV
I was already here.' (Pennington 1981:77)

The question is: why are negative markers an important constructional property of *before*-clauses in some languages, but not in others? In this chapter, I argue that whether the restricted device is monofunctional or polyfunctional seems to be the key to this puzzle. In particular, it is shown that *before*-clauses marked by monofunctional restricted devices tend not appear with a negative marker or the negative marker is optional, and *before*-clauses realized by polyfunctional restricted devices tend to occur with negative markers that are obligatory. The main rationale behind this proposal is as follows. Polyfunctional restricted devices are used for expressing various types of adverbial relations in specific contexts. Accordingly, negative markers play an important role in that they serve as morphosyntactic material aiding in the *before*-interpretation. That is, they are an important constructional property in this scenario in that they cue that the situation of the ground clause is construed as not yet having taken place at the time of the figure clause situation. *Before*-clauses marked by monofunctional devices tend not to appear with negative markers, because they are encoded

by restricted devices that are only used for expressing temporal precedence. Therefore, there is no need to have other morphosyntactic material aiding in the *before*-interpretation.

This chapter is organized as follows. In §6.1, I give an overview of the range of strategies without restricted devices in the sample. It is shown that *before*-clauses formed by strategies without restricted devices are exceedingly rare in the database. In §6.2, I turn my attention to the most common restricted devices of the sample: restricted adverbial subordinators (§6.2.1), restricted deranking devices (§6.2.2), adverb(ial)s meaning 'not yet' (§6.2.3), and correlative constructions (§6.2.4). In §6.3, I present the classification of the less common restricted devices in the database: nouns used as clause-linking devices (§6.3.1) and verbs used as clause-linking devices (§6.3.2). Finally, §6.4 summarizes the main points of the chapter.

The general policy adopted in the previous chapters was to not list or to discuss the range of functions of polyfunctional restricted devices. However, for the sake of clarity, this practice is not maintained in the present chapter. Accordingly, when I mention that a restricted device is polyfunctional, I show the range of meanings within the domain of adverbial clauses that a particular restricted device can have. Discussing the range of functions of polyfunctional restricted devices will enable the reader to understand how the 'before' interpretation is plausible. That is, given that in this scenario *before*-meanings tend to be compositionally encoded by negative markers together with a polyfunctional device, the discussion of the range of functions will enable the reader to assess how the 'before' interpretation is computed. Unlike *when*-clauses (§3.4) and *after*-clauses (§5.5), *before*-clauses tend not to have more than one primary strategy. Accordingly, an analysis of the factors that lead speakers to choose one primary strategy over the other one is not pursued here.

Due to the scarcity of information, I do not provide a detailed account of the position of *before*-clauses with respect to their figure clause. The following comments should suffice. It is expected that *before*-clauses occur postposed to the figure clause. This stems from the fact that they refer to a situation that occurs posterior to the one in the figure clause (Diessel 2008: 470). In twenty-eight languages of the sample, *before*-clauses tend to appear postposed to the figure clause showing an iconic order. Intriguingly, there are forty-eight languages in the sample in which *before*-clauses tend to appear or always appear preposed to the figure clause showing a non-iconic order. A linkage such as 'before X, Y' is non-iconic, in that clause 'Y' is enunciated after clause 'X' although the situation referred to by 'X' happened after that referred to by 'Y' (Dixon 2009: 39). The main reason why these constructions do not follow an iconic order may be due to the fact that the languages show OV word order.[66] Cross-linguistically, there is a tendency in OV languages to place the ground clause before the figure clause in adverbial clause constructions (Diessel 2001: 442). Accordingly, there are languages in which a syntactic requirement may override any semantic preference for iconic ordering.

6.1 Strategies without restricted devices

Given that *before*-clauses realized by strategies without restricted devices are almost non-existent in the database, I only provide, in what follows, a brief discussion of this pattern. In the sample, five languages have *before*-clauses formed by asyndetic constructions (5/218=2.29%). Examples of languages in which this pattern is attested are presented below.

[66] The languages in question maybe more generally place ground clauses before figure clauses in adverbial clause constructions. However, it was not possible to explore this issue due to the fact that grammars present examples with particular orders but do not discuss the ordering possibilities explicitly.

Unlike asyndetic *after*-constructions in which iconicity of sequencing plays an important role, this does not seem to be the case for various asyndetic *before*-constructions.

The primary strategy for denoting 'before' in Koyra Chiini is that of asyndesis. In (349), the figure clause and ground clause are not linked by any overt device. In this construction, the ground clause appears postposed to the figure clause. Accordingly, the *before*-interpretation arises due in part to iconicity of sequencing. Heath (1999a: 279) mentions that not only iconicity of sequencing, but also the negative marker *na* plays an important role in asyndetic *before*-constructions. He notes that the negative marker *na* appearing in the ground clause is a property that cues that the situation of the ground clause is construed as not yet having taken place at the time of the figure clause situation.

Koyra Chiini (Songhay)

(349) *a-a* *gar* *ey* *fatta*
3SG-IPFV find 1SG exit
'It happens that I had left

woo *bine* *o* *gar* *ŋgi* *ta* ***na*** *tun*.
DEM TOP IPFV find 3PL TOP NEG arise
before they have arisen.' (Heath 1999a: 279)

Another language with an asyndetic *before*-construction is Nakkara. In this language, the primary way for conveying *before*-relations is by two clauses with no overt device, as in (350). In this construction, the *before*-relation arises due in part to iconicity of sequencing.

Besides iconicity of sequencing, the ground clause shows negative polarity. Eather (1990: 361) mentions that this also plays a role in the *before*-interpretation of the construction in (350).

Nakkara (Mangrida/Nakkara)

(350) *warrikka* *rra-bbu-ba* *kunjma* *naddjorra* *ka-na-**wornba**-Ø*
quickly HORT-INCR-go again rain 3SG.IRR-here-go.NEG-FUT.NEG
'Let's leave quickly before the rain comes again.' (Eather 1990: 361)

Intriguingly, there are languages in which the *before*-interpretation of an asyndetic construction does not arise due to iconicity of sequencing. In Tangsa, the ground clause and the figure clause of an asyndetic *before*-construction do not follow an iconic order, as in (351). Boro (2017: 517) points out that the *before*-meaning of the construction in (351) is cued by the negative marker *mà* that occurs in the ground clause (Boro 2017: 517).

Tangsa (Sino-Tibetan/Northern Naga)

(351) *a-ɲùvà* *ləpʰùŋ* ***mà*** *ʒuk* *k-aʔ* *ikə́,* *ʒɤ́la* *ləp* *vɤ̀.*
3SG-parents lunch NEG eat PRS-3SG there quickly get come
'Before his parents take lunch, (the boy) quickly gets (home) (Boro 2017: 517)

A quite similar exposition can be given for Puyuma. This language also has non-iconic asyndetic *before*-constructions. In (352), the order of the ground clause and figure clause is not presented in the order in which the situations have occurred. The *before*-interpretation of the asyndetic construction is cued by the negative clitic *aDi=*. This language also has another

primary strategy for expressing ‘before’ (i.e. the free adverbial subordinator *pakanguayan* ‘before’; Teng 2008: 409).

Puyuma (Austronesian/Puyuma)

(352) ***aDi****=ku=Diyan* *m-uka* *i* *balaka* *i,*
NEG=1SG.NOM=IPFV INTR-go LOC oversea TOP
‘Before I went overseas,

pa-takesi=ku *Da* *tiLin.*
CAUS-study=1SG.NOM OBL book
I was a teacher.’ (Teng 2008: 409)

The last example is found in Wooi. In this language, the order of the clauses in asyndetic *before*-constructions does not always mirror their temporal order, as in (353). In this construction, the ground clause appears preposed to the figure clause showing a non-iconic order. Therefore, the *before*-relation of the example in (353) is cued by the negative marker *va-* (Sawaki 2017: 100).

Wooi (Austronesian/South Halmahera-West New Guinea)

(353) *he-t-ra* *ma* *ho* *Wooi.Rawing* ***va****-mi,*
3PL-PL-go HITH to Wooi.Bay NEG-IPFV
‘Before they came (to live) in Wooi,

mara *he-t-na* *na* *Asua*.

that 3PL-PL-live LOC Ansus

they used to live in Ansus.' (Sawaki 2017: 100)

6.2 Restricted devices

In this section, I introduce the most common restricted devices found in the languages of the sample. Three types of restricted devices discussed in this section are generally acknowledged in the literature on *before*-constructions: restricted adverbial subordinators (§6.2.1), restricted deranking devices (§6.2.2), and adverb(ial)s meaning 'not yet' (§6.2.3). However, I distinguish a fourth type which has been traditionally neglected: correlative constructions (§6.2.4). The discussion of restricted adverbial subordinators and restricted deranking devices is followed by a detailed analysis of the interaction of negative markers and the mono/polyfunctionality of these devices.

6.2.1 Restricted adverbial subordinators

The most widespread device in the database is that of restricted adverbial subordinators, as in (354). In total, one hundred-five languages in the sample denote 'before' by restricted adverbial subordinators (105/218=48.16%).

Bilua (Solomons East Papuan/Bilua)

(354) ***puliako*** *nioqa* *tada=o* *nio,* *o* *ol=a…*

before 3PL.DU depart=NOM FOC 3SG.M go=PRS

'Before they departed, he went…' (Obata 2003: 225)

Restricted adverbial subordinators can be characterized in terms of their mono/polyfunctionality. In the Kukama-Kukamiria construction in (355), the ground clause is marked by *anan* 'before'. This device is monofunctional. The Jalkunan example in (356) is realized by *fɔ̄* 'before'. This free adverbial subordinator is polyfunctional in that it can also be employed for indicating 'until' (Heath 2017: 309).

Kukama-Kukamiria (Tupian/Tupi-Guaraní)

(355) ***anan*** *tua* *eyu-ari-n,* *n=yapana* *ichari* *ra=tu.*
before spirit eat-PROG-NMLZ 2SG=run leave 3SG.M=AUGM
'Before the spirit eats (you), you run and leave him.' (Vallejos 2016: 646)

Jalkunan (Mande/Western Mande)

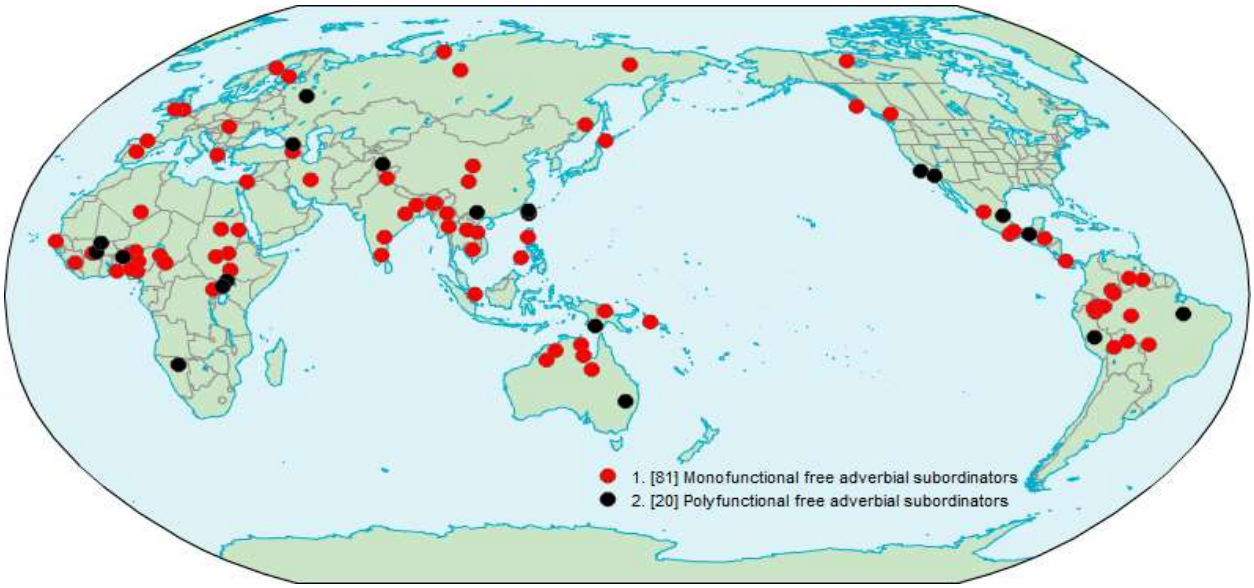
(356) *bon* ***fɔ̄*** *èè^{n}* *cíɛ́* *jɛ̀rɛ́* *mà* *tɔ̄=nɛ̄ʔ,*
well before 3PL.SBJ arrive.PFV lion on yet-NEG
'Before they reach the lion,

èè^{n} *cíɛ́…*
3PL.SBJ arrive.PFV
they arrive...' (Heath 2017: 309)

As can be seen in Map 18, monofunctional free adverbial subordinators (81/101=80.19%) outweigh polyfunctional free adverbial subordinators (20/101=19.81%). However, their distribution across macro-areas is not the same. That is, monofunctional free

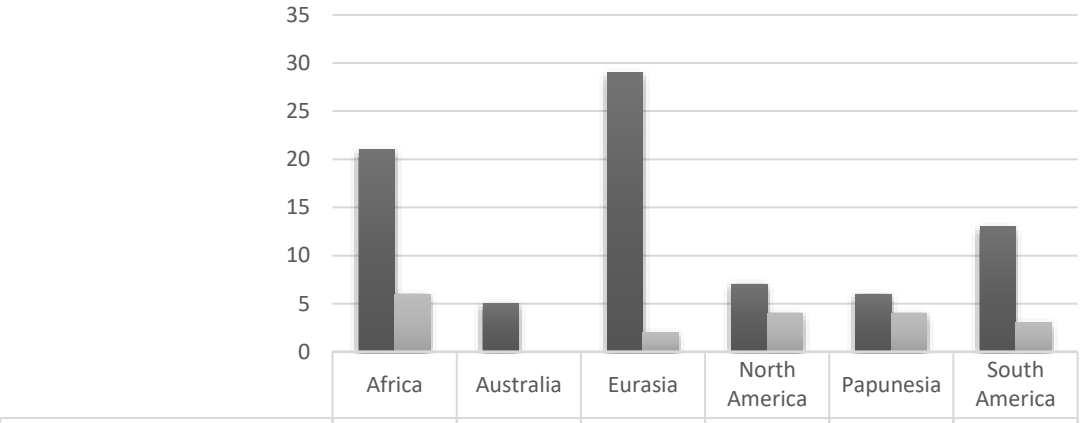
adverbial subordinators seem to be more common in specific macro-areas and the same holds for polyfunctional free adverbial subordinators.

Map 18. Free adverbial subordinators encoding *before*-clauses



As Figure 13 shows, Eurasia and Africa host the majority of languages with free adverbial subordinators encoding *before*-constructions. Note that Australia and Papunesia display scarce occurrences of this type of restricted device. Instead, as is illustrated in §6.2.3 and §6.2.4, languages of these macro-areas have *before*-constructions formed by adverb(ial)s meaning 'not yet' and correlative constructions. Two other observations gleaned from Figure 13 are the following. First, although monofunctional free adverbial subordinators are found in all macro-areas, they seem to be more common in Eurasia. Second, polyfunctional free adverbial subordinators are attested in almost all macro-areas. However, they seem to be more frequent in African languages in the database.

Figure 13. Free adverbial subordinators encoding *before*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional free adverbial subordinators	21	5	29	7	6	13
Polyfunctional free adverbial subordinators	6	0	2	4	4	3

There are four languages in the sample in which *before*-constructions are marked by bound adverbial subordinators. These devices are polyfunctional. In Ts'ixa, *before*-constructions appear with the bound adverbial subordinator =*sè*, as in (357). The ground clause must be marked by a negated verb and by the focus particle *xàwèè* 'still, yet'. The bound adverbial subordinator =*sè* is polyfunctional and can be used for expressing 'while' when the ground clause shows positive polarity, as in (358) (Fehn 2016: 272). The remaining languages with *before*-clauses marked by polyfunctional bound adverbial subordinators are Yurakaré, Cavineña, and Hadza.

Ts'ixa (Khoe-Kwadi)

(357) ***xàwèè*** *tsé* *kű̃ũ̃-**tã̀**=**sè**,* *nguú=mà* *ʔà* *ǂáú.ǂàù* *kùè.*

yet 1PL go-NEG.IPFV=before house=SG.M ACC straighten IPFV

'Before we go, (we) clean the house.' (Fehn 2016: 275)

Ts'ixa (Khoe-Kwadi)

(358) *ʔé.ǹ* *k'uí-tótùm̀-nà-hà* *tsé* *kò* *Mãã́* *ʔò* *kũũ̀̃=**se***.
3PL speak-INT-J-PST 1PL IPFV Maun ALL go=while
'They talked a lot while we were going to Maun.' (Fehn 2016: 272)

I now turn my attention to the role of negative markers in *before*-constructions. As was mentioned above, eighty-one languages have free adverbial subordinators that are monofunctional. Of these, seventy-one languages have constructions in which negative markers are not allowed to occur in the *before*-clause and eight languages in which negative markers are optional in the *before*-clause. Some examples illustrating these patterns follow.

In Japhug, *before*-constructions are realized by *ɕɯŋgɯ* 'before', as in (359). Guillaume Jacques (personal communication) mentions that this device is only used for indicating a *before*-relation between the ground clause and the figure clause. Furthermore, he notes that negative markers cannot occur in this type of construction.

Japhug (Sino-Tibetan/rGyalrong)

(359) *ɲɯ-si* ***ɕɯŋgɯ***, *pɯ-nɯ-NGɣt-ndzi*.
IPFV-die before PFV-AUTO-ANTICAUS.separate-DU
'Before she died, they had divorced.' (Jacques 2014: 287)

In a similar fashion, Lawa expresses *before*-relations by a monofunctional free adverbial subordinator, as in (360). In this language, *kaŋ* 'before' is monofunctional and the ground clause cannot be marked by negative markers (Blok 2013: 104).

Eastern Lawa (Austro-Asiatic/Palaungic)

(360) ***kaŋ*** *sam* *hew* *ɲaʔ* *takɛ,* *ʔaprɒh* *kʰua* *teʔ.*

before FUT go to headman change clothes SBJ

'Before going to the headman, (I) changed my clothes a little.' (Blok 2013: 104)

Another language in which *before*-constructions cannot appear with a negative marker is Baure. In this language, *before*-relations are indicated by the monofunctional free adverbial subordinator *moena'* 'before', as in (361). The ground clause cannot be marked by negative markers (Danielsen 2007: 396).

Baure (Arawakan/Bolivia-Parana)

(361) *ši* *ha* *vi=ponoek-pa-po* ***moena'*** *to* *sowon* *ro=koviko=vi.*

HORT HES 1PL=sow-go-PFV.REFL before ART rain 3SG.M=reach=1PL

'Let's go and sow before the rain catches up with us.' (Danielsen 2007: 396)

There are also languages in which *before*-constructions marked by a monofunctional free adverbial subordinator occur with negative markers that are optional. In Southeastern Tepehuan, *bajɨkkam* 'before' is a monofunctional free adverbial subordinator that appears with the negative particle *chakui* 'not yet', as in (362). This negative marker is optional and can be omitted (García Salido 2014: 235).

Southeastern Tepehuan (Uto-Aztecan/Tepiman)

(362) *…dhi' mattur na bhai' kɨk*

DEM metate SUB DIR stand.SG

'…The standing metate was there

bajɨk-kam *dhi' na=ch* (***chakui***) *tu-ma-mar-ka'.*

before-origin DEM SUB=1PL.SBJ not.yet DUR-RDP.PL-son-STAT

before we had kids.' (García Salido 2014: 235)

A possible explanation of the fact that negative markers cannot appear or are optional in *before*-constructions could be the following. *Before*-clauses that appear with monofunctional free adverbial subordinators are encoded by devices that are only used for expressing temporal precedence. That is, the free adverbial subordinator sufficiently cues the semantic relation holding between the ground clause and figure clause. Therefore, there is no need to have other morphosyntactic material aiding in the *before*-interpretation. Recall that negative markers appearing in *before*-constructions could be considered constructional properties that cue that the situation of the ground clause is construed as not yet having taken place at the time of the figure clause situation. The optionality of constructional properties of adverbial clause constructions has not gone unnoticed. In the context of adverbial clauses, Hetterle (2015: 108) shows that in some languages, adverbial clause constructions can dispense with any constructional property (e.g. TAM markers, clause-linking devices) as long as the semantic relation holding between clauses is sufficiently cued by the remaining constructional properties of the construction (Schmidtke-Bode 2009: 33). In the recent typological and

psycholinguistic literature, such patterns have attracted increasing attention under the label of 'redundancy management in grammar' (see §3.2.3.1).

There are a couple of languages in the database showing an exception to the tendency discussed above. In Bunan, *before*-relations are indicated by the monofunctional free adverbial subordinators *durek* 'before', as in (363). The ground clause must appear with the negative marker *ma-* (Widmer 2017: 489). That is, this negative polarity element cannot be omitted. This indicates that negative polarity is part of the constructional properties of the Bunan *before*-clause.

Bunan (Sino-Tibetan/Bodic)

(363)	*mu*	***ma**-ra-ka*	***durek***,	*Manwel*	*lep-Ø-dza*.
	snow	NEG-come-PROG.SG	before	Manuel	reach-TRANS-PST.DIR.SG

'Manuel reached here before it snowed.' (Widmer 2017: 489)

A similar situation is observed in Kayah Monu. In this language, *before*-constructions are encoded by *nɔ́kʰə̀* 'before', as in (364). This device is monofunctional. However, in spite of the fact that the free adverbial subordinator sufficiently cues the semantic relation holding between the ground clause and figure clause, it appears with the negative marker *tə́*. This negative marker is obligatory and cannot be omitted (Aung 2013: 116). Clearly, then, Kayah Monu is a counterexample on the same grounds as Bunan.

Kayah Monu (Sino-Tibetan/Karen)

(364) *ʔà* *hámàʔə́* ***nɔ́kʰə̀*** ***tə̰́,*** *nū* *ʔà* *tʃàbà.*

3SG sleep before NEG TOP 3SG pray

'Before he sleeps, he prays.' (Aung 2013: 116)

Regarding polyfunctional free adverbial subordinators, twenty languages have this type of device in the database. Unlike the picture described above for monofunctional free adverbial subordinators, there are sixteen languages in which a negative marker is obligatory in *before*-constructions marked by polyfunctional free adverbial subordinators. There is no room to present each of these cases individually here. A few examples should suffice to illustrate this tendency.

In the example in (365) from Tzeltal, 'before' is expressed by a construction in which the ground clause is obligatorily negated syntactically by *mato* 'not yet'. This construction includes the free adverbial subordinator *k'alal* 'before', which is polyfunctional. That is, it denotes 'before' when the ground clause shows negative polarity. However, *k'alal* can also be used for expressing other adverbial relations when the ground clause shows positive polarity. In the example in (366), *k'alal* indicates 'after', and in the construction in (367), this device conveys a *when*-relation.

Tzeltal (Mayan)

(365) *…te* ***k'alal*** ***ma=to*** *ay-uk* *s-k'op* *yos=a=e,*

DET before NEG=still EXIS-IRR 3SG-word God=ADV=DET

'…Before we knew the word of God,

ya *j-xi'-tik* *awil* *xal* *te* *mut-etik=e.*

INCL 1SG-afraid-PL EVID DISC DET bird-PL=DET

we were afraid of birds.' (Polian 2013: 889)

Tzeltal (Mayan)

(366) *te* ***k'alal*** *la* *s-mil* *tel=e,*

DET after COMPL.TRANS 3SG-kill come.DIR.NON.FIN=DET

'After killing it (the squirrel)

la *y-ich'* *tel* *ta* *s-na* *te* *winik=e.*

COMPL.TRANS 3SG-take come.DIR.NON.FIN PREP 3SG-home DET man=DET

the man took it to his home.' (Polian 2013: 889)

Tzeltal (Mayan)

(367) *te* ***k'alal*** *la* *jk-il* *a* *k'ajk'* *te* *templo=e…*

DET when COMPL.TRANS 1SG-see COMPL.INTR burn DET temple=DET

'When I saw that the temple was burning…' (Polian 2013: 889)

In Apinajé, *before*-clauses marked by *ri* ‘before’ obligatorily carry the negative marker *ket*, as in (368). Note that *ri* ‘before’ is polyfunctional in that it expresses another adverbial relation when the ground clause shows positive polarity, as in (369), in which the free adverbial subordinator *ri* signals temporal subsequence (Cunha de Oliveira 2005: 290).

Apinajé (Macro-Ge/Ge-Kaingang)

(368) *kɔt paj ič-wər* ***ket*** ***ri***, *amɲĩ=kĩ grɛgrɛri*.
IRR 1PL.IRR 1PL-bathe.NON.FIN NEG before REFL=hair rub.oil.on
‘Before I bathe, I will rub oil in my hair.’ (lit. ‘at my having not bathed…’) (Cunha de Oliveira 2005: 290)

Apinajé (Macro-Ge/Ge-Kaingang)

(369) *kɔt paj kagə n-ipeč pa* ***ri*** *kɔtmə̃ apku*.
IRR 1PL.IRR mark RELAT-make.NON.FIN CONCL and.then still eat.INTR
‘I am going to study and then I will eat.’ (Cunha de Oliveira 2005: 290)

Burushaski is another language in which *before*-constructions are formed by a polyfunctional free adverbial subordinator that must appear with a negative marker. In (370), the *before*-meaning does not reside exclusively in the polyfunctional device *qháas* ‘before’, but it is compositionally encoded by the negative polarity marker *a-* together with *qháas* ‘before’. When *qháas* appears in a ground clause in positive polarity, the meaning is that of ‘until’, as can be observed in the example in (371).

Burushaski (Isolate)

(370) *baadšáa* *ké* *zizí* *ɣénis-Ø* ***a**-d-é-s* ***qháas**,*

king LINK mother queen-ABS NEG-TEL-get.up-OPT before

'Before the king and his queen woke up,

sínda-c-ar *n-a-n…*

river-ADESS-DAT go.PTCP-1SG-PTCP

I used to go to a river....' (Noboru 2012: 223)

Burushaski (Isolate)

(371) *šaríik* *man-i* *sén-as-at* *šuá* *n-sén* *teíl* *ité*

joining become-IMP.SG say-INF-DAT good PTCP-say in.that.way that

gar-Ø *garoóni-Ø* *bas-s* ***qháas*** *iné-Ø* *ité* *ha-al-e*

marriage-ABS bridal-ABS settle-OPT until that-ABS that house-LOC-ESS

hurút-m-i *jót* *iné* *i-i-Ø.*

sit-NON.PRS-3SG small that 3SG-son-ABS

'On his saying "take part (in my wedding)", (the youngest son) said: "Good!", and so remained in his house until the completion of the marriage, that little son.' (Noboru 2012: 223)

In the Bangime example in (372), the ground clause not only appears with the polyfunctional free adverbial subordinator *gìlāā* ‘before’, but it is also marked for negative polarity by *bè*. The clause-linking device *gìlāā* along with the negative marker *bè* yield the *before*-interpretation of the construction in (372). When the restricted device *gìlāā* appears in a ground clause in positive polarity, it signals a (temporal) *since*-relation, as in (373), or an *as soon as*-relation, as in (374).

Bangime (Isolate)

(372) ***gìlāā*** ∅ *màà* *púj*ɛ́ ∅ ***bè*** ∅ *twáá-rà* *ŋúj*,
before 3SG POSS wife 3SG NEG 3SG arrive-PFV there
‘Before his wife arrived there,

∅ *kóó* ∅ *nìŋà*…
3SG PFV 3SG say.PFV
he (had) said…’ (Heath & Hantgan 2018: 515)

Bangime (Isolate)

(373) ***gìlāā*** *ŋ̀* *ŋíj*ɛ́*-r*ɛ̀, *ŋ̀* *bé* ∅ *tīndà*.
since 1SG.SBJ drink-PFV 1SG.SBJ NEG 1SG.SBJ be.healthy.PFV
‘Since I drank (it), I have not been feeling well.’ (Heath & Hantgan 2018: 513)

Bangime (Isolate)

(374) ***gìlāā*** *nɛ̄* *ŋ̄* *būrà,*

as.soon.as 1PL.SBJ 1PL.SBJ come.out.PFV

'As soon as we came out,

à *ɥɔ̀wⁿ* ∅ *kóó* *ŋ́* *tììndà* ∅ *ɥúwⁿɔ̀.*

DEF rain 3SG.SBJ PFV 3SG.SBJ begin.PFV 3SG.SBJ rain.fall.IPFV

it started to rain.' (Heath & Hantgan 2018: 514)

The question is: why are negative markers obligatory in the constructions discussed above? Polyfunctional restricted adverbial subordinators are used for expressing various types of adverbial relations in specific contexts. Accordingly, negative markers play an important role in that they serve as morphosyntactic material aiding in the *before*-interpretation. This has not gone unnoticed and echoes Hetterle (2015: 137), who notes that in various languages of her sample, a *before*-relation does not reside exclusively in a clause-linking device, but it is compositionally encoded by negative polarity together with a general temporal linker or a deranked verb form. Accordingly, negation in *before*-clauses marked by polyfunctional free adverbial subordinators can be considered part of a compositional strategy (Mithun 1984; Verstraete 2010). By compositional encoding, I mean the various ways in which specific constructional properties of a construction combine to dictate a particular adverbial reading (Hetterle 2015: 106). These constructional properties jointly determine a semantic relation. It has been noted that cross-linguistically, the meaning of many adverbial clause constructions is encoded compositionally by the adverbial clause and specific morphosyntactic characteristics

of the ground clause and/or figure clause (e.g. Hetterle 2015: 144; Olguín Martínez & Lester 2021; de Swart et al. 2022).

There are four languages in which polyfunctional devices do not appear with negative markers. Accordingly, they should be considered counterexamples to the tendency highlighted above. In !Xun, *n!àkāē* ‘before’ conveys the idea that the situation of the figure clause happens before the situation expressed in the ground clause, as in (375). This device is polyfunctional and denotes not only ‘before’, but also ‘while’, as is illustrated in (376). Intriguingly, negative markers cannot appear in contexts in which *n!àkāē* indicates ‘before’ (König & Heine 2001: 123).

!Xun (Kxa/Ju-Kung)

(375) ***n!àkāē*** *g/ùi* *kū-ndò’à* *!òè,* *hà* *ò* *n!ō-tcāō* */òhè.*
before hyena LOC-DIST pull NC do hit-stand.up horse
‘Before the hyena pulled, he hit the horse to make it stand up.’ (König & Heine 2001: 123)

!Xun (Kxa/Ju-Kung)

(376) ***n!àkāē*** *mā* *ḿ,* *má* *hà* *tc’ā.*
while 1SG.SBJ eat TOP NC sleep
‘While I am eating, he is asleep.’ (König & Heine 2001: 123)

The Ik example in (377) is similar to the construction discussed above in that *before*-constructions are encoded by a polyfunctional free adverbial subordinator. In (377), the ground

clause is marked by *ɗɛmʊsʊ* ‘before’. This device is found not only in contexts expressing ‘before’, but also in contexts in which the relation holding between clauses is that of ‘until’, as in (378). In spite of the fact that *ɗɛmʊsʊ* is polyfunctional, the ground clause of the *before*-construction in (377) does not appear with a negative marker. The other languages with a similar pattern are Zoulei and Paiwan. It remains unclear how in these cases the ‘before’ interpretation is guaranteed given that the sources do not discuss this aspect. Therefore, this is a topic for future research.

Ik (Kuliak)

(377) *ʃɛ-ɪḱw-ɛɛ́se* *cu-a* ***ɗɛmʊsʊ*** *fetí-á* *pɛlɛḿ-ɛt́-ɪ.*

sprinkled-and-SPS water-NOM before sun-ACC appear-VEN-3SG.SUBJ

‘And the water is sprinkled before the sun comes up.’ (Schrock 2014: 356)

Ik (Kuliak)

(378) ***ɗɛmʊsʊ*** *pakó-íce-a* *det-i* *rié-á…*

until cave-PL-ACC bring-3SG goat-ACC

‘Until the Turkana brought the goats....’ (Schrock 2014: 357)

On a general level, it can be established that the few potential counterexamples discussed above can be rated as marginal when compared to the overwhelming number of confirmations.

6.2.2 Restricted deranking devices

In this section, I survey another common trend in the expression of 'before'. Thirty-six languages have patterns coded as restricted deranking devices in my database (36/218=16.51%). An illustration of this device can be seen in (379). In Icari Dargwa, *-sar* is the primary device employed for encoding *before*-constructions.

Icari Dargwa (Nakh-Daghestanian/Lak-Dargwa)

(379) *uk-u-t̄-aj* *kejğ-u-t̄-aj-**sar***,
eat.IPFV-THEM-2SG-SUBJ sit.down.PFV-THEM-2SG-SUBJ-before
'Before you sit down at the table,

nalq'-bi *d=irc-a.*
hand-PL NON.HUM.PL=wash.PFV-IMP
wash your hands.' (Sumbatova & Mutalov 2003: 195)

Restricted deranking devices denoting 'before' can be classified into monofunctional and polyfunctional devices. A typical example of a monofunctional device is attested in Ingush. In (380), the ground clause occurs with the monofunctional restricted deranking device *-lehw*.

Ingush (Nakh-Daghestanian/Nakh)

(380) *mashen* *hwa-jaala-**lehw***, *so* *kiicha* *xugvy.*
car DEIC-go-before 1SG.SBJ ready be.FUT.GEND
'Before the car gets here, I'll be ready.' (Nichols 2011: 605)

The Gumuz example in (381) is encoded by the polyfunctional restricted deranking device *-n*. This device denotes not only ‘before’, but also *if*-relations when the ground clause shows positive polarity (Ahland 2012: 439).

Gumuz (Gumuz)

(381) *dua* *b-á-fá-gá*

child AFF-3SG.INTR-die-NON.FUT

‘The child died

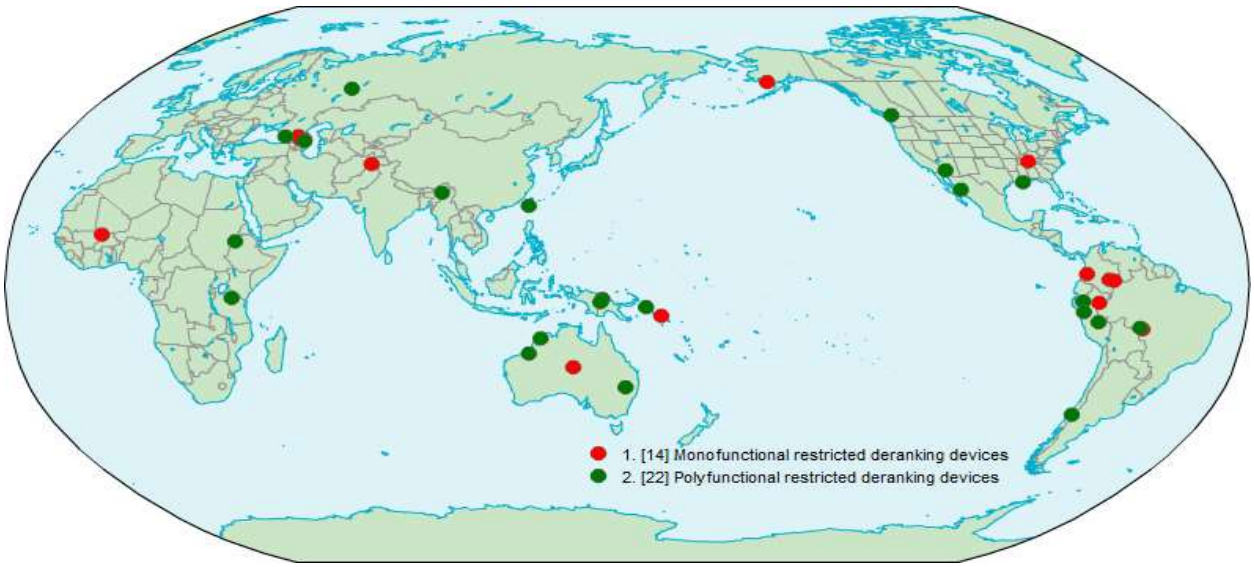
*n-íí-gá-m-t’ô-**n*** *ká=máts’á-tamaríá*.

HYP-3PL.TRANS-NEG.HYP-NMLZ-put-LOC DAT=house-student

before entering school.’ (Ahland 2012: 439)

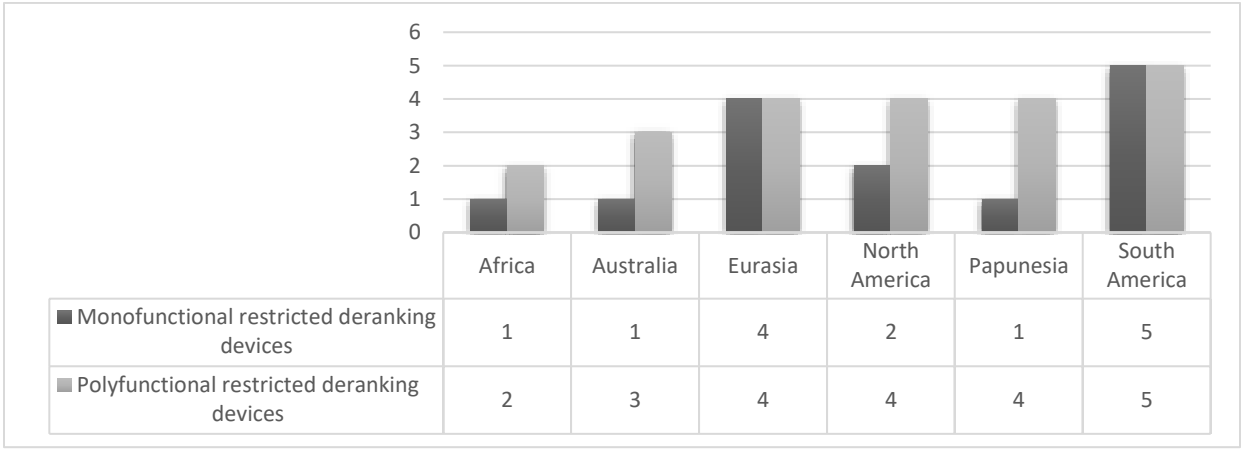
As can be observed in Map 19, polyfunctional restricted deranking devices are more common than monofunctional restricted deranking devices in the present study. In total, there are fourteen languages coded as containing monofunctional restricted devices and twenty-two languages coded as having polyfunctional restricted devices.

Map 19. Restricted deranking devices encoding *before*-clauses



As is shown in Figure 14, restricted deranking devices are attested in all macro-areas, but they are particularly distinctive of the languages of South America. Note that Africa shows scarce occurrences of restricted deranking devices in the sample. This distributional overview has made it clear that polyfunctional restricted deranking devices are more common than monofunctional restricted deranking devices to denote 'before' in the sample.

Figure 14. Restricted deranking devices encoding *before*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional restricted deranking devices	1	1	4	2	1	5
Polyfunctional restricted deranking devices	2	3	4	4	4	5

I now turn my attention to the more theoretical question of how negative markers interact with the mono/polyfunctionality of restricted deranking devices. Based on the results and discussion of negative markers and free adverbial subordinators in §6.2.1, it seems reasonable to expect that *before*-constructions realized by polyfunctional restricted deranking devices will be marked by negative markers and *before*-constructions formed by monofunctional devices will not occur with negative markers or the negative marker will be optional. In what follows, I confine myself to exploring whether this holds for restricted deranking devices.

As was outlined above, the value monofunctional restricted devices characterizes fourteen of the sample languages. Of these, thirteen languages have *before*-constructions marked by monofunctional restricted deranking devices that cannot occur with negative markers. Let us now have a brief look at some examples supporting this observation.

In Arrernte, temporal precedence is signaled by the restricted deranking device -*tyenhenge* 'before', as in (382). This device is monofunctional and the ground clause of a *before*-construction cannot appear with a negative marker in this language (Wilkins 1989: 239).

Arrernte (Pama-Nyungan)

(382) *the* *aherre* *irrtnye-iwe-ke*
1SG kangaroo skin-throw.away-PST.COMPL
'I skinned the kangaroo

urreke-le *unte* *ure* *ite-**tyenhenge***.

later-LOC 2SG fire light-before

before you got the fire going.' (Wilkins 1989: 239)

The Tommo So example in (383) is similar to the construction discussed above in that a negative marker cannot appear in the *before*-clause. In Tommo So, *before*-relations are conveyed the restricted deranking device *-mɔ*. This device is monofunctional and the ground clause of the *before*-construction cannot appear with a negative marker.

Tommo So (Dogon)

(383) *àn-sáárá* *yɛ̀lɛ́-**mɔ***=*nɛ*, *ɔ̀gɔ́* *pɛ̀lù* *kúlóy* *tàándú-go* *sígɛ́*=*nɛ*.

àn-white.person come-before-OBL Hogon ten six three-ADV more=OBL

'Before the white people came, the Hogons (were) at (the number of) 63.' (McPherson 2013: 476)

In the database, there is only one language in which *before*-constructions encoded by a monofunctional restricted device must appear with a negative marker. In Yuchi, the restricted deranking device *-le* is monofunctional. As was discussed above, *before*-constructions formed by monofunctional restricted deranking devices tend not to appear with negative markers. Intriguingly, the ground clause in the Yuchi example in (384) must be marked by the negative marker *hæ* (Linn 2000: 504). Accordingly, this construction represents a counterexample to the tendency sketched above.

Yuchi (Isolate)

(384) *Sonny* ***hæ*** *ne-hē-thli-**le**,* *ke-nō-fe* *jē.*

Sonny NEG here-3SG-arrive-before LOC-1PL.EXCL-go PST

'Before Sonny got here, we left.' (Linn 2000: 504)

Having addressed the interaction of monofunctional restricted deranking devices and negative markers, I can proceed to exploring the interaction of polyfunctional restricted devices and negative markers. As was pointed out above, twenty-two languages are coded as having polyfunctional restricted devices in the database. Of these, there are eighteen languages in which a negative marker must appear in *before*-constructions. Some examples illustrating this pattern follow here.

Mongsen Ao expresses *before*-relations by a polyfunctional restricted deranking device. In (385), the ground clause appears with *-ku*. Note that this construction must appear with the negative marker *mə-*, which is obligatory for expressing the 'before' meaning of the construction. When the ground clause shows positive polarity, the restricted deranking device *-ku* is used for indicating a *when*-relation holding between the ground clause and the figure clause, as in (386). Alexander Coupe (personal communication) informs me that the same situation seems to hold for some other Sino-Tibetan languages in that *before*-constructions encoded by polyfunctional restricted deranking devices must occur with a negative marker.

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(385) *tə-ku* *lítʃá-pàʔ* *ki* *phi<tʃu>nə* ***mə**-khàp-tsəŋta-**ku**…*

RELAT-uncle Lichaba-M house <DIST>ABL NEG-depart-between-before

'Before he departs from the house of Uncle Lichaba… (Coupe 2006: 447)

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(386) *a-ki* *tʃhá-thùŋ-**ku**…*

NON.RELAT-house make-reach-when

'When (he) was building his house… (Coupe 2006: 183)

Another example can be found in Rukai. In this language, *before*-relations are conveyed by the polyfunctional restricted deranking device *a-*, as in (387). The occurrence of the negator *ki-* is obligatory for the construction to be understood as having a 'before' interpretation (Zeitoun 2007: 526). It is worth noting that when the ground clause marked by *a-* does not appear with the negative marker *ki-*, the interpretation of the construction is that of 'after', as in (388), or 'when', as in (389) (Zeitoun 2007: 526-527).

Rukai (Austronesian/Rukai)

(387) ***a-ki**-dhaace-'o*,

before-NEG-DYN.NON.FIN.leave-2SG.GEN

'Before you leave,

mata-cengel-ae-mo'o *ana* *solate*.

DYN.FIN.certainly-see-certainly-2SG.NOM that book

you must read that book.' (Zeitoun 2007: 526)

Rukai (Austronesian/Rukai)

(388) ***a***-*paka-tamako-nga-li*,

after-finish-DYN.NON.FIN.smoke-already-1SG.GEN

'After I have finished smoking,

amo-dhaace-lrao.

IRR-DYN.FIN.leave-1SG.NOM

I will leave.' (Zeitoun 2007: 527)

Rukai (Austronesian/Rukai)

(389) *dhona* ***a***-*alra-li* *ketekekete* *'ina* *'aelrenge*,

that when-DYN.NON.FIN.take-1SG.GEN DYN.SUBJ.cut this flower

'When I cut this flower,

oka'ac-iae *'olra'a*.

DYN.FIN.bite-1SG.OBL snake

the snake bit me.' (Zeitoun 2007: 527)

The last example comes from Mapuche. In this language, the restricted deranking device *-n* is polyfunctional and can be employed for indicating 'before' when the ground appears with *petú* 'still' and the negative marker *-nu-*, as in (390). The restricted deranking device *-n* may also be used for indicating other adverbial relations when the ground clause shows positive polarity. In (391), the relation holding between clauses is that of manner, and in the example in (392), the construction conveys a *because*-relation.

Mapuche (Araucanian)

(390) *iñché* ***petú*** *ñí* *amu-**un**-**n***, *entu-permiso-fi-ñ* *ñí* *ñuke*.
1SG.SBJ still POSS go-NEG-INF take.out-permission-OBJ-IND POSS mother
'Before going, I asked my mother permission.' (Smeets 2008: 196)

Mapuche (Araucanian)

(391) *müpü-le-**n*** *puw-üy*.
fly-STAT-INF arrive-3SG.IND
'He arrived flying.' (Smeets 2008: 195)

Mapuche (Araucanian)

(392) *ayü-w-küle-n* *fey* *ñi* *müle-pa-**n**-mew*.
love-REFL-STAT-1SG.IND 3SG.SBJ 3SG.POSS be-HITH-INF-INSTR
'I am glad because he is here.' (Smeets 2008: 194)

There are four languages that do not align with the tendency discussed above in that *before*-clauses marked by polyfunctional restricted deranking devices do not occur with negative markers. In Udmurt, as can be seen in (393), the *before*-construction is formed by -*toź*. This is a restricted deranking device that is polyfunctional and can not only be found in contexts expressing 'before', but also in other contexts expressing 'until', as in (394), and 'while', as in (395). Surprisingly, the ground clause of the example in (393) is not marked by a negative marker. The sources consulted do not explain how the 'before' interpretation is guaranteed in these four languages. Accordingly, this is a topic for future research.

Udmurt (Uralic/Permic)

(393)	*atas*	*ćorti-**toź*,**	*kuiń*	*pol*	*ton*	*mon*	*bordiś*	*kuštiś-o-d.*
	rooster	crow-CVB	three	times	2SG	1SG	from	deny-FUT-2SG

'Before the rooster crows, you will deny me three times.' (Georgieva 2018: 91)

Udmurt (Uralic/Permic)

(394)	*tunne*	*mon*	*šundi*	*pukśi-**toź***	*uža-j.*
	today	1SG.SBJ	sun	set-CVB	work-PST

'Today I worked until the sun set.' (Georgieva 2018: 91)

Udmurt (Uralic/Permic)

(395) *ton* *vetli-**toź**,* *mon* *so-de* *voźmal-o*.
2SG.SBJ go-CVB 1SG.SBJ that-2SG.ACC protect-FUT
'While you go (get tableware), I will look after that (hedgehog) of yours.' (Georgieva 2018: 92)

6.2.3 Adverb(ial)s meaning 'not yet'

Another device that constitutes a large class in the database is adverb(ial)s meaning 'not yet'. The *before*-construction in Buru consists of the adverb(ial) *mohede* 'not yet', as in (396). This form is the primary device used for indicating that the situation of the figure clause happens before the situation expressed in the ground clause. Veselinova (2015) mentions that 'not yet' expressions typically indicate not only the non-occurrence of an expected situation, but also an anticipation about its imminent realization.

Buru (Austronesian/Central Malayo-Polynesian)

(396) *da* *mata* ***mohede***,
3SG.SBJ die not.yet
'Before he died,

da *stori* *gam* *naa*.
3SG.SBJ speak like this
this is what he said.' (Grimes 1991: 421)

In the sample, sixteen languages have *before*-constructions which are built around adverb(ial)s meaning ‘not yet’ (16/218=7.33%). These devices are only used for signaling ‘before’ and therefore can be characterized as monofunctional. Recall that in Chapter1, I decided that, from a classificatory point of view, such constructions should be rated as restricted devices in the present study. Before proceeding, I should mention that adverb(ial)s meaning ‘not yet’ may also appear in *before*-constructions realized by polyfunctional devices in various languages, as was shown above. In this scenario, they play an important role in that they serve as morphosyntactic material aiding in the *before*-interpretation, as has been proposed in the previous sections. Note that in this section, I limit myself to the discussion of languages in which ‘not yet’ markers are the only device encoding the *before*-construction. That is, they do not appear with a polyfunctional restricted device (i.e. free adverbial subordinator or restricted deranking device). A discussion of some selected manifestations of the ‘not yet’ *before*-construction in the sample follows here.

It is worth noting that the languages of the sample differ in their typology of how ‘not yet’ is formed. In ten languages (10/16=62.50%), *before*-constructions are marked by ‘not yet’ markers that are formed compositionally by a standard negative marker and an adverb(ial) meaning ‘still’ or ‘yet’. In West Coast Bajau, a ‘before’ clause is expressed by the negative particle *nya’* combined with the adverb(ial) *lagi* ‘still, yet’, as in (397).

West Coast Bajau (Austronesian/Sama-Bajaw)

(397) ***nya’ lagi*** *iyo* *lumaan,* *iyang=ni* *nge-dede’* *sinsim…*

NEG yet 3SG go mother=3SG AV-send ring

‘Before (her son) left, his mother sent (with him) a ring…’ (Miller 2007: 416)

Comparable formations can be documented for Begak. In this language, *before*-relations are achieved by marking the ground clause with the phrasal adverb(ial) *apon dan* ‘not yet’, as in (398).

Begak (Austronesian/North Borneo)

(398) *jadi* ***apon*** ***dan*** *miro* *gə-lisang*, *ino-u-tata’* *anak* *Rəngngon*.
so NEG yet 3PL AV-play yonder-DEP-cry child Civet
‘So before they started playing, Baby Civet (began) to cry.’ (Goudswaard 2005: 408)

There are six languages in which ‘not yet’ constructions are non-compositional (6/16=37.5%). In Thao, the *before*-formation is made up of the adverb(ial) *niwan* ‘not yet’, as in (399). In a similar fashion, Makasae features a *before*-construction that is marked by a non-compositional adverb(ial) meaning ‘not yet’, as in (400).

Thao (Austronesian/Western Plains Austronesian)

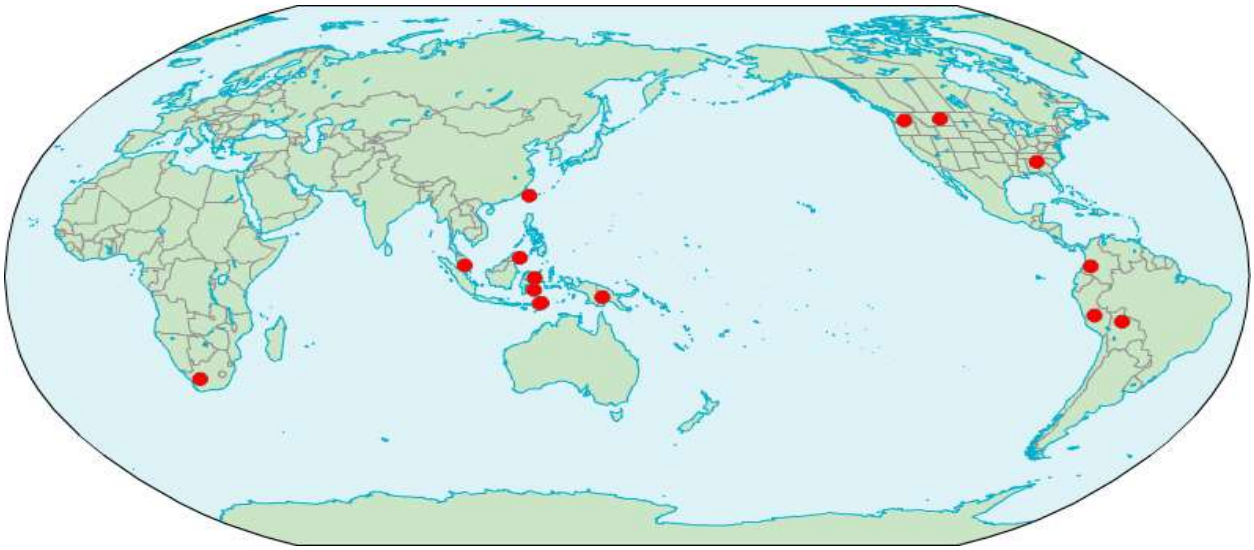
(399) ***niwan*** *yamin* *tu* *ininay*, *initusi* *yamin* *Lalu*.
not.yet 1PL.EXCL.NOM DET PFV.here PFV.there 1PL.EXCL.NOM Lalu
‘Before we were here, we were there on Lalu Island.’ (Wang 2004: 271)

Makasae (Timor-Alor-Pantar/Makasae-Fataluku-Oirata)

(400) ***ne'egu*** *tuku* *lola'e* *isi* *rata,* *ai* *dadau* *ni* *mi* *lolo.*
not.yet hour two LOC arrive 2SG must REFL along say
'You must report before two o'clock (lit. before two o'clock arrives).' (Huber 2008: 113)

As Map 20 shows, the cross-linguistic distribution of *before*-constructions formed by 'not yet' markers is not the same across macro-areas. That is, there are some macro-areas in which 'not yet' *before*-clauses seem to be more common than in others. A more detailed analysis can be found in Figure 15.

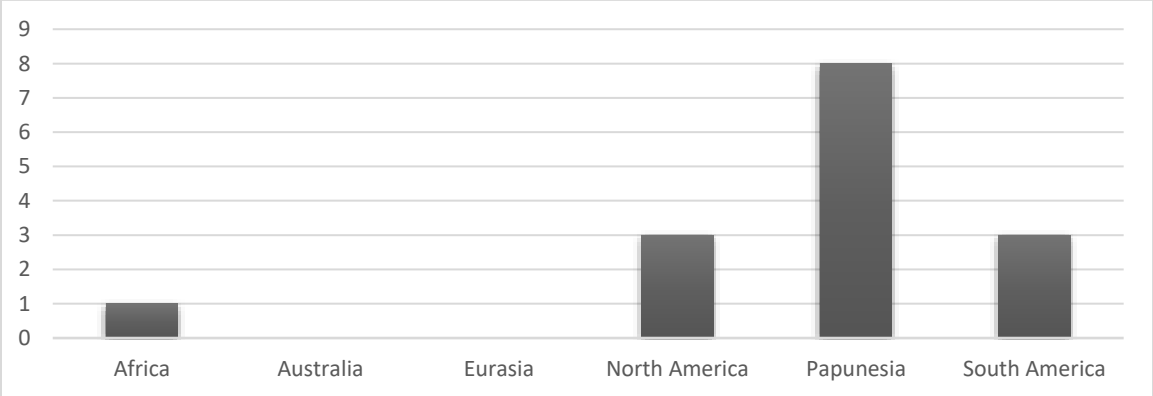
Map 20. 'Not yet' devices encoding *before*-clauses



As can be seen in Figure 15, 'not yet' *before*-constructions can be found in four macro-areas: Africa, North America, Papunesia, and South America. Of these, Papunesia hosts the majority of *before*-clauses marked by 'not yet' in the sample of the present study. In particular,

they seem to be common in the Austronesian languages of the database. This observation has not gone unnoticed and echoes Jonsson (2012: 238) who notes that 'not yet' markers are common in the expression of 'before' in many Austronesian languages. Africa only shows one language in which *before*-relations are conveyed by an adverbi(ial) meaning 'not yet'. Interestingly, Van der Auwera & Veselinova (2018) show, based on a sample of 100 Bantu languages, that 'not yet' markers are abundant in the central-eastern parts of the Bantu territory but are not so common in the northwest areas. They show that they are frequently used for indicating *before*-relations. They also note that they may be used for expressing surprise/counter-expectation, emphatic negation, and questions and near future. Another observation to be gleaned from Figure 15 is the following. The Australian and Eurasian languages of the sample do not employ 'not yet' for indicating 'before'. With respect to Eurasia, Veselinova (2015) notes that 'not yet' used for signaling 'before' is rather rare in Indo-European and in European languages (see Wälchli 2018: 193 for a similar claim).

Figure 15. 'Not yet' devices encoding *before*-clauses per macro-area



6.2.4 Correlative constructions

In this section, I treat one construction which includes both, a *before*-clause and an *after*-clause. Accordingly, they can be considered correlative constructions with a double figure/ground (see §1.2 for a more detailed discussion). This type manifests itself in a number of linguistic groupings and language isolates in the sample, as is shown below. However, before I address the cross-linguistic distribution of this construction, consider the following example:

Bardi (Nyulnyulan)

(401) *ngayoo* ***inngoorr*** *oo-ngg-arr-a-y-a* *ngay*,
1MIN first 3-FUT-AGM-TRANS-take-FUT 1MIN
'They'll take me first,

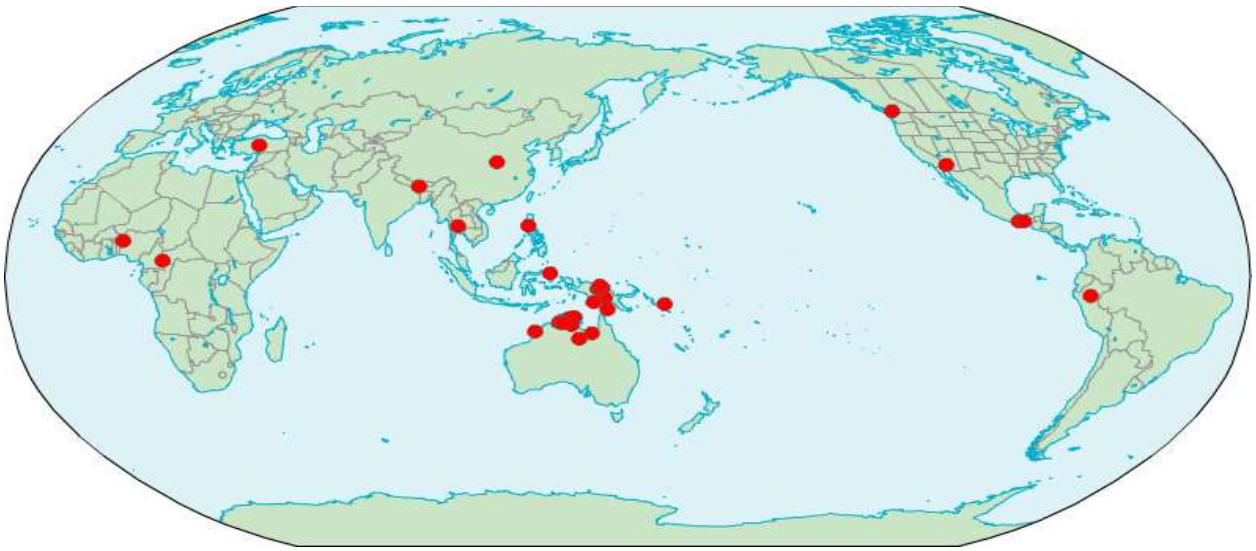
*joo=**gid*** *garrma* *oo-ngg-arr-arg-ij*.
2MIN=and.then later 3-FUT-AGM-pick.up-PFV
and then they'll come and pick you up later' (Bowern 2012: 450)

Bardi has the option of construing a complex sentence indicating 'before' by a correlative construction with double figure/ground. In (401), the clause *garrma oonggarrargij* 'they'll come and pick you up later' is understood as the ground clause in that it indicates a situation that has not yet been realized when the situation of the figure clause *ngayoo inngoorr oonggarraya* 'they'll take me first' takes place. By virtue of having double figure/ground, there are contexts in which this construction may also indicate an *after*-relation. In this scenario, the situation expressed by *garrma oonggarrargij* 'they'll come and pick you up later' happens

after the situation expressed by *ngayoo inngoorr oonggarraya* ‘they’ll take me first’. Therefore, *ngayoo inngoorr oonggarraya* ‘they’ll take me first’ can be considered the figure or ground. In a similar fashion, *garrma oonggarrargij* ‘they’ll come and pick you up later’ could be characterized as the figure or ground.

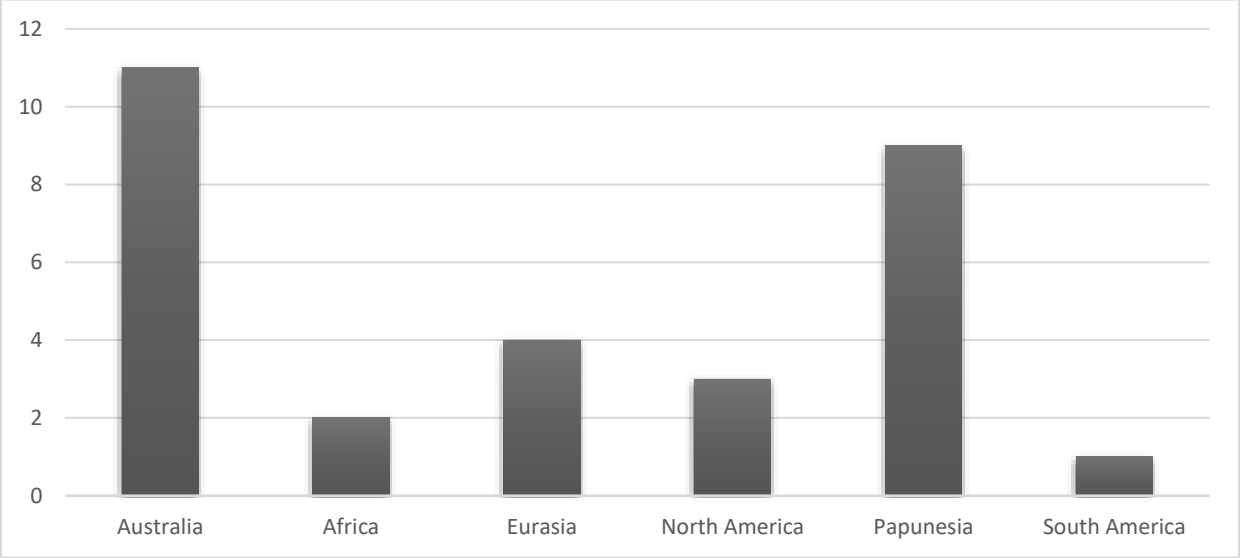
In the sample of the present study, thirty languages accomplish their ‘before’ clause-linking via a double figure/ground construction (30/218=13.76%). As is shown in Map 21, there are some macro-areas that show a large number of languages with this type of correlative constructions.

Map 21. Correlative constructions encoding *before*-clauses



As can be seen in Figure 16, *before*-constructions realized by correlative constructions are found in all macro-areas. However, they seem to be most common in Australia and Papunesia in the database of the present study. This correlative construction used for conveying ‘before’ is scarce in South America and Africa.

Figure 16. Correlative constructions encoding *before*-clauses per macro-area



Both clauses of the double figure/ground construction must appear with correlative words. I present in what follows the correlative words that may appear in this type of construction.

6.2.4.1 Adverb(ial) meaning ‘first’ and sequential coordinating device

The most common correlative pattern consists of a construction where the first clause in linear order appears with an adverb(ial) meaning ‘first’ and the second clause in linear order is marked by a sequential coordinating device meaning ‘and then’. This is attested in twenty-nine languages of the database. A typical example can be found in Tagalog, as in (402).

Tagalog (Austronesian/Greater Central Philippine)[67]

(402) *k<um>ain* ***muna*** *ako,* ***tsaka*** *nag-shopping.*

REAL.ACT.TOP.eat first 1SG and.then REAL.ACT.TOP-shopping

'I ate first, and then went shopping.'

Randy LaPolla (personal communication) informs me that in Tagalog, there is a construction in which a *before*-relation is achieved by a correlative pattern, as in (402). In this construction, *nagshopping* 'went shopping' can be considered the ground clause. Under this interpretation, the semantic relation holding between clauses is that of 'before' in that the situation of the figure clause 'I ate first' happens before the situation expressed by *nagshopping* 'went shopping'. Note that 'I ate first' could also be understood as the ground clause. In this scenario, an *after*-relation holding between clauses is denoted in that the situation of the figure clause *nagshopping* 'went shopping' happens after the situation expressed by 'I ate first'.

A similar construction can also be identified in Mandarin. Randy LaPolla (personal communication) mentions that in Mandarin there is a correlative construction in which the first clause in linear order is marked by *xiān* 'first' and the second clause in linear order is encoded by *zài* 'and then'. Note that *zài* most often means 'again', but in certain constructions can mean 'and then', as in (403). This pattern can be characterized as a construction with double figure/ground including both a *before*-clause and an *after*-clause.

[67] Example provided by Randy LaPolla (personal communication).

Mandarin (Sino-Tibetan/Chinese)[68]

(403) *wǒ* ***xiān*** *chī,* ***zài*** *qù* *gōngzuò*.
1SG.SBJ first eat again go work
'I'll eat first, and then go to work.'

In addition to the correlative pattern sketched above, I have spotted a few other occurrences of correlative patterns effectuated by an adverb(ial) meaning 'first' and an adverbial meaning 'later' or 'afterwards. This is illustrated in (404). In Wagiman, *yoŋgona* 'first' occurs in the first clause in linear order and *gorro* 'later' appears in the second clause in linear order. The second clause in linear order is marked by another adverb(ial), viz. *dyumbany* 'afterwards'. This pattern is also characterized as a construction with double figure/ground including both a *before*-clause and an *after*-clause.

Wagiman (Isolate)

(404) ***yoŋgona*** *mi-ga,* ***gorro*** *ma-di* ***dyumbany***
first 2SG.POT-take later 2SG.POT-come afterwards
'You take it first, and I will come up afterwards.' (Cook 1987: 277)

Various Oceanic languages spoken in northern Vanuatu have a similar construction with double figure/ground. Interestingly, the first clause in linear order does not appear with an adverb(ial) meaning 'first'. Instead, it occurs with the prioritive, a category whose meaning is similar to an adverb(ial) meaning 'first' (Alex François, personal communication).[69] As is

[68] Example provided by Randy LaPolla (personal communication).
[69] The reader is referred to François (2001: 278-301) for a more detailed discussion of the prioritive.

shown in the Mwotlap example in (405), the first clause in linear order is encoded by *bah* and *en* which together are called the prioritive. Etymologically, *bah* is a verb meaning 'to finish', and *en* is a topic marker. The second clause in linear order is marked by the sequential coordinating device *tō* 'and then'. This correlative construction includes a double figure/ground. The clause marked by the prioritive is also commonly heard on its own, as in (406). In this construction, the action is politely suggested as preliminary to another one.

Mwotlap (Austronesian/Oceanic)[70]

(405)	*gēn*	*in*	***bah***	*na-ga*	***en***,	***tō***	*gengen*.
	1PL.INCL	drink	PRIOR	ART-kava	PRIOR	then	eat

'We first drank kava, then we had dinner.'

Mwotlap (Austronesian/Oceanic)

(406)	*gēn*	*in*	***bah***	*na-ga*	***en***.
	1PL.INCL	drink	PRIOR	ART-kava	PRIOR

'(Before anything else) let's have kava!'

Interestingly, the creole Bislama has copied the category of the prioritive with native material (Alex François, personal communication). The Bislama prioritive is the adverb(ial) *fastaem* (< Eng. first time), as can be observed in (407). Note that Bislama has copied not only the correlative pattern with double figure/ground, but also its usage in simple clause

[70] Examples (405), (406), (407), and (408) were provided by Alex François.

constructions, as in (408). Exploring this language contact situation in detail is beyond the scope of the present study. However, this seems like a fruitful area for future research.

Bislama

(407) *yumi* *trink* *kava* ***fastaem***, ***ale*** *kakae*.
1PL.INCL drink kava PRIOR then eat
'We first drank kava, and then we had dinner.'

Bislama

(408) *yumi* *trink* *kava* ***fastaem***.
1PL.INCL drink kava PRIOR
'(Before anything else) let's have kava!'

6.2.4.2 Locative noun 'in front of' and locative noun 'behind'

There is one language in the sample in which the correlative pattern consists of a locative noun meaning 'in front of' and a locative noun meaning 'behind'. In Toqabaqita, *before*-relations can be explicitly signaled by the spatial locational noun *naqo* or *tootoqonaqo* 'in front' and *buri* 'behind', as in (409). Lichtenberk (2008: 1183-1184) mentions that the spatial locational noun *naqo* or *tootoqonaqo* 'in front' is not used more generally for temporal 'before'. That is, it can only be found in constructions with double figure/ground, as in (409). Unlike *naqo* or *tootoqonaqo* 'in front', the spatial locational noun *buri* 'behind' can be used more generally for temporal 'after'. This seems to indicate that while the extension of *naqo* or *tootoqonaqo*

‘in front’ is unique to the correlative construction, the extension of *buri* ‘behind’ is not unique to the correlative construction.

Toqabaqita (Austronesian/Oceanic)

(409) *kulu* *unga* *si* *qa-kuluqa,* *qi* ***naqo***,
PL(INCL).NON.FUT clear.scrub PREC BEN-PL(INCL) LOC in.front
‘First let’s clear the scrub (in a garden),

qi ***buri*** *kuka* *qili* *butete*.
LOC behind PL(INCL).SEQ dig sweet.potato
and then we’ll dig out sweet potatoes.’ (Lichtenberk 2008: 1184)

6.3 Less common restricted devices

There are only two less common restricted devices found in the database: nouns used as clause-linking devices (§6.3.1) and verbs used as clause-linking devices (§6.3.2). The investigation of these devices proceeds along exactly the same lines as those that were followed in the previous sections. The languages encoding *before*-clauses by these devices are scattered through different macro-areas showing no effects of areal grouping. Accordingly, I do not provide a detailed account of their cross-linguistic distribution. Note that I examine here the interaction of negative markers with the mono/polyfunctionality of these clause-linking devices. Recall that *before*-clauses marked by monofunctional restricted adverbial subordinators and monofunctional restricted deranking devices tend not to appear with negative markers or the negative markers are optional. Furthermore, *before*-clauses encoded

by polyfunctional restricted adverbial subordinators and polyfunctional restricted deranking devices tend to be marked by negative markers. I explore whether the empirical validity of this tendency holds for *before*-clauses formed by nouns and verbs.

6.3.1 Nouns used as clause-linking devices

In the database, thirteen languages have *before*-constructions that are effectuated by nouns (13/218=5.96%). A typical example can be found in Japanese. In this language, *before*-constructions are built around the noun *mae* 'advance, front' and the postposition *ni,* as can be seen in (410). This device can only be employed for denoting *before*-relations.

Japanese (Japonic)

(410) *kuraku naru* ***mae*** ***ni***, *kaerimasyoo*.
darkly become front in let's.go.home
'Before it gets dark, let's go home.' (Kuno 1973: 154-155)

Japanese has another noun used for expressing 'before', i.e. *uti ni* 'in the interval'. However, unlike *mae ni* 'in advance, in front', this noun is polyfunctional in that it conveys 'before' and other adverbial relations. I provide a more detailed discussion of this device below when I pay closer attention to the interaction of negative markers and the mono/polyfunctionality of nouns used as clause-linking devices.

Another typical example can be found in Korean. In this language, the primary device used for signaling a *before*-relation is the noun *cen* 'prior time', as can be seen in (411). This device is monofunctional.

Korean (Koreanic)

(411) *Pulaun-ssi* *Hankwuk-ey* *oki-**cen**-ey,* *Cwungkwuk-ey* *sal-ass-eyo.*
Brown-Mr Korea-to come-prior.time-at China-at live-PST-POL
'Before Mr. Brown came to Korea, he lived in China.' (Chang 1996: 154)

As was shown in previous chapters of this dissertation, *when*-clauses tend to be encoded by generic temporal nouns meaning 'time' (§3.2.3.1) and occasionally by non-generic temporal nouns (e.g. 'year'; §3.2.3.2). In a similar fashion, *while*-clauses tend to be realized by generic temporal nouns meaning 'time' (§4.2.3.1) and rarely by non-generic temporal nouns (e.g. 'duration', 'amount', 'occasion'; §4.2.3.2). *After*-clauses show an interesting picture in that they tend to be formed by non-generic nouns meaning 'back' (§5.3.2). In the sample of the present study, *before*-clauses tend to be marked by non-generic nouns (10/13=76.92%). In particular, they tend to be formed by spatial nouns meaning 'in front of', as in (412) or 'face', as in (413). In all of these languages, 'in front of' and 'face' exhibit a metaphorical relationship between the spatial sense of 'in front of' and 'face' and the temporal sense of 'before'. While the Bantawa example in (412) illustrates a *before*-construction in which the ground clause appears with the spatial noun *bu* 'front', the Huitoto example in (413) shows a *before*-construction in which the relation holding between the ground clause and the figure clause is signaled by the noun *uieko* 'face'.

Bantawa (Sino-Tibetan/Bodo-Garo)

(412) *lok-ma-bʰənda* ***bu****-ya,* *mo-so-ʔo* *i̶-duŋ-du* *i̶k-tet*…

boil-INF-COMP front-LOC that-PRN-GEN 3SG.POSS-top-LOC.high one-qual

'Before it cooks, on top of that…. (Doornenbal 2009: 348)

Huitoto (Huitotoan/Huitoto)

(413) *kue* *jaai-aka-na* ***uieko****-do,* *boyiti̶-kue.*

1SG.SBJ go-DES-NMLZ front-INSTR urinate.FUT-1SG.SBJ

'Before wanting to leave, I will pee.' (Wojtylak 2020: 500)

Only three languages of the sample encode *before*-constructions by generic nouns (3/13=23.08%). Accordingly, this seems to indicate that non-generic nouns are more common than generic nouns in the encoding of *before*-constructions in the sample. As can be seen in (414), Toqabaqita has the option of construing a complex sentence indicating 'before' by the generic temporal noun *manga* 'time' along with the negative marker *aqi*. When the ground clause shows positive polarity, the temporal noun *manga* 'time' denotes 'when', as in (415).

Toqabaqita (Austronesian/Oceanic)

(414) *kini* *e* *kuki-a* *fanga* *si*

woman 3SG.NON.FUT cook-3SG.OBJ food PART

'The woman cooked the food

manga *na* *wane* *qe* ***aqi*** *si* *fula* *quu*.

time REL man 3SG.NON.FUT NEG 3SG.NEG arrive ANT.CONT

before the man arrived (lit. the time the man had not arrived yet).' (Lichtenberk 2008: 1177)

Toqabaqita (Austronesian/Oceanic)

(415) *si* ***manga*** *na* *kero* *fula* *mai*,

PART time REL 3DU.NON.FUT arrive VEN

'At the time they arrived,

keko *qono* *qa-daroqa*…

3DU.SEQ sit BEN-3DU

they sat down…' (Lichtenberk 2008: 1173)

As observed above, nouns used in the expression of 'before' may be monofunctional or polyfunctional. In the sample, eight languages use monofunctional nouns as clause-linking devices (8/13=61.53%). In Xong, *before*-constructions are marked by the monofunctional noun *neul* 'front', as in (416). Five languages show polyfunctional nouns used as clause-linking devices (5/13=38.47%). This is illustrated by the Lele example in (417), where the ground clause is marked by the noun *kur* 'time'.

Xong (Hmong-Mien)

(416) *mx* *beut* *nggueb* *naond* *geud-**neul*** *is* *xank,*

2SG.SBJ lie.down sleep ASSOC place-front want first

'Before you go to sleep,

geud *zolniel* *chauk* *diul.*

hold homework do complete

you need to finish your homework.' (Sposato 2015: 215)

Lele (Afro-Asiatic/East Chadic)

(417) ***kur*** *wèl* *kay* *ɗé* *ɓey* *ná,*

time pass finish NEG still ASSOC

'Before the day ended (lit. the time the day has not ended yet),

tamá *na* *du* *è* *sógú* *ni.*

woman HYP 3SG.F go toilet LOC

the wife pretended that she was going to the toilet.' (Frajzyngier 2001: 266)

I now turn my attention to the interaction of negative markers with the mono/polyfunctionality of nouns used as clause-linking devices.

As was pointed out above, eight languages accomplish their 'before' clause-linking via monofunctional nouns. Of these, seven languages have *before*-constructions in which the ground clause cannot be marked by a negative marker. This tendency aligns with the one shown

by monofunctional restricted adverbial subordinators (§6.2.1) and monofunctional restricted deranking devices (§6.2.2) in that they tend not to appear with negative markers. An example illustrating this pattern is found in Sidaama. In this language, the ground clause and the figure clause are linked by the spatial noun *alba* 'face', as in (418). This device is monofunctional and can only be used for conveying *before*-relations. The ground clause of this construction cannot appear with a negative marker (Kawachi 2007: 108).

Sidaama (Afro-Asiatic/Highland East Cushitic)

(418) *Bule* *Dangur-í* ***alba**-a-nni* *dag-g-u.*
Bule Dangura-GEN.M face-LV-LOC come-3SG.F-PERF.3SG.F
'Bule (came) before Dangura came.' (Kawachi 2007: 108)

A quite similar exposition can be given for Trumai. In this language, a *before*-relation holding between clauses is achieved by marking the ground clause with the spatial noun *huk* 'front', as in (419). Negative markers cannot appear in the ground clause of this complex sentence construction (Guirardello 1999: 456).

Trumai (Isolate)

(419) *hai-ts* *kade-in* *k'ate* *yi* *kuhmu* *hat'ke* *hi* *wakepka* ***huk**-ki*.
1SG-ERG FOC-already finish ? throw in.future 2SG return front-DAT
'I will throw the fish away before you return (lit. I will throw the fish away in front of your returning).' (Guirardello 1999: 456)

There seems to be only one language in the database that must be rated as a counterexample to the tendency shown above. Consider the construction in (420). In Nuosu, *before*-constructions are formed by monofunctional nouns which must occur with a negative marker. In (420), the ground clause is marked by the noun *nep* 'origin'. This device is only employed for conveying *before*-relations. Surprisingly, the ground clause is also encoded by the 'not yet' marker formed compositionally by a standard negative marker and an adverb(ial) meaning 'still'. This adverb(ial) cannot be omitted from the construction in (420) (Gerner 2013: 478). Given that this is the only language that can be considered a counterexample to the analysis shown above, I feel justified in concluding that this is not particularly damaging to the tendency mentioned before.

Nuosu (Sino-Tibetan/Burmese-Lolo)

(420)	*axyi*	***itnyiapgu***	***sy***	*gex*	***nep***,	*zza*	*ddie*	*cyx*	*zha*.
	child	sleep.NEG	still	at	origin	food	COV	3SG	feed

'Before the child is sleeping, let him eat.' (Gerner 2013: 478)

As was illustrated above, five languages indicate 'before' by polyfunctional nouns. All of these languages have *before*-constructions effectuated by ground clauses that must be marked by a negative marker. Accordingly, they are in line with the tendency sketched for polyfunctional restricted adverbial subordinators and polyfunctional restricted deranking devices in that negative markers are an important constructional property of *before*-clauses marked by these devices. A couple of examples should suffice to illustrate this pattern.

In Japanese, *uti ni* ‘in the interval’ introduces a construction that is interpreted as a *before*-construction when in negative polarity, as in (421). Note that *uti ni* ‘in the interval’ is polyfunctional and can be found in other contexts expressing ‘while’ when the ground clause shows positive polarity (Kuno 1973: 154-155).

Japanese (Japonic)

(421) *kuraku* ***naranai*** ***uti*** ***ni***, *kaerimasyoo*.
darkly become.NEG interval in let’s.go.home
‘Before it gets dark, let’s go home.’ (Kuno 1973: 154-155)

Another similar example can be found in Lele, repeated here for convenience. As can be seen in (422), the *before*-clause consists of the generic temporal noun *kur* ‘time’, which must appear with a ‘not yet’ marker formed compositionally by the standard negative marker *dḗ* and the adverb(ial) *ɓey* ‘still’. The generic temporal noun *kur* ‘time’ is polyfunctional in that it can also denote another adverbial relation when the ground clause shows positive polarity, as in (423), where the interpretation of the construction marked by *kur* is that of ‘when’. The remaining languages of the sample with a similar pattern are Somali, Toqabaqita, and Onondaga.

Lele (Afro-Asiatic/East Chadic)

(422) ***kur*** *wèl* *kay* ***dḗ*** ***ɓey*** *ná*,
time pass finish NEG still ASSOC
‘Before the day ended (lit. the time the day has not ended yet),

tamá *na* *du* *è* *sógú* *ni*.

woman HYP 3SG.F go toilet LOC

the wife pretended that she was going to the toilet.' (Frajzyngier 2001: 266)

Lele (Afro-Asiatic/East Chadic)

(423) ***kur*** *ro* *gúnyé* *ágì-ì* *jè* *na-ì* *è* *jéèé-ì* *dà* *kama-ŋ,*

time REF spider take.FUT-3SG VEN HYP-3SG go throw-3SG LOC water-DEF

'At the time the spider was about to take him to throw him into the water,

ni *dàì* *kàyo-ŋ* *se* *an* *ná* *galmbo* *kíin-dì…*

LOC 3SG squirrel-DEF INCEP leave ASSOC bag hole-3SG

the squirrel left through the hole in the bag...' (Frajzyngier 2001: 266)

6.3.2 Verbs used as clause-linking devices

Among the sampled languages, four languages employ verbs for denoting 'before' (4/218=1.83%). These verbs are only weakly grammaticalized in that they can still appear with verbal properties. Accordingly, they can be considered items that are not (yet) fully grammaticalized. In Ma'di, *before*-relations are conveyed by the verb *ɪ̀ʃā* 'to reach', as in (424). This verb is weakly grammaticalized in that it is marked by low tone indicating non past tense and presumably cannot appear in any other form in this construction.

Ma’di (Central Sudanic/Moru-Ma’di)

(424) *má* ***tʃā*** *drɨ́* *dʒè-rē,* *lɨ́ɲá* *ōkó* *rá.*

1SG.SBJ reach.NON.PST hand wash-SUB food 3SG.finish AFF

‘Before I washed my hands, the food was finished.’ (Blackings & Fabb 2003: 432)

Verbs used as clause-linking devices may be monofunctional or polyfunctional. In the database, one language encodes *before*-constructions by monofunctional verbs and three languages express ‘before’ by polyfunctional verbs. The Ma’di example above illustrates a monofunctional device that can only be found in contexts used in the expression of *before*-relations. A construction that occurs with a polyfunctional verb is found in Moskona. In this language, the ground clause of a *before*-construction is marked by the verb *okuk* ‘be like’ and must appear with *néesa* ‘not yet’, as in (425). This clause-linking device can also indicate ‘after’ when the ground clause shows positive polarity, as in (426) (Gravelle 2010: 374).

Moskona (East Bird’s Head)

(425) …***okuk*** *no-ma-i* ***néesa***

be.like DEIC.NMLZ-far-GIV not.yet

‘Like that not yet (before the kid singed the hair from the pig),

ekok *oduk* *efer* *no-ma-i* *ni* *ok* *mergej* *owok.*

father send child DEIC.NMLZ-far-GIV for bear firewood branch

the father sent the kid to bring firewood.’ (Gravelle 2010: 374)

Moskona (East Bird's Head)

(426) *...**okuk** no-ma-i edá bua bi-ejij dif edá bi-okog jig.*
be.like DEIC.NMLZ-far-GIV then 2SG 2SG-twist 1SG then 2SG-precede LOC
'…after that, you should go around me and then precede (me).'

Regarding the interaction of negative markers with the mono/polyfunctionality of verbs used as clause-linking devices, it is worth noting the following. As was pointed out above, the only language with monofunctional verbs used in the expression of 'before' is Ma'di. In this language, *before*-constructions are marked by the verb *ì́ā* 'reach'. Blackings & Fabb (2003) mention that the ground clause of this construction can appear with the negative marker *kōrò*. However, this marker is optional and can be omitted. This is in line with the tendency shown by monofunctional restricted adverbial subordinators (§6.2.1), monofunctional restricted deranking devices (§6.2.2), and monofunctional nouns used as clause-linking devices (§6.3.1) in that they tend not to appear with negative markers or the negative marker is optional.

Of the three languages with polyfunctional verbs used in the expression of 'before', all have *before*-clauses that must be marked by a negative marker. As was shown above, Moskona has a *before*-construction in which the ground clause must occur with *néesa* 'not yet'. This verb can also denote 'after' when the ground clause shows positive polarity, as is shown above (Gravelle 2010: 373). The obligatoriness of negative markers in *before*-constructions encoded by polyfunctional verbs is in line with the tendency shown by polyfunctional restricted adverbial subordinators (§6.2.1), polyfunctional restricted deranking devices (§6.2.2), and polyfunctional nouns used a clause-linking devices (§6.3.1) in that negative markers are an important constructional property of *before*-clauses realized by these devices.

6.4 Summary

In this chapter, I have investigated the range of 'before' clause-linking strategies along with their polyfunctionality, and cross-linguistic distribution.

It was demonstrated that *before*-clauses realized by strategies without restricted devices are almost non-existent in the database of the present study. The only semantically non-specific type of clause-linkage attested in the sample is that of asyndetic constructions. Unlike this picture, it has been shown that *before*-clauses tend to be marked by restricted devices. Four common types have been identified in the database: restricted adverbial subordinators, restricted deranking devices, adverb(ial)s meaning 'not yet', and correlative constructions. First, monofunctional free adverbial subordinators outweigh polyfunctional free adverbial subordinators. Note that five languages in the sample indicate 'before' by bound adverbial subordinators which are polyfunctional. Second, unlike restricted adverbial subordinators which tend to be monofunctional in the database, polyfunctional restricted deranking devices are more common than monofunctional restricted deranking devices in the present study. Third, adverb(ial)s meaning 'not yet' used in the expression of 'before' are monofunctional in the sample. Fourth, correlative constructions employed for indicating 'before' have a double figure-ground. Accordingly, they are inherently polyfunctional in that they are used for denoting not only 'before', but also 'after'.

With respect to less common restricted devices, two types have been identified: nouns used as clause-linking devices and verbs used as clause-linking devices. It has been shown that nouns used for encoding *before*-clauses tend to be monofunctional with respect to encoding temporal relations among clauses. Furthermore, *before*-clauses tend to be marked by non-

generic nouns used as clause-linking devices. In particular, they are formed by spatial nouns meaning ‘in front of’. Verbs used as clause-linking devices show the opposite picture in that they tend to be polyfunctional with respect to clause combining in the sample of the present study.

In this chapter, I have also shown that *before*-clauses marked by monofunctional restricted devices tend not to appear with a negative marker or the negative marker is optional, and *before*-clauses realized by polyfunctional restricted devices tend to occur with negative markers that are obligatory. This seems to hold for *before*-clauses encoded by: restricted adverbial subordinators, restricted deranking devices, nouns used as clause-linking devices, and verbs used as clause-linking devices. In discussing these tendencies, I came across various counterexamples. However, the few potential counterexamples can be rated as marginal when compared to the overwhelming number of confirmations.

CHAPTER 7

Until-clauses

Temporal clauses expressing terminal boundary (a.k.a. *until*-clauses) mark the endpoint of a situation expressed in the figure clause (Kortmann 1997: 85; Hetterle 2015: 48). Two types of 'until' constructions have been distinguished in the literature (Klima 1964; Lakoff 1969; Lindholm 1969; Karttunen 1974; Mittwoch 1977). First, there are *until*-constructions in which the figure clause appears with a durative predicate, as in (427). In this construction, the *until*-clause indicates the endpoint or end-period of the figure clause situation (cf. Kortmann 1997: 85). Second, there are *until*-constructions in which the figure clause appears with a non-durative predicate plus a negative marker (see de Swart et al. 2022), as in (428).

(427) *Danny will sleep* ***until*** *the party starts*.

(428) *Danny will* ***not*** *put his hat on* ***until*** *the party starts*.

The constructions in (427) and (428) are formally similar. In a literal sense, (428) exactly parallels (427), since the situation 'Danny will not put his hat on' continues up to the point where the situation 'the party starts' occurs. However, the function of (428) is rather different, namely to say that Danny will only put his hat on when the party starts. Accordingly, I disregard *until*-constructions, as in (428) and consider only constructions as in (427) in the present study. Another reason for not including examples like (428) stems from the fact that there are few relevant examples in the sample sources.

As was discussed in Chapter 6, *before*-clauses may appear with negative markers. Negative markers may also interact in *until*-clauses. However, this interaction is not as

pervasive as the one attested in *before*-clauses (cf. Hetterle 2015: 137; Jin & Koenig 2021: 66). In the languages of the database, the ground clause of an *until*-construction, as in (427), tends not to appear with negative markers. However, there are four languages in the sample that have obligatory negation in *until*-clauses, with absence of negation giving the interpretation 'as long as'. In Hindi (Indo-European/Indo-Aryan), *until*-clauses are formed by the correlative pattern *jab-tak…tab-tak* 'when-until…then-until'. In this construction, the clause marked by *jab-taq* must appear with the negative marker *nahĩ̃*. Another language with a similar pattern is Russian (Indo-European/Slavic). In this language, *until*-clauses are realized by *poka* 'until'. The ground clause must appear with the negative marker *ne* (Wälchli 2018: 222). In Hungarian (Uralic/Ugric), *until*-clauses are formed by *amíg* 'until' and the negative marker *nem* (Ürögdi 2013). The last example comes from Georgian (Kartvelian), in which *sanamde* 'until' clauses must be marked by the negative marker *ar* (Hewitt 1995: 593-594). Wälchli (2018: 190) shows that in many languages of Eastern Europe and South Asia, it is not infrequent for *until*-clauses to appear with negative markers. He mentions that when the *until*-clause does not occur with a negative marker in these languages, the interpretation is that of 'as long as'. This suggests that expanded negation in *until*-clauses might originate from a paraphrase 'as long as not'. Interestingly, there is one language in the sample in which the negative marker from the *until*-clause is optional and can be omitted without changing the *until*-interpretation of the construction. In Hebrew (Afro-Asiatic/Semitic), *ad še-* 'until' clauses may appear with the negative marker *lo*, which is optional and can be omitted. The absence of the negative marker *lo* does not affect the *until*-interpretation of the *ad še-* construction. Due to the scarcity of data in the sample regarding the interaction of *until*-clauses and negative markers, I do not provide a discussion of this domain in this chapter.

The present chapter is sketched as follows. It starts out, in §7.1, with the presentation of the range of strategies without restricted devices used for denoting 'until' in the languages of the sample: asyndetic constructions and general coordinating devices. In all languages of the database having these semantically non-specific types of clause linkage, the figure clause and ground clause follow an iconic order. That is, the *until*-clause or ground clause occurs at the end of the complex sentence construction given that the *until*-clause denotes a situation realized after the situation of the figure clause situation (Diessel 2008: 470). Accordingly, the *until*-interpretation in these constructions arises due to iconicity sequencing. Interestingly, in various languages, not only iconicity of sequencing plays a role in the interpretation of the *until*-relation holding between clauses, but also other constructional properties. The discussion then turns to the range of restricted devices found in the database. First, I explore three types of restricted devices that constitute the most common devices in the sample: restricted adverbial subordinators (§7.2.1), restricted deranking devices (§7.2.2), and verbs used as clause-linking devices (§7.2.3). Second, I turn my attention in §7.3 to four types of restricted devices that are not common in the sample: nouns used as clause-linking devices (§7.3.1), adverb(ial)s meaning 'only' (§7.3.2), sequential coordinating devices (§7.3.3), and correlative constructions (§7.3.4). In discussing the range of devices found in the sample, I show that the order of the clauses in constructions encoded by restricted devices tends to be iconic. The discussion in this chapter is then summarized (§7.4). Recall that when I mention that a device is polyfunctional, I do not show the range of meanings within the domain of adverbial clauses that a particular device can have. The reader is referred to Chapter 9 and the Appendix associated with this dissertation. Note that §7.3.3 is the only section of this chapter where I do not maintain this practice. This stems from the fact that it may be difficult to evaluate, at first

glance, how ‘and then’ devices are used for expressing ‘until’. Accordingly, discussing the polyfunctionality of this clause-linkage pattern in detail will enable the reader to assess how the ‘until’ interpretation is computed.

7.1 Strategies without restricted devices

The first part of this chapter is dedicated to exploring constructions encoded by non-specific strategies. Unlike restricted devices (§7.2), strategies without restricted devices are not common ways for denoting ‘until’ in the languages of the sample. Two types of strategies without restricted devices are attested in the database: asyndetic constructions and constructions marked by general coordinating devices. Of these, asyndetic constructions (10/218=4.58%) are more frequent than constructions marked by general coordinating devices (3/218=1.37%). In both types of constructions, the ‘until’ relation arises by implicature, usually due to contextual or common knowledge and/or iconicity of sequencing. However, for some languages, there may be other constructional properties also aiding in the *until*-interpretation of the complex sentence construction, as is shown below.

A non-prominent way for denoting ‘until’ in the languages of the sample is by asyndetic constructions, in which clauses are strung together in a series without any overt linking device. An example of this clause-linking technique is the following:

Aghu (Trans-New Guinea/Awju-Dumut)

(429) *dii* *bu* *bē-dke* *napi* *da-xe*.
sago DUR pound-1SG mother come-REAL.SG
‘I pounded sago until my mother came.’ (van den Heuvel 2016: 74)

As can be seen in the Aghu construction in (429), the *until*-relation is not directly expressed by any overt linking device, but inferred from iconicity of sequencing (van den Heuvel 2016: 74). In this construction, the figure clause appears before the ground clause. Therefore, the linear order of the figure clause and ground clause mirrors their temporal order.

A parallel situation is attested in Mbodomo. In this language, the figure clause and the ground clause are not linked by any clause-linking device. Instead, the *until*-interpretation of the construction in (430) arises due to iconicity of sequencing.

Mbodomo (Atlantic-Congo/Gbaya-Manza-Ngbaka)

(430)	*mï*	*nón-a*	*tará*	*a*	*tá*	*mï*	*dalsï.*
	1SG.SBJ	scratch-PST	insect.bite	LOC	body	1SG.POSS	wound

'I scratched the insect bite until I bled.' (Boyd 2008: 44)

In one language of the sample, *until*-meanings are conveyed by an asyndetic construction in which the verb of the figure clause must be reduplicated. In Toqabaqita, the *until*-clause always occurs at the end of the complex sentence construction, as in (431). Therefore, the linear order of the figure clause and ground clause always mirrors their temporal order (Lichtenberk 2008: 1201). Note that the verb *fanga* 'to eat' is reduplicated. Reduplication is used for indicating continuative/iterative aspect in this language. Lichtenberk (2008: 1201) states that this strategy is very common in his corpus and should be considered the primary strategy used for conveying 'until'. However, he shows that it is more frequent to find asyndetic constructions in which the verb of the figure clause is reduplicated and is followed by the verb *lae* 'to go' which is also reduplicated, as in (432).

Toqabaqita (Austronesian/Oceanic)

(431) *roowane, ma tarafula-a qaburu i Ratane,*
man and quote.proverb-DEVERB ogre LOC Ratane
'Man!, (you know) the saying of the ogre of Ratane:

imol=e ***faa-fanga*** *boqo ka mae.*
Person=3SG.NON.FUT RDP-eat ASSERT 3SG.SEQ die
A person eats until he or she dies (A reply used by people who have been teased for eating too much at a feast or a communal meal).' (Lichtenberk 2008: 1201)

Toqabaqita (Austronesian/Oceanic)

(432) *wane baa ki kera* ***taa-tari****-a botho baa,*
man that PL 3PL.NON.FUT RDP-chase-3SG.OBJ pig that
'The men kept chasing the pig,

laa-lae*, keka raqu-a.*
RDP-go 3PL.SEQ catch-3SG.OBJ
until they caught it.' (Lichtenberk 2008: 1201)

Comparable formations can be found in other Oceanic languages. As can be observed in (433), Vera'a conveys 'until' by an asyndetic construction. In this example, the sequence of linguistic forms reflects the sequence of experiences in the real world. In (433), the verb of the

figure clause (i.e. *n̄ōr* ‘gnaw’) is repeated and is followed by the verb *van* ‘to go’ which is reduplicated.

Vera'a (Austronesian/Oceanic)

(433) *di=n* ***n̄ōr*** ***n̄ōr*** ***va-van*** *dōmētētaka=m* *mēlē’.*
man=TA gnaw gnaw RDP-go wild.kava=TA break
‘He chewed and chewed until the wild kava broke.’ (Schnell 2011: 209)

There are other Oceanic languages in which the verb of the figure clause is not reduplicated. Instead, a verb meaning ‘to go’ is reduplicated or repeated several times. Alex François (personal communication) informs me that this construction is known as the “durative-result construction”. He mentions that in this construction there is no segmental lexeme or morpheme that could translate as ‘until’. The actual equivalent of ‘until’ is an asyndetic construction that follows an iconic order. In this construction, the figure clause situation stretches out in time (through the reduplication or repetition of a verb meaning ‘to go’) and the second situation encoded by the ground clause comes as a result. Accordingly, what the reduplicated or repeated verb ‘to go’ does in this type of construction is to indicate the stretching out in time of the figure clause situation. On these grounds, I feel justified in rating the constructions in (431), (432), and (433) as instances of asyndetic constructions. Given that this construction has not been addressed in most typological work related to clause combining, it may be unknown to the wider audience. Therefore, I provide, in what follows, a more detailed discussion of this construction.

In Lelepa, *until*-meanings are denoted by the asyndetic constructions in (434). In this example, the *until*-interpretation arises due to iconicity of sequencing. The verb of the figure clause is not reduplicated. Instead, the figure clause appears with the verb *pan* 'to go' which is repeated for indicating a long duration of the previous situation (i.e. 'he sang it'). Lacrampe (2014: 395) points out that this constructional property also aids in the *until*-interpretation of the construction in (434). She also mentions that the number of times that *pan* 'to go' is repeated is iconic in that it reflects the duration of the situation expressed in the figure clause. That is, the number of iterations of the verb *pan* 'to go' correlates with the length of time the speaker wants to portray.

Lelepa (Austronesian/Oceanic)

(434)	*malange*	*e=legat=ia*	***pan***	***pan***	***pan***	*e=ga*	*nou*.
	then	3SG.SBJ=sing=3SG.OBJ	go	go	go	3SG.SBJ=IRR	be.finished

'Then he sang it on and on until he was done.' (Lacrampe 2014: 113)

In Raga, *until*-constructions are formed by asyndesis. In (435), the situation of the figure clause continues for a while until it reaches a climax where the onset of the ground clause situation immediately takes place (Vari-Bogiri 2011: 250). In this construction, the *until*-relation arises due to iconicity of sequencing. Vari-Bogiri (2011: 250) mentions that not only iconicity of sequencing, but also the reduplication of the verb *va* 'to go' plays an important role in asyndetic *until*-constructions. In this scenario, the figure clause situation, i.e. *Tagaro mwa siro atat mataisaoga* 'Tagaro searched for wise people' stretches out in time through the

reduplication of the verb *va* ‘to go’, and the second situation encoded by the ground clause comes as a result.

Raga (Austronesian/Oceanic)

(435) *Tagaro* *mwa* *siro* *atat* *mataisao-ga*
Tagaro 3SG.CONT search person wise-ADJ
‘Tagaro searched on and on for wise people

va-va *mwa* *habwe* *borogai*.
RDP-go 3SG.CONT find banded.rail
until he found banded rail.’ (Vari-Bogiri 2011: 250)

A similar construction can be found in Daakaka. In this language, *until*-constructions are realized by asyndesis, as in (436). In this example, the ground clause appearing at the end of the complex sentence construction marks the endpoint or end-period of the situation expressed in the figure clause. The *until*-relation holding between clauses arises due to iconicity of sequencing. The fact that the verb *vyan* ‘to go’ is reiterated several times can also be considered an important constructional property of the Daakaka asyndetic *until*-construction. This stems from the fact that the figure clause situation, i.e. *bwe tyup barar* ‘he kills pigs’, stretches out in time through the reduplication of the verb *vyan* ‘to go’ and the second situation encoded by the ground clause comes as a result (von Prince 2015: 411).

Daakaka (Austronesian/Oceanic)

(436) *te* *bwe* *tyup* *barar* ***vyan*** ***vyan*** ***vyan*** *i* *sakran.*

CONJ CONT battle pig go go go COP second.rank

'He kills pigs until he becomes a sakran (a rank).' (von Prince 2015: 411)

A similar exposition can be given for Maskelynes. In this language, there is no form that could translate as 'until'. Instead, the *until*-meaning is conveyed by means of an asyndetic construction, as in (437). The figure clause and the ground must follow an iconic order. Furthermore, Healey (2013: 324) mentions that the figure clause situation of the asyndetic *until*-construction must be stretched out in time through the iteration of the verb *van* 'to go'.

Maskelynes (Austronesian/Oceanic)

(437) *namtu-varus* ***van*** ***van*** ***van*** ***van*** *bar* *na-ut* *a* *Hoti*.

1PL.SBJ.REAL-paddle go go go go reach NMLZ-place LOC Hoti

'We paddled on and on until we reached Hoti.' (Healey 2013: 324)

Having addressed asyndetic *until*-constructions, I now turn my attention to *until*-constructions realized by general coordinating devices. A couple of examples should suffice to illustrate this pattern. In Teribe, the figure clause and the ground clause of an *until*-construction are linked by the general coordinating device *ga* 'and', as in (438). In this example, the ground clause indicates a situation as the endpoint of the situation expressed in the figure clause (Quesada 2000: 129). The *until*-interpretation arises due to iconicity of sequencing.

Teribe (Chibchan/Talamanca)

(438) *eni* *ga* *era* *walë* *buk* *li* ***ga*** *dlo* *ö-tong* *dlodlu* *bek.*
so and however woman lie there and sun go-PFV midday right
'But the woman lay there until it was midday.' (Quesada 2000: 129)

Another example comes from Kisi. In this language, *until*-constructions are realized by a construction marked by *mí* 'and' in which the figure clause always appears before the ground clause showing an iconic order, as in (439). Besides iconicity of sequencing, the ideophone *háá* that appears in the figure clause also plays an important role in the *until*-interpretation of the construction (Childs 1995: 301). The ideophone *háá* means something like 'for a long time' with the prolongation of the vowel iconically related to the duration of the figure clause situation. It implies that the figure clause situation has an end or a consequence which is stated in the following clause (Childs 1995: 301).

Kisi (Atlantic-Congo/Mel)

(439) *à* *ló* *bùsɔ̀ɔ́* ***háá*** ***mí*** *pàáléŋ* *lè* *sià*.
3PL.SBJ stay bark IDPH and day PRO break
'They kept barking until it was day.' (Childs 1995: 301)

7.2 Restricted devices

In this section, I turn my attention to the various restricted devices employed for the formal expression of *until*-relations. In order to facilitate the exposition, I have found it convenient first to deal with common restricted devices: restricted adverbial subordinators (§7.2.1),

restricted deranking devices (§7.2.2), and verbs used as clause-linking devices (§7.2.3), and then to discuss less common restricted devices, such as nouns used as clause-linking devices (§7.3.1), adverb(ial)s meaning ‘only’ (§7.3.2), sequential coordinating devices (§7.3.3), and correlative constructions (§7.3.4).

7.2.1 Restricted adverbial subordinators

One prominent way in which the concept of ‘until’ is formally realized in the database is by means of restricted adverbial subordinators, as in the Fonge example in (440), where the ground clause is marked by *káká* ‘until’.

Fongbe (Atlantic-Congo/Kwa)

(440) *Kɔ̀kú ɖù nú* ***káká*** *é jɛ̀ àzɔ̀n.*
Koku eat thing until 3SG.SBJ fall ill
‘Koku ate until he fell ill.’ (Lefebvre & Brousseau 2002: 303)

In total, one hundred-seven languages encode *until*-constructions by restricted adverbial subordinators (107/218=49.08%). Of these, one hundred-four languages denote ‘until’ by free adverbial subordinators (104/107=97.19%), as in (441). Only three languages express ‘until’ by bound adverbial subordinators (3/107=2.81%), as in the Cavineña example in (442), where the ground clause appears with =*tupu* ‘until’. This indicates that free adverbial subordinators are overwhelmingly more frequent than bound adverbial subordinators in the sample.

Basque (Isolate)

(441) *filmaren* *kredituak* *amaitu* *ziren* ***arte***, *jezarrita* *egon* *ginen*.
film.GEN credits finish AUX until sit.PTCP stay AUX
'We sat there until the credits of the film were over.' (Hualde & Ortiz de Urbina 2003: 722)

Cavineña (Tacanan)

(442) *tu-wa=dya=yatses,* *iwa-iwa-chine* *tuna* *ju-diru-bare-ya=**tupu***.
there-LOC=FOC=1DU wait.for-RDP-REC.PST 3PL.SBJ be-PERM-DISTR-IPFV=until
'(Having arrived) there (first), we waited until they arrived.' (Guillaume 2008: 279)

Restricted adverbial subordinators used for signaling 'until' can be monofunctional or polyfunctional. In what follows, I explore the mono/polyfunctionality of free adverbial subordinators. Given that bound adverbial subordinators conveying 'until' are almost non-existent in the database, suffice to say that they are attested in Cavineña, Rukai, and Kharia. Furthermore, these devices are monofunctional.

A typical example of a monofunctional free adverbial subordinator can be found in Bardi. In this language, to indicate the endpoint of a situation expressed in the figure clause, the ground clause must appear with the free adverbial subordinator *gardi* 'until', as in (443). This device is monofunctional. An example of a polyfunctional free adverbial subordinator is attested in Alto Perené. In this language, *until*-constructions are realized by *irohatzi* 'until', as in (444). This device can be found not only in contexts indicating the endpoint or end-period of a figure clause situation, but also in other contexts expressing other adverbial relations.

Bardi (Nyulnyulan)

(443) *goorr* *ing-arr-a* *gaara* ***gardi*** *ingirr-iidi-ngirr.*

poke 3PL.SBJ-poked-3SG.OBJ sand until 3PL.SBJ-touched-3PL.OBJ

'They poked the sand until they touched them (the turtle eggs).' (Bowern 2012: 650)

Alto Perené (Arawakan/Pre-Andine Arawakan)

(444) *o=pas-a-t-aty-e=ro* *tsNki* *tsiNki* *tsiNki*

3SG.SBJ=crush-REP-EP-PROG-IRR=3SG.OBJ IDPH IDPH IDPH

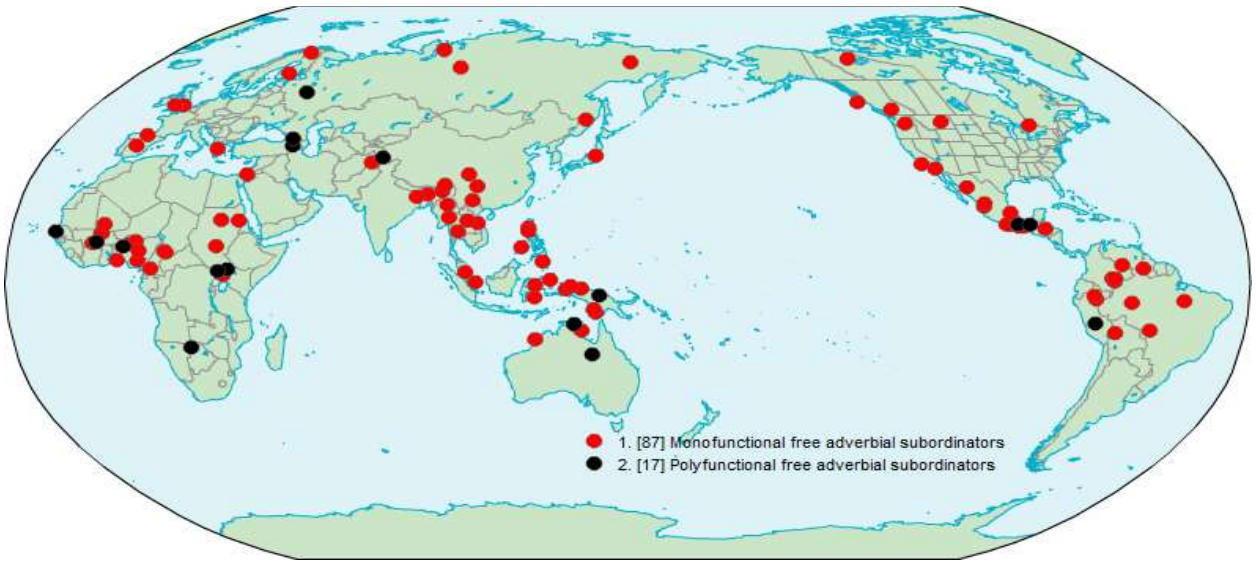
'She will have to crush it (cotton)

irohatzi *o=tsoNk-aNt-ak-ia=ro*

until 3SG.SBJ=IRR-finish-APPL-PFV =3SG.OBJ

until she finishes it (the pile).' (Mihas 2015: 254)

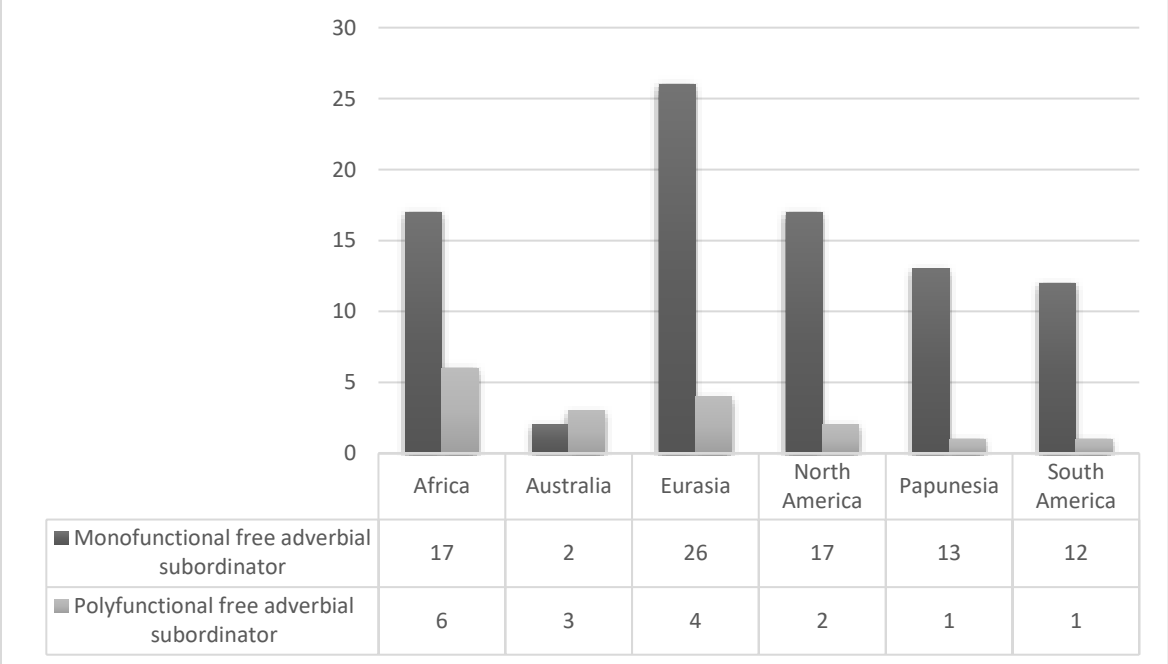
Map 22. Free adverbial subordinators encoding *until*-clauses



As can be seen in Map 22, monofunctional free adverbial subordinators are overwhelmingly more common than polyfunctional free adverbial subordinators in the sample of the present study. Both types of devices are attested in all macro-areas. However, their cross-linguistic distribution is not the same

As is shown in Figure 17, *until*-constructions realized by monofunctional free adverbial subordinators are more common than those formed by polyfunctional free adverbial subordinators in all almost all macro-areas. An exception is Australia, where polyfunctional free adverbial subordinators are slightly more frequent than monofunctional ones. Another observation to be gleaned from Figure 17 is the following. Figure 17 suggests that there are certain geographical skewings. The most evident asymmetry can be detected between Eurasia, which is host to the majority of free adverbial subordinators in my sample, and Australia, with scarce occurrences of this type of clause-linking device.

Figure 17. Free adverbial subordinators encoding *until*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional free adverbial subordinator	17	2	26	17	13	12
Polyfunctional free adverbial subordinator	6	3	4	2	1	1

Before I leave the present section, mention should be made of the following construction. Two African languages of the sample (i.e. Tommo So and Bangime) have a narrative construction in which the *until*-clause appears with a verb meaning 'to get tired'. This clause does not necessarily denote literal weariness or physical fatigue. Instead, this construction is used in contexts where speakers express that they carried out an activity for a very long time. With this in mind, the Tommo So construction in (445), encoded by the free adverbial subordinator *hálè* 'until', gives the idea 'I worked for a very long time'. The first clause in linear order denotes a prolonged activity and is followed by a clause meaning 'until I got tired' emphasizing the extreme prolongation of the figure clause situation. Note that *hálè* 'until' can also be found in other contexts in which a verb meaning 'to get tired' does not appear in the *until*-clause. However, unlike the construction in (445), the *until*-clause in the example in (446) indicates the endpoint or end-period of the figure clause situation. I provide a more detailed analysis in Chapter 10.

Tommo So (Dogon)

(445)	*bírɛ́*	*bìr-áa*	***hálè***	***mí***	***ɔ́ŋŋ-íy-aa***.
	work	work-PFV	until	1SG.SBJ	get.tired-PASS-PFV

'I worked for a very long time (lit. I worked until I got tired).' (McPherson 2013: 451)

Tommo So (Dogon)

(446)	*bírɛ́*	*bìr-ée*	***hálè***	*kɛ̀ɛ̀lɛ́*	*díyɛ̀-go*	*mí*	*bɛ̀l-ì*.
	work	work-NON.FIN	until	money	big-ADV	1SG.SBJ	find-PFV

'I worked until I found (=made) a lot of money.' (McPherson 2013: 452)

7.2.2 Restricted deranking devices

Restricted deranking devices are another strategy that is frequent in the. An example illustrating this clause-linkage pattern can be found in Maricopa. In the construction in (447), the *until*-relation holding between the figure clause and the ground clause is marked by the restricted deranking device *-ingk*.

Maricopa (Yuman)

(447) *ˈ-ashvar-k* *ˈ-uuva-**ingk*** *ˈ-nˈay-sh* *vaa-k.*
1SG.SBJ-sing-SS 1SG.SBJ-be.LOC-until 1SG.POSS-father-SBJ come-REAL
'I sang until my father came' (Gordon 1986: 274)

Of the two hundred eighteen languages of the sample, thirty-nine languages have restricted deranking devices used for conveying 'until' (39/218=17.88%). These devices can be characterized as monofunctional or polyfunctional. The Nyangumarta example in (448) is a construction that appears with the restricted deranking device *-karti*. This device is monofunctional (Sharp 2004: 13).

Nyangumarta (Pama-Nyungan)

(448) *kuyi* *kampa-rna* *tikirl-**karti***.
meat cook-NON.FUT dry-CVB
'He cooked the meat until it was dry.' (Sharp 2004: 13)

Opposed to cases like Nyangumarta, we also find languages in which restricted deranking devices are polyfunctional. In Matsés, *until*-constructions are formed by the restricted deranking device *-nuc*, as in (449). This device is polyfunctional in that it serves as the codification of 'until' and other adverbial relations (Fleck 2003: 1108).

Matsés (Panoan)

(449) *ado-shun-bi*, *shancuin* *podo-n* *danoshca-quid* *canti*
do.thus-after-EMPH tree.species leaf-INSTR sand-HAB bow
'After doing that, they sand the bow with shancuin tree leaves

ise-mbo *ic-**nuc***.
smooth-AUG be-CVB
until it is smooth.' (Fleck 2003: 1108)

As can be observed in Map 23, monofunctional restricted deranking devices are more common than polyfunctional restricted deranking devices in the languages of the sample. Of the thirty-nine languages in which *until*-constructions are formally realized by this type of device, twenty-four languages have monofunctional devices (24/39=61.53%) and fifteen languages have polyfunctional ones (15/39=38.48%). Their distribution across macro-areas is not homogenous. A more nuanced picture of their distribution can be seen in Figure 18.

Map 23. Restricted deranking devices encoding *until*-clauses

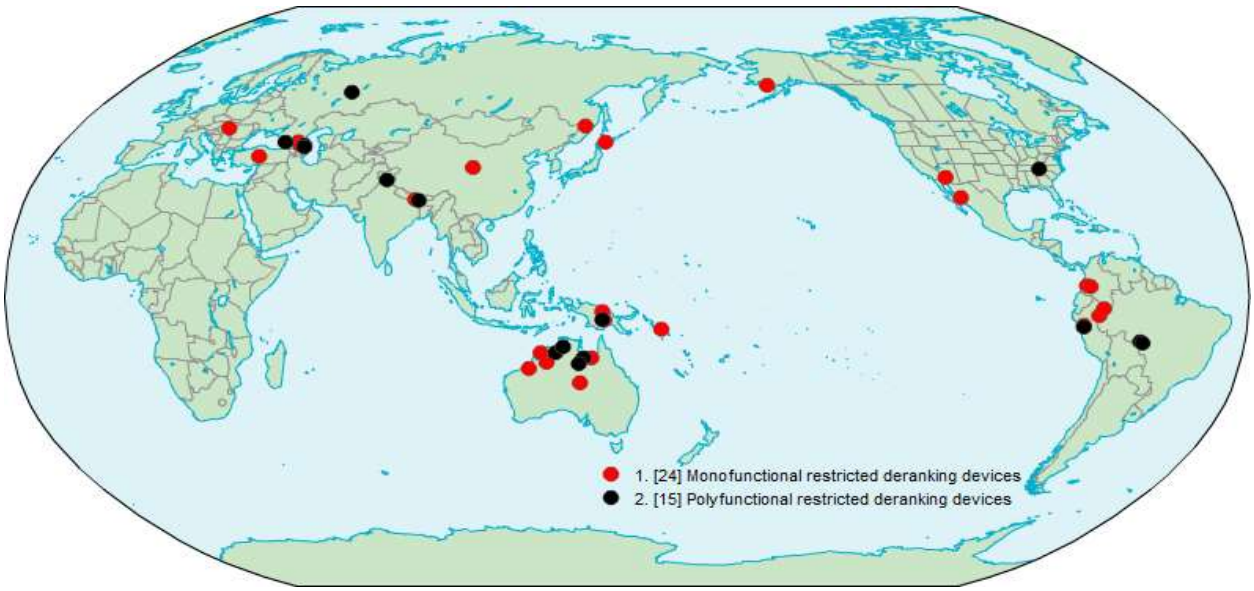
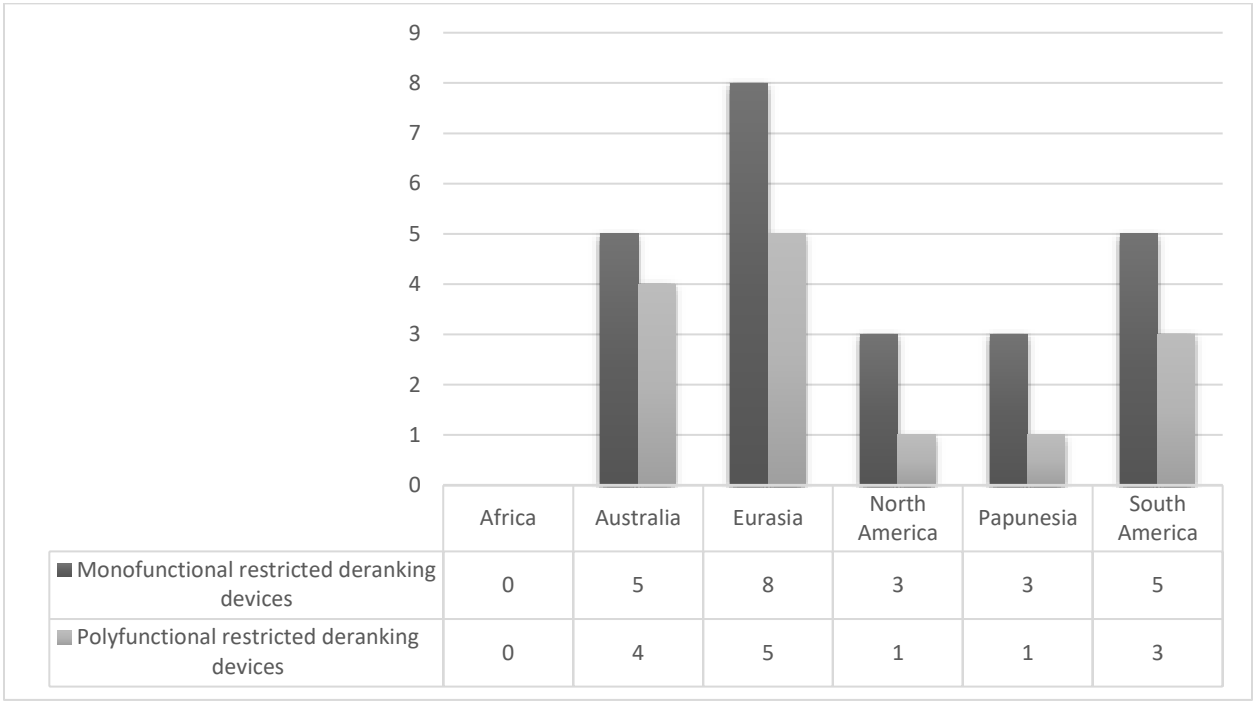


Figure 18. Restricted deranking devices encoding *until*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional restricted deranking devices	0	5	8	3	3	5
Polyfunctional restricted deranking devices	0	4	5	1	1	3

Two main observations can be gleaned from Figure 18. First, *until*-constructions effected by restricted deranking devices are most common in Eurasia in the languages of the

database. Note that restricted deranking devices used for expressing ‘until’ are not attested in African languages in the sample. Second, monofunctional restricted deranking devices are more common than polyfunctional restricted deranking devices in Australia, Eurasia, North America, Papunesia, and South America.

Although not specified in Map 23 and Figure 18, various types of case markers play a role in the expression of ‘until’: dative case markers, allative or lative case markers, and terminative/limitative case markers. Each of these oblique case markers is dealt with in turn.

The first category is that of dative case markers used for denoting ‘until’. Four languages of the database employ dative case markers for signaling ‘until’. An example can be found in Epena Pedee. In (450), the dative case marker *-a* marks a ground clause situation that continues contingent upon the situation of the figure clause. This form is often used with the Spanish loanword *hasta* ‘until’, which is optional and can be omitted from the *until*-construction. The remaining languages of the sample with *until*-clauses marked by dative case markers are Australian languages (i.e. Arrernte, Wambaya, and Wagiman). In these languages, when dative markers are used in nominal constructions, the core function they share is the expression of beneficiaries, recipients, maleficiaries, etc. In many languages around the world, dative case markers may also be used for encoding other types of adverbial clause constructions (Schmidtke-Bode 2009: 89). It is likely that the most well-known extension of dative case markers to the domain of adverbial clause-linkage is dative case markers to purpose clauses.

Epena Pedee (Choco)

(450) *kʰari-pá-ri* ***hásta*** *kʰǩ́ra* *pa-ru-má-**a***.
sing-HAB-PRS until face arrive-PRS-LOC-DAT
'(The singer) sings until she (the shaman) revives.' (Harms 1994: 154)

Allative or lative case markers used for denoting 'until' are also attested in the present study. In total, three languages denote 'until' by allative or lative case markers. A case in point comes from Udihe. In this language, *until*-constructions are realized by means of the lative case marker *-tigi*, as in (451). The remaining languages of the sample with this pattern are Australian languages (i.e. Nyangumartha and Gooniyandi). In these languages, allative or lative case markers indicate direction of motion when they appear in noun phrases ('toward, to'). The use of allative or lative case markers as *until*-devices appears to be an instance of a more general process whereby spatial concepts, including motion in space, are used as structural templates for expressing temporal concepts (Kuteva et al. 2019a: 55)

Udihe (Altaic/Tungusic)

(451) *ŋiča* *aziga* *sagdi* *odo-i-**tigi*** *igi-si-e-ni*.
little girl big become-PTCP.PRS-LAT feed-IPFV-PST-3SG
'(The man) used to feed a little girl (his future wife) until she grew up.' (Nikolaeva & Tolskaya 2001: 738)

The third case marker that can be used with an 'until' function is the terminative/limitative case marker. In total, five languages of the database encode *until*-

constructions by terminative/limitative case markers. In these languages, the core function of these case markers, when used in noun phrases, is to denote a movement that goes all the way to its endpoint. An example illustrating the use of a terminative/limitative case marker denoting 'until' comes from Yauyos Quechua. In this language, the ground clause of an *until*-construction is marked by the limitative case marker *-kama*, as in (452). This device signals the endpoint of the situation expressed in the figure clause.). The remaining languages of the sample with a similar pattern are Bunan, Hungarian, Manambu, and Cholón.

Yauyos Quechua (Quechuan)

(452) *traki* *palta-nchik-pis* *pushllu-na-n-**kama***, *puri-nchik.*
foot soul-1PL-ADD blíster-NMLZ-3-LIM walk-1PL
'We walked until blisters formed on the soles of our feet.' (Shimelman 2017: 308)

7.2.3 Verbs used as clause-linking devices

Another way of marking *until*-constructions in the sample is by verbs. Of the languages of the database, sixteen languages have verbs used for conveying 'until' (16/218=7.33%). Verbs indicating 'until' can be considered items that are not (yet) fully grammaticalized in that they still appear with verbal properties. A case in point comes from Saaroa. In this language, *until*-clauses are encoded by *iungu* 'to arrive', as in (453). In this example, the verb *iungu* 'to arrive' still appears with verbal properties, i.e. it occurs with the change of state aspectual marker *=cu*, which expresses a recent change of a state or situation. Furthermore, *iungu* 'to arrive' occurs with the actor voice marker *m-*. Given that *iungu* 'to arrive' is an intransitive verb, it appears

with the actor voice marker *m-* (i.e. intransitivizing affix). With this in mind, *miungucu* ‘to arrive’ should be considered an item that is weakly grammaticalized.

Saaroa (Austronesian/Tsou)

(453) …***m-iungu=cu*** *a* *alhavungulu*.
AV-arrive=ASP COR spring
‘…until it is spring time.’ (Pan 2012: 299)

Another example is attested in Puyuma. In this language, a temporal boundary relation is indicated by *palu* ‘to demarcate’, as in (454). Teng (2008: 398) explicitly mentions that “the readers may suspect that *palu* may not be a verb but a subordinator, but it can take pronominal clitics and/or voice/transitive markers.” Accordingly, this seems to indicate that *palu* ‘to demarcate’ is an item that is not (yet) fully grammaticalized in that it still appears with verbal properties.

Puyuma (Austronesian/Puyuma)

(454) …***palu=ku*** *da* *me-reta* *i* *takesian*.
demarcate=1SG.NOM COMP INTR-put.down LOC school
‘…until I finished my study.’ (Teng 2008: 398)

Of the sixteen languages that show verbs used for indicating ‘until’, twelve languages can be characterized as languages with monofunctional devices (12/16=75%), and four languages can be rated as languages with polyfunctional devices (4/16=25%). An example

illustrating a monofunctional verb used as clause-linking device is found in Tetun. In order to express 'until', this language resorts to a construction in which the ground clause is marked by *to'o* 'to arrive', as in (455).

Tetun (Austronesian/Central Malayo-Polynesian)

(455) *nia* *manán* *belu-n* *daudaun*
3SG defeat friend-GEN continue
'She kept defeating her friend (in gambling)

to'o *ni* *belu-n* *osan* *la* *n-ó*.
arrive 3SG friend-GEN money NEG 3SG-have
until her friend had no money.' (van Klinken 1999: 163)

Opposed to Tetun, Aguaruna employs a polyfunctional verb used as clause-linking device. In (456), the *until*-relation is conveyed by the verb *tu-* 'to say'. This verb can not only be found in contexts encoding *until*-constructions, but also in other contexts encoding other types of adverbial clause constructions.

Aguaruna (Chicham)

(456) *mina* *duku-hu* *tsaɰaha-ti* ***tu**-sa-un*,
1SG.ACC mother-1SG.POS recover-JUSS say-SUB-1SG.SS
'Until my mother gets well (lit. saying may my mother recover),

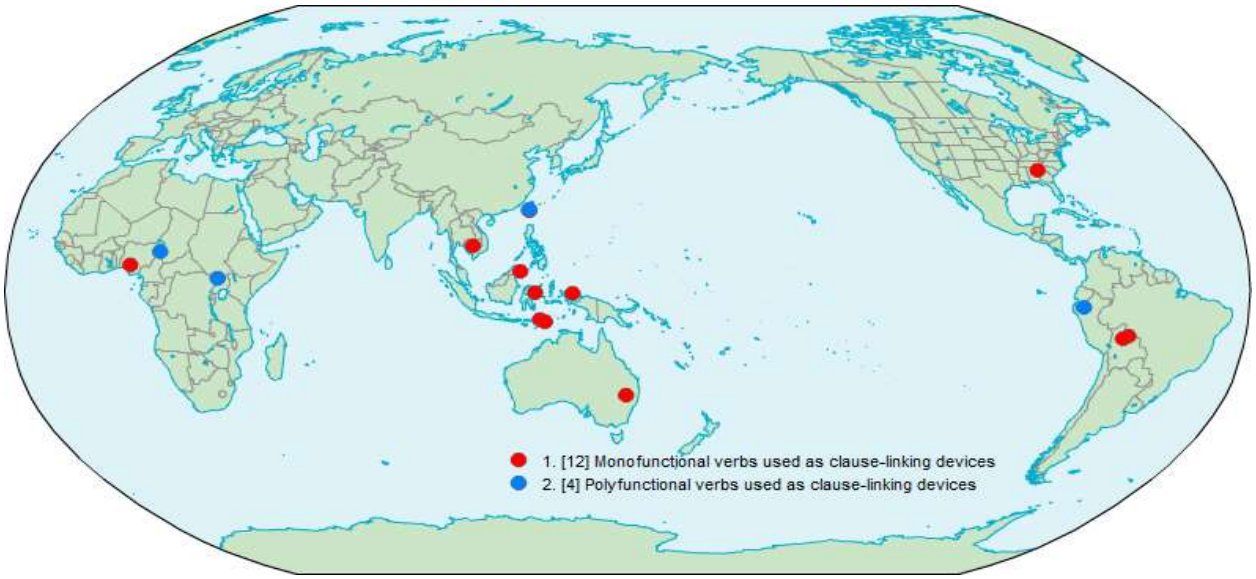
kuitama-ku-nu *puhu-tata-ha-i.*

care.for.IPFV-SIM-1SG.SS live-FUT-1SG-DECL

I will stay here looking after (my mother).' (Overall 2017: 183)

As can be seen in Map 24, monofunctional verbs used for signaling 'until' are more common than polyfunctional ones. Note their cross-linguistic distribution across macro-areas is skewed. I turn my attention to this issue in Figure 19.

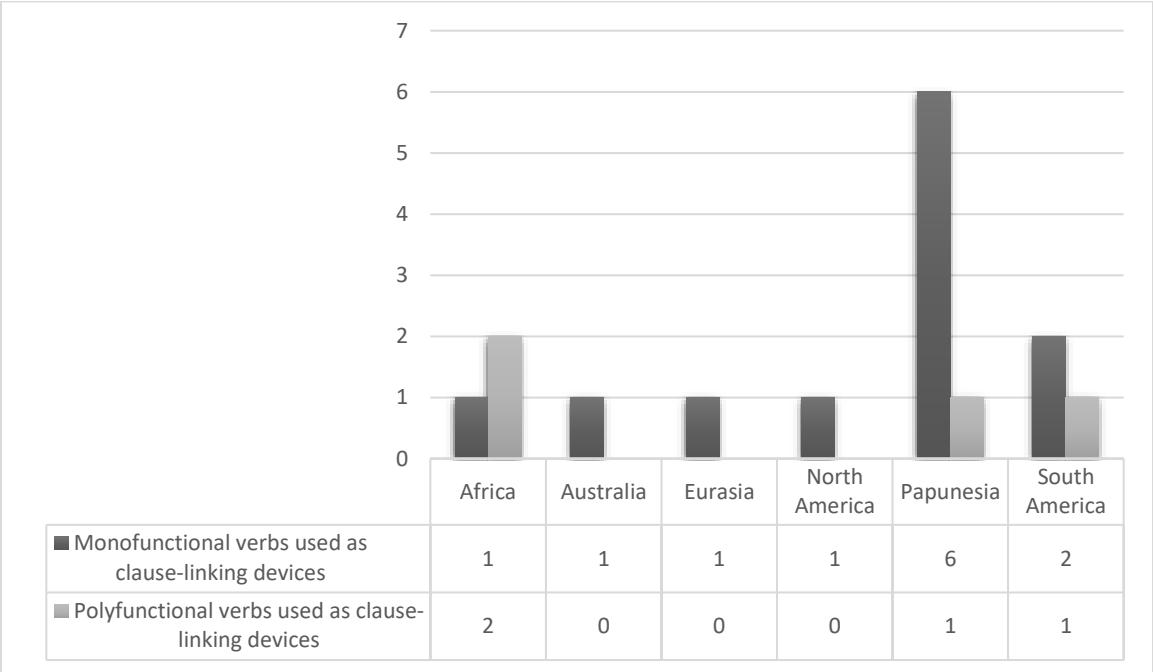
Map 24. Verbs used for expressing 'until'



As is shown in Figure 19, verbs used for denoting 'until' are attested in all macro-areas. However, they are more frequent in Papunesia in the languages of the database. Note that *until*-relations indicated by this clause-linkage pattern are almost non-existent in Australia, Eurasia, and North America. Another observation from Figure 19 is the following. Monofunctional verbs conveying 'until' are more common in all macro-areas. One exception to this tendency

is Africa, where *until*-constructions realized by polyfunctional verbs outnumber monofunctional ones.

Figure 19. Verbs encoding *until*-clauses per macro-area



	Africa	Australia	Eurasia	North America	Papunesia	South America
Monofunctional verbs used as clause-linking devices	1	1	1	1	6	2
Polyfunctional verbs used as clause-linking devices	2	0	0	0	1	1

One issue that I have ignored so far in the previous discussion is concerned with the range of verbs that can be used for indicating 'until' in the database. The most common verb is 'to arrive' or 'to reach'. In total, seven languages use this pattern for denoting 'until' (7/16=43.75%). Of these, five languages are Austronesian. An example comes from Begak, as can be seen in in (457), where the *until*-relation is signaled by the verb *sawot* 'to arrive'.

Begak (Austronesian/North Borneo)

(457) *da* *gə-tuttug* *ino*

PROG AV-fall.out yonder

'Its fur fell out on and on

sawot *nong* *a-matay* *tu* *bəgko* *asu* *di*

arrive OBL NON.VOL-dead too also dog over.there

until her friend had no money.' (Goudswaard 2005: 178)

This observation has not gone unnoticed and echoes Jonsson (2012: 131), who shows that various Austronesian languages employ verbs meaning 'to arrive' or 'to go' for encoding *until*-constructions. In the present study there are no Austronesian languages in which verbs meaning 'to go' signal 'until'. The usage of verbs meaning 'to arrive/to reach' in the expression of 'until' can be interpreted as being part of a more general process whereby languages use a spatial metaphor (sometimes called fictitious motion) to refer, not to the motion of an agent, but to the (metaphorical) motion in time of a situation.

Regarding Austronesian languages, a closer look reveals that verbs meaning 'to reach' or 'to touch' are common in many Oceanic languages not included in the database. It may be of some use if the reader has at least some general idea of the various ways in which *until*-clauses can be realized by this device across Oceanic languages. Accordingly, some examples illustrating this clause-linkage pattern follow here.

In Caac, *until*-constructions are realized by the motion verb *taa* ‘to arrive’ that occurs with the directional clitic *=de*. Note that the figure clause situation of the *until*-construction must be stretched out in time through the iteration of the verb *te* ‘to go down’, as in (458).

Caac (Austronesian/Oceanic)

(458) *jo* *te* *te* *te*

then go.down go.down go.down

‘Then it (the river) goes down, goes down, goes down,

taa=de *tele* *i…*

arrive=downward ANA 3SG

until it is downhill….’ (Cauchard 2014: 99)

Another Oceanic language spoken in New Caledonia with a similar construction is Nêlêmwa. In this language, *until*-constructions are formed by the verb *uya* ‘to arrive’, as in (459). This verb used as clause-linking device may be marked by directional clitic *=da*. This is parallel to the situation of Caac, as was shown before. Interestingly, *uya* ‘to arrive’ can also appear with the crosswise directional *=ve*, as in (460). The crosswise directional is used for directions such as ‘across a river’ (Bril 2016: 104). Regarding the use of *uya* ‘to arrive’ for signaling ‘until’, it is not clear whether there is a difference in meaning when this verb is used either with the directional clitic *=da* or the crosswise directional *=ve*.

Nêlêmwa (Austronesian/Oceanic)

(459) *lo* *na* *xam* *gaa* *shaya* *maya*

FUT 1SG.SBJ ASSER PERSIST work slowly

'I'll do this work slowly

uya=da *o* *na* *kûûlî.*

arrive=up VIRT 1SG.SBJ finish.TRANS

until I finish (it).' (Bril 2016: 104)

Nêlêmwa (Austronesian/Oceanic)

(460) …***uya=ve*** *ni* *thumaaxa* *i* *aayo-ma*.

arrive=DIR in do.funeral DET chief-great

'… (They do so) until the great Chief's funerals (come).' (Bril 2016: 104)

Another example comes from Tamambo. In this language, an *until*-relation is achieved by marking the ground clause with *hisi* 'to touch/to reach', as in (461). This verb appears with the causative marker *va-* and the third person irrealis marker *a*. However, there are instances in which *hisi* 'to touch/to reach' may occur with other person markers, as in (462), where *hisi* 'to touch/to reach' is used with the third person singular marker *mo*.[71] The causative prefix *va-* is optional when *hisi* 'to touch/to reach' introduces a noun phrase, as in (463).

Tamambo (Austronesian/Oceanic)

[71] Other Oceanic languages in which *until*-constructions are built around verbs meaning 'to arrive' or 'to reach' are Samoan *o'o 'i* 'reach to, arrive at', Maori *tae noa ki* 'to reach freely to', East Futunan *kaku ki* 'arrive at, reach to', and Tuvaluan *kee oko* 'arrive to, reach to' (Andrew Pawley, personal communication).

(461) *…ku-mbo* *turu* *aien* ***a-va-hisi*** *ku* *mate.*

1SG.SBJ-FUT stand here 3SG.IRR-CAUS-touch 1SG.SBJ die

'…I will keep standing here until I die.' (Jauncey 2011: 339)

Tamambo (Austronesian/Oceanic)

(462) *na* *welu* *welu* *welu* ***mo*** ***va-hisi*** *rani* *titivesi.*

3PL.SBJ dance dance dance 3SG.SBJ CAUS-touch daylight scrape

'They danced and danced and danced until the daylight scraped through.' (Jauncey 2011: 406)

Tamambo (Austronesian/Oceanic)

(463) *…mo* *sohi* *tuai* *mo* *sohi* *le* ***hisi*** *barindi.*

3SG.SBJ hide of.old 3SG.SBJ hide TA touch today

'…he hid in olden times and he hides until today.' (Jauncey 2011: 406)

Note that *hisi* 'to touch/to reach' can also cooccur with the verb *vano* 'to go', as in (464). This formation of the *until*-construction is essentially parallel to other Oceanic languages spoken in Vanuatu in which a serial verb construction composed of a verb meaning 'to go' plus a verb meaning 'to reach/to touch' is used for denoting 'until'. Crowley (2002: 76), in his description of Paamese serial verbs, calls this construction "limit serial verbs". He notes that the serialization of these verbs gives rise to the meaning 'until' in Paamese and other Oceanic languages spoken in Vanuatu (e.g. Neverver; Barbour 2012: 345).

Tamambo (Austronesian/Oceanic)

(464) *mo-iso* ***mo*** ***vano*** ***mo*** ***hisi*** *arua-na* *hisa-na* *Jara*.
3SG.SBJ-finish 3SG.SBJ go 3SG.SBJ touch two-3SG name-3SG Jara
'Afterwards, (time went on and on and on) until the second one called Jara.' (Jauncey 2011: 407)

Besides Oceanic languages spoken in Vanuatu, there seem to be other languages where a serial verb composed of a verb meaning 'to go' and verb meaning 'to reach/to touch' is used for conveying 'until'. In Hatam, a serial verb construction composed of a verb meaning 'to go' plus a verb meaning 'to reach/to touch' can be used for indicating 'until', as in (465). In this construction, the serial verb *ug pek* 'go reach' marks the endpoint of the situation expressed in the figure clause.

Hatam (West Papuan)

(465) *i-bong* *kikau* ***ug*** ***pek*** *njap-big-yo-ti*.
3PL.SBJ-sleep continually go reach daylight-not-yet-NMLZ
'They slept until it was morning.' (Reesink 1999: 137)

Another language of the sample that employs a similar pattern is Moskona. In this language, a serial verb composed of *eyja* 'to go' and *éysaha* 'to reach' is used for indicating 'until'. Interestingly, this pattern is used for introducing a temporal or locational peripheral argument, as in (466). This language employs a different device for signaling an *until*-relation holding between the figure clause and the ground clause. In (467), the clause introduced by

jida ‘until’ indicates the terminal boundary of the situation expressed in the figure clause (Gravelle 2010: 347).

Moskona (East Bird’s Head)

(466)	*bua*	*bi-en*	*mar*	*no-mai-i*	***eyja***	***éysaha***	*jig*	*ofof*.
	2SG.SBJ	2SG-do	thing	DEIC.NMLZ-far-GIV	go	reach	LOC	border

‘You did that (clearing underbrush) up to the border.’ (Gravelle 2010: 307)

Moskona (East Bird’s Head)

(467)	*bua*	*bi-osot*	*mar*	*efeyu*	*no-mai-i*
	2SG.SBJ	2SG-read	thing	patterned	DEIC.NMLZ-far-GIV

‘Read the writing

jida	*bi-eigen*	*tum*.
until	2SG-know	onto

until you learn it.’ (Gravelle 2010: 347)

As could be observed above, there are Oceanic languages in which a verb meaning ‘to reach/to arrive’ may appear with a causative marker. A closer look reveals that this is attested not only in Oceanic languages, but also in West Papuan languages, not included in the database. In particular, North Halmaheran languages seem to have a parallel clause-linkage pattern.

Various North Halmaheran languages have *until*-constructions encoded by a restricted adverbial subordinator whose etymology is a verb meaning ‘to reach/to arrive’ plus a causative

marker. A case in point comes from Ternate. In this language, temporal boundary is indicated by the restricted adverbial subordinator *sigado* 'until', as in (468). This device can only be used in contexts where the situation of the figure clause occurs up until the point at which the situation expressed by the ground clause occurs. Hayami-Allen (2011: 77) mentions that this clause-linking device may have once been morphologically complex, comprising the causative marker *si* and the verb *gado* 'to reach/to arrive'.

Ternate (West Papuan)

(468) *oho* ***si-gado*** *si-moi…*
eat CAUS-reach CAUS-finish
'(It) ate until all were finished…' (Hayami-Allen 2011: 151)

Another example comes from Tobelo. As can be seen in (469), *until*-constructions are realized by the restricted adverbial subordinator *hiadono* 'until'. Holton (2003: 65) points out that the etymology of this clause-linkage device is easy to identify in that the prefix *hi-* is a causative marker and *adono* is a verb meaning 'to reach/to arrive'.

Tobelo (West Papuan)

(469) *onanga* *i-ma-mahau* ***hiadono*** *manga-biono* *i-tebini*.
3PL.SBJ 3PL.SBJ-REFL-wash.face until 3PL.POSS-face 3PL.SBJ-shine
'They washed their faces until they shone.' (Holton 2003: 65)

Other verbs used for denoting ‘until’ found in the database are: verbs meaning ‘to go’ (e.g. Baure), verbs meaning ‘to end’ (e.g. Movima), verbs meaning ‘to demarcate’ (e.g. Puyuma), verbs meaning ‘to say’ (e.g. Aguaruna), verbs meaning ‘to be up to (an amount)’ (e.g. Creek), verbs meaning ‘to let’ (e.g. Gamilaray), and verbs meaning ‘to except’ (e.g. Makary Kotoko).

Before I leave the present section, mention should be made of the following issue. One verb used for denoting ‘until’ not found in the database is the modal verb ‘to be able to’. It has been shown that various Oceanic languages spoken in Papua New Guinea employ a verb meaning ‘to be able to’ for encoding *until*-constructions. In Mandara, a serial verb construction composed of the verb *tuir-* ‘to stand’ and the verb *-oit* ‘to be able to’ indicates an ‘until’ relation holding between the figure clause and the ground clause, as in (470) (Hong & Hong 2003: 34)

Mandara (Austronesian/Oceanic)

(470)	*ine*	*mi*	*kulou*	*gi*	*nga*	*veis*	*nge*	*veis*
	DEIC.PROX	ART	men	3PL.SBJ	PST	walk	and	walk

‘These people walked and walked

tuir-oit	*gi*	*nga*	*so*	*beit*	*ine*	*si-mi*	*rie*.
stand-able	3PL.SBJ	PST	IMM	arrive	DEIC.PROX	LOC-ART	cave

until they arrived at the cave.’ (Hong & Hong 2003: 34)

Another example comes from Papapana. In this language, *until*-constructions are formed by the modal verb *eangoi* ‘to be able to’, as can be seen in (471). This verb appears

with the postverbal subject indexing enclitic *ena=* (Smith-Dennis 2020: 287). Interestingly, Tok Pisin employs the modal verb *inap* for expressing ability as well as 'until' (Smith-Dennis 2020: 287).

Papapana (Austronesian/Oceanic)

(471) *o=dari=a=a*

2SG.SBJ=rub=3SG.OBJ=IRR

'You rub it

ean-goiena	*na=au*	*dada*	*e=to*	*taosi*.
SBJ-be.able.to	SPEC=II	coconut.milk	3SG.SBJ=to	finish

until the coconut milk is done.' (Smith-Dennis 2020: 287)

7.3 Less common restricted devices

In this section, I focus on four restricted devices that are not common in the database: nouns used as clause-linking devices (§7.3.1), adverb(ial)s meaning 'only' (§7.3.2), sequential coordinating devices (§7.3.3), and correlative constructions (§7.3.4). As is shown, some of these devices seem to appear in areal clusters.

7.3.1 Nouns used as clause-linking devices

Until-constructions built around nouns are found in thriteen languages of the sample (13/218=5.96%). As an example, let us consider Tamil. This language resorts to the noun *varai*

‘end/limit’, as in (472). This construction can only be used for indicating the endpoint of a situation expressed in the figure clause.

Tamil (Dravidian/Southern Dravidian)

(472) *Kumaar varu-kir-a* ***varai****-kk-um, naan kaattiru-nt-een.*
Kumar come-PRS-ADJ end-DAT-INCL 1SG.SBJ wait-PST-1SG.SBJ
‘I waited until Kumar came.’ (Lehmann 1993:335)

Nouns denoting ‘until’ can be rated monofunctional or polyfunctional in the domain of clause combining. In the sample of the present study, seven languages have *until*-constructions encoded by monofunctional nouns (7/13=53.84%) and six languages have *until*-constructions realized by polyfunctional nouns (6/13=46.16%). An example of a monofunctional noun used for conveying ‘until’ is attested in Iraqw. In this language, *until*-clauses are constructed by *dir* ‘place’, as in (473). This device may also cooccur with the noun *afíqoomár* comprising *afa* ‘edge’ and *qoomár* ‘period’, as in (474). Note that the meaning of the *until*-construction does not change with the addition of the noun *afíqoomár*.

Iraqw (Afro-Asiatic/Southern Cushitic)

(473) *inós i kasír huuríin* ***ay*** ***dí-r*** *harmát.*
3SG.SBJ 3PL potatoes cook.3SG.SBJ to place-F be.ripe.3SG.SBJ
‘She will cook the potatoes until they are ready.’ (Mous 1992: 101)

Iraqw (Afro-Asiatic/Southern Cushitic)

(474) *yaamu* *gi-na* *dóohl*

land 3SG-PST dig.3SG.SBJ.PST

'He dug the land

ay ***dí-r*** ***afí-qoomá-r*** *ma'ay* *ti'inangw*.

to place-F edge-period-F water coming.out

until the water came out.' (Mous 1992: 101)

An example of a language with a polyfunctional clause-linkage pattern can be found in Somali. In this language, *inta* 'amount/extent' is not only used for expressing an *until*-relation, as in (475), but it can also be found in other contexts denoting other adverbial relations.

Somali (Afro-Asiatic/Lowland East Cushitic)

(475) *waxay* *labadii* *kale* *ku* *heshiiyeen* *inay* *indhaha* *ka* *xiraan*

3PL.SBJ two.DET other on agreed that eyes.DET from close

'Then the other two agreed to blindfold him over and over again

ilaa *iyo* ***inta*** *ay* *iyagu* *ka* *seexanayaan*.

until and extent.DET 3PL.SBJ 3PL.SBJ from go.to.sleep

until they (left him to) go to bed.' (Saeed 1999: 220)

In the languages of the database, *until*-constructions can be formed by generic and non-generic nouns. Some constructions illustrating these patterns follow here. An example of an *until*-construction formed by a generic temporal noun can be attested in Mbembe. In this language, the primary way for denoting 'until' is by a relative clause that occurs with the generic head noun *ébɔ̄* 'time', as in (476). This clause-linking device is polyfunctional. Note that the verb *dū* 'to stir' of the figure clause is reiterated several times. This is an important constructional property of the Mbembe *until*-construction in that the figure clause situation must be stretched out in time through the repetition of the verb of the figure clause.

Mbembe (Atlantic-Congo/Platoid)

(476)	*ā*	***dū***	***dū***	***dū***	***dū***
	2SG.SBJ	stir	stir	stir	stir

'You stir, stir, stir, and stir

ébɔ̄	*édɔ*	*ē*	*ké*	*yā*	*má*	*ékpūrū*	*hű́*
time	DEM.ANA	3SG.SBJ	PROX.FUT	come	be	thick	DEF.SG

until it becomes thick.' (Richter 2014: 378)

Until-constructions can also be realized by non-generic nouns. In Sidaama, the ground clause of the *until*-construction is marked by the non-generic noun *geeššа* 'degree/extent', as in (477). This device is monofunctional.

Sidaama (Afro-Asiatic/Highland East Cushitic)

(477) *ani* *insa* *dag-g-anno* ***geeššа,*** *got'-u-mn-o.*

1SG.NOM 3PL.NOM come-3SG.F-IPFV degree sleep-PERF-1SG-M

'I slept until they came.' (Kawachi 2007: 114)

The formation of the *until*-construction in Sidaama is essentially parallel to Onondaga. As can be seen in (478), Onondaga *until*-constructions are effected by the non-generic temporal noun *nigę* 'extent'. This device is polyfunctional.

Onondaga (Iroquoian/Northern Iroquoian)

(478) *dane* *d-ę-t-k-hwę?gar-asthw-hb-a?*

then DU-FUT-CISL-1SG.A-splint-diminish-CAUS-PUNCT

'So then I will whittle the stick

tsha? ***nigę*** *tho* *n-ę-yo-?ksd-e-k-Ø*

that extent thus PART-FUT-3SG.P-heavy-STAT-CONT-PUNCT

tsha? *ni-t-hs-yęsd-ih.*

that PART-CISL-2SG.A-be.appropriate-STAT

until its weight is appropriate for you.' (Woodbury 2018: 382)

Another type of noun denoting 'until' documented in the sample concerns locational nouns meaning 'edge', 'border', 'end', or 'limit'. As was shown above, Tamil expresses 'until'

by the noun *varai* ‘end/boundary’. Another example is documented in Korean. In this language, a terminal boundary relation is indicated by *kkaci* ‘boundary/edge’ accompanied by the noun *ttay* ‘time’, as in (479). The locational noun *kkaci* ‘boundary/edge’ is characterized as monofunctional.

Korean (Koreanic)

(479)	*eminimi*	*tolao-si-l*	***ttay***	***kkaci***	*kkay-e*	*iss-ca*.
	mother	return-HON-NMLZ	time	boundary	awake-INF	be-PROP

‘Let’s stay awake until Mother returns.’ (Chang 1996: 154)

With respect to locational nouns meaning ‘edge’, ‘border’, ‘end’, or ‘limit’ denoting ‘until’, Kuteva et al. (2019a: 81-82) mention that they are attested in various African languages (e.g. Swahili *mpaka* ‘border’).[72] They point out that the use of locational nouns meaning ‘edge’, ‘border’, ‘end’, or ‘limit’ in the expression of ‘until’ is a general process whereby locational nouns give rise to typically spatial or temporal grammatical markers. It is worth noting that locational nouns used as clause-linking devices have also been documented in many Oceanic languages, not included in the present study. Some examples follow here.

A typical codification of this construction is attested in Tinrin. In this language, *until*-constructions are realized by the locational noun *nrîrri* ‘edge/border’, as in (480). This noun used as clause-linking device must appear with the third person possessive marker *-nrî*. This clause-linkage pattern is monofunctional.

[72] It has been proposed that many Eastern African languages have copied the Swahili noun *mpaka* ‘border’ for expressing ‘until’ (Mous 2020).

Tinrin (Austronesian/Oceanic)

(480) *ria* *go* *trua* *rri* *ru* *nrî* *fadre* *mêrrê* *tôrrô* *amwairrù*

1PL.INCL then wait 3PL at there with PL torch aforesaid

'We then waited for them there with the torch

nrîrri-nrî *fwirri* *gu-ha* *nrâ* *rri*.

edge-3SG.POSS hear sound-speak POSS 3PL

until we heard their sound.' (Osumi 1995: 291)

Gumawana shows a similar situation to Tinrin in that *until*-constructions are formalized in a parallel way. In this language, an *until*-relation is signaled by the locational noun *tuwana* 'border/edge', as in (481). This noun must be marked by a third person possessive marker. This construction must be rated as monofunctional in that it can only express 'until'.

Gumawana (Austronesian/Oceanic)

(481) *i-kaiaka* *i-na-vada* *a-**na-tuwana*** *i-boboina*.

3SG.SBJ-remain CONT-3SG.POSS-house PASS-3SG.POSS-border 3SG.SBJ-well

'He remains in his house until he is well.' (Olson 1992: 357)

The *until*-construction in Tinrin and Gumawana is practically identical to that in Tawala. As is shown in (482), Tawala indicates 'until' by a nominalized possessive construction with the locational noun *siga* 'end/border/edge'. This construction can only signal the endpoint of the situation expressed in the figure clause (Ezard 1997: 239).

Tawala (Austronesian/Oceanic)

(482) *to-bulili* ***a*** ***siga*** *Lae* *to-geleta*.
1PL.EXCL-run 3SG.POSS edge Lae 1PL.EXCL-arrive
'We sped (in a plane) until we got to Lae.' (Ezard 1997: 239)

Before I leave the present section, mention should be made of the following clause-linkage pattern. As was shown in §3.2.3.1, one phenomenon widespread in the languages of Europe as well as in other languages of the world is constructions in which a temporal noun appears with a restricted adverbial subordinator or a restricted deranking device (lit. 'at the time when…'). In the sample of the present study, there are various languages showing this pattern.

In Tamashek, *until*-clauses are constructed by the generic temporal noun *íket* 'time'. This noun must be preceded by the free adverbial subordinators *har* 'until', as is illustrated in (483). Accordingly, this construction should be understood as '…until the time (when) they get some greenery (ground vegetation)'.

Tamashek (Afro-Asiatic/Berber)

(483) …***har*** ***íket*** *í* *jærrǽw-æn* *t-æddàlæ-t-t*.
until time PROX obtain.IPFV-3PL F-greenness-F-SG.F
'…until they get some greenery (ground vegetation).' (Heath 2005: 642)

A similar construction can be found in Iquito. In this language, *until*-constructions are realized by the noun *iyácari* ‘period of time’, as in (484). This device must appear with the allative clitic *=íira* or the allative clitic *=ánuura* (they can be used interchangeably without affecting the meaning of the construction). Furthermore, *iyácari* ‘period of time’ must be followed by *yaaja* ‘until’. Therefore, this collocation should be understood as lit. ‘towards the period of time until’.

Iquito (Zaparoan)

(484) *nu=raati-Ø-curáana* *umáata*,
3SG=drink-PFV-REC.PST a.lot
‘He drank a lot,

iyácari=íira ***yaaja*** *nu=ámuu=quiaaqui* *náana* *najáaja*.
time.period=ALL until 3SG=kill=REM.PST tree also
until he killed the tree as well (by using its roots in a decoction).’ (Michael 2009: 154)

It has been noted that many Oceanic languages have an *until*-construction composed a temporal noun that must also occur with a verb meaning ‘to reach’ and a restricted device meaning ‘when’, lit. ‘reach the time when…’ (see §7.3.2 for a detailed discussion of verbs meaning ‘to reach’ used for expressing ‘until’). In Neverver, a terminal boundary relation is indicated by the generic temporal noun *dran* ‘time’ and the verb *sber* ‘to reach’ which appears

with the third person realis marker *i-*, as in (485). This gives rise to a complex clause-linkage pattern that must be understood as: lit. ‘it reaches the time when’.

Neverver (Austronesian/Oceanic)

(485) *at-lukh-lukh-luk*

3PL.SBJ.REAL-RDP-RDP-stay

‘They waited

i-sber	***dran***	***an***	*nidam*	*i-yaj*.
3SG.SBJ.REAL-reach	time	PART	yam	3SG.SBJ.REAL-ripe

until the time when the yams were ready.’ (Barbour 2012: 153)

Lewo encodes *until*-constructions by a similar clause-linkage pattern. In (486), the ground clause is marked by the generic temporal noun *pogos* ‘time’, preceded by the verb *tol* ‘to reach’ that occurs with a third person realis marker. Therefore, this *until*-clause linkage device should be understood as: lit. ‘it reaches the time when’.

Lewo (Austronesian/Oceanic)

(486) *...Lora* *Ø-vitom* *si-na*

Lora 3SG-come.down again-EMPH

‘…Lora keeps coming down

Ø-tol	***pogos***	***napã***	*yoko*	*a-talopa*	*e*	*sukul*.
3SG.SBJ-reach	time	when	FUT	3PL-marry	LOC	school

until the time when they marry in the church.' (Early 1994: 435)

In Mavea, the equivalent to 'until' is expressed by a clause-linkage pattern in which the verb *tikelia* 'to reach' is followed by a relative clause with the head noun *taro* 'time' and *ma*, as in (487). The verb *tikelia* 'to reach' must be marked by the third person irrealis marker *i-*. Guérin (2008: 463) points out that there are contexts in which the verb *tikelia* 'to reach' is not followed by the head noun *taro* 'time'. Instead, it is only followed by *ma*, as in (488). Accordingly, she mentions that, in this context, the verb *tikelia* 'to reach' is followed by a headless relative clause: lit. 'it reaches (the time) when'.

Mavea (Austronesian/Oceanic)

(487)

ko-l-to	*pemel*	*i-ṽa*,	
2SG-IPFV-stay	like.this	3SG.SBJ.IRR-go	

'You keep staying like this for a while,

i-tikel	***taro***	***ma***	*me*	*ki-on*	*i-mo-du*.
3SG.SBJ.IRR-reach	time	when	FUT	1PL.EXCL-look	3SG.SBJ.IRR-COND-good

until the time when we see it's good.' (Guérin 2008: 464)

Mavea (Austronesian/Oceanic)

(488) *ko-l-arvlesi* *pelmel*

2SG-IPFV-stir like.this

'You keep stirring like this

i-tikel ***ma*** *i-ḿa* *i-oele*.

3SG.SBJ.IRR-reach when 3SG.SBJ.IRR-come 3SG.SBJ.IRR-oil

until it becomes oil.' (Guérin 2008: 463)

7.3.2 Adverb(ial)s meaning 'only'

As was shown in Chapter 5, 'as soon as' constructions can be realized by adverb(ial)s meaning 'only' (see §5.4.4). There is evidence in the database of the present study that adverb(ial)s meaning 'only' may also be used in the encoding of *until*-clauses. Of the languages of the sample, four languages have adverb(ial)s meaning 'only' indicating 'until' (4/218=1.83%). This is attested in Bininj Gun-Wok, Majang, Marrithiyel, and Ngankikurungkurr. These devices are monofunctional in the database. In what follows, I present a discussion of these clause-linking devices.

In Ngankikurungkurr, the primary way for signaling 'until' is the adverb(ial) *napa* 'only', as in (489). This device is monofunctional. Note that the figure clause and the ground clause are also linked by the general coordinating device *yi* 'and'. The reader may wonder whether this construction should be characterized as a semantically non-specific strategy, where the *until*-interpretation arises only due to iconicity of sequencing. Hoddinott & Kofod (1988: 117) mention that the *until*-interpretation is explicitly signaled by the adverb(ial) *napa*

'only'. That is, if the construction in (489) occurred without *napa* 'only', the interpretation of this construction would not be of an 'until' relation holding between clauses. Furthermore, the general coordinating device is optional and can be omitted from (489). On these grounds, I feel justified in rating the construction in (489) as an instance of restricted clause-linking device.

Ngankikurungkurr (Southern Daly/Ngankikurungkurr)

(489)	*yedi*	*leli*	*tye*	*mumba*	*yi*	*pallak*	*mem*	***napa***.
	3SG.SBJ.go.PST	walk	PST	road	and	tired	3SG.SBJ.say.PRS	only

'He walked along the road until he was tired.' (Hoddinott & Kofod 1988: 117)

A parallel situation can be described for Bininj Gun-Wok. In this language, one of the primary ways for conveying 'until' is by an adverb(ial) meaning 'only/just'. As can be seen in (490), the *until*-construction is formed by *djal-* 'only/just'. Interestingly, it is the figure clause, and not the ground clause, that takes *djal-* 'only/just'. In the same way as the Ngankikurungkurr *until*-construction discussed above, the figure clause and the ground clause of the Bininj Gun-Wok *until*-construction are linked by a general coordinating device that is optional. In (490), the general coordinating device *dja* 'and' can be omitted. Evans (2003: 656) indicates that the *until*-meaning of the construction in (490) resides in the adverb(ial) *djal-* 'only/just'.

Bininj Gun-Wok (Gunwinyguan)

(490)	*gabarri-**djal**-noihme-noihme*	*dja*	*ga-rrung-bebme.*
	3SG-just-ITER.fuck-RDP	and	3SG-sun-appear

'They just keep fucking until the sun comes up.' (Evans 2003: 657)

Another Australian language of the sample with a similar pattern is Marrithiyel. As is illustrated in (491), *until*-constructions are realized by the adverb(ial) *-defen* 'only'. This device is monofunctional and can only express 'until'.

Marrithiyel (Western Daly/Bringen)

(491) *ngawu-ni-manthi-mbel-wa* *gan*
1SG.IRR.sit-STAT.LOC-wait.neck-2SG.PURP-FUT here
'I'll sit here waiting for you

*gurr-ing-wirr-**defen**-wa*.
3SG.SBJ.IRR-1SG.OBJ-uncover-only-FUT
until the day breaks on me.' (Green 1989: 197)

Given that the Australian languages discussed above are not genetically related and given that 'only' used for signaling 'until' is not common cross-linguistically, it is likely that language contact may have taken place here. The details of the areality of this construction in Australian languages are discussed in more detail in chapter 10.

7.3.3 Sequential coordinating devices

Another device that also should be taken into account is sequential coordinating devices (see §5.2.3 for a more detailed discussion of 'and then' devices). In the sample, there are seven languages in which *until*-relations are conveyed by sequential coordinating devices (7/218=3.21%). Some examples illustrating this pattern follow here.

Urim features an *until*-construction that is marked by *pa*. This device is polyfunctional in that it is used for indicating 'and then' as in (492). The question is: how is the 'until' interpretation achieved by *pa*? As can be seen in (493), to indicate that the action of the figure clause continues until something else happens or until the end of the situation of figure clause is achieved, the verb of the figure clause must be repeated several times (Hemmilä & Luoma 1987: 26). This repetition depends how much the speaker wants to emphasize the length of the situation. Durative aspect is indicated in Urim by repeating a verb more than once (Hemmilä & Luoma 1987:202).

Urim (Torricelli/Urim)

(492) *men* *lap* *namung* ***pa*** *plalng* *apis*.
1PL.EXCL roast.REAL banana and.then finish scrape.REAL
'We roasted the bananas and then scraped the ashes off.' (Hemmilä & Luoma 1987: 80)

Urim (Torricelli/Urim)

(493) *men* *ak* *yikal* ***or-or-or-or-or-or***,
1PL.EXCL do.REAL bow hit-hit-hit-hit-hit-hit
'I kept hitting and hitting it with the bow,

pa *amo*.
until die.REAL
until it died.' (Hemmilä & Luoma 1987: 26)

Comparable formations can be documented for Bininj Gun-Wok. In this language, *until*-relations may also be achieved by *wanjh*. This device is polyfunctional in that it is also used for indicating a temporal subsequence relation holding between clauses, as is shown in (494). The question is: how is the *until*-relation computed by *wanjh*? To indicate a terminal boundary relation holding between the figure clause and the ground clause, the figure clause must be marked by the adverb(ial) *korrogo*/*gorrogo* 'for a long time', as can be observed in the example in (495).

Bininj Gun-Wok (Gunwinyguan)

(494) *birri-worrhm-inj* ***wanjh*** *birri-yo-y*.
3PL.A-become.full-PST.PFV then 3PL.A-sleep-PST.PFV
'They ate and then went to sleep.' (Evans 2003: 654)

Bininj Gun-Wok (Gunwinyguan)

(495) *galukborrk* *ba-werrhme-nh* ***gorrogo***,
long.time 3SG-scratch-PST.PFV long.time
'She raked them up for a long time,

ba-rrolga-ng ***wanjh***.
3SG-get.up-PST.PFV until
until he suddenly flew up.' (Evans 2003: 655)

7.3.4 Correlative constructions

Another device that does not constitute a large class in the database is that of correlative constructions. In total, three languages of the sample have *until*-constructions that are formed by this clause-linkage pattern (3/218=1.37%). This is attested in Hungarian, Lithuanian, and Mandarin.

As is illustrated in (496), Lithuanian employs an *until*-construction realized by a correlative construction in which the figure clause is marked by *tol* 'that' and the ground clause is encoded by *kol* 'until'. This clause-linkage pattern is polyfunctional in that it can also be used for indicating 'as long as', as in (497). Interestingly, Wälchli (2018: 186) mentions that the preposition *iki* 'until' with *tol* 'that' is a possibility to resolve the ambiguity, as in (498). Furthermore, he mentions that it is likely that *iki tol* is on its way to be reanalyzed as a whole expression.

Lithuanian (Indo-European/Baltic)

(496)	*tikros,*	*gilios,*	*apimančios*	*meiles*
	true.GEN.SG.F	deep.GEN.SG.F	embrace.PRS.GEN.SG.F	love.GEN.SG.F

	trunkančios	***tol***,
	endure.PRS.GEN.SG.F	that

'True, deep, and all-embracing love endures,

kol *išskirs* *mirtis*.

until part.FUT.3SG death.NOM.SG

until death parts (them).' (Wälchli 2018: 185)

Lithuanian (Indo-European/Baltic)

(497) ***tol*** *mokinamės,* ***kol*** *gyvi* *esame*.

that teach.PRS.1PL.REFL as.long.as alive.NOM.PL.M be.PRS.1PL

'We are learning as long as we live.' (Wälchli 2018: 184)

Lithuanian (Indo-European/Baltic)

(498) *dainavo* ***iki*** ***tol***,

sing.PST.3SG until that

'She sang,

kol *iš* *jos* *ateme* *mikrofoną*

until from 3SG.GEN.F away.take.PST.3SG microphone.ACC.SG

until they took away the microphone from here.' (Wälchli 2018: 186)

7.4 Summary

The discussion in this chapter has shown that *until*-constructions have a range of possible linguistic realizations, from asyndetic constructions, to various types of restricted devices.

It has been shown that restricted devices are more common than semantically non-specific strategies (e.g. asyndetic constructions). With respect to restricted devices, the

discussion has made it clear that they vary with respect to their mono/polyfunctionality. *Until*-constructions realized by monofunctional free adverbial subordinators are more common than those formed by polyfunctional free adverbial subordinators. Monofunctional restricted deranking devices are more common than polyfunctional restricted deranking devices. It has been discussed that various types of case markers play a role in the expression of 'until', i.e. dative case markers, allative or lative case markers, and terminative/limitative case markers. Regarding verbs denoting 'until', they tend to be monofunctional in the sample of the present study.

Less common restricted devices attested in the sample show a similar picture to the restricted devices mentioned above in that they also tend to be monofunctional. Nouns conveying 'until' are slightly more common than polyfunctional nouns. In all languages of the sample expressing 'until' by an adverb(ial) meaning 'only', the clause-linking device is monofunctional. These devices are mostly attested in various Australian languages of the sample. Finally, sequential coordinating devices denoting 'until' are polyfunctional.

CHAPTER 8

Semantic mono/polyfunctionality of restricted devices

The range of strategies by which temporal adverbial relations are conveyed has been explored in the previous chapters. I now turn my attention to the following nested research questions of the present dissertation. **Research question 2**: are restricted devices more common than strategies without restricted devices in the encoding of particular types of temporal adverbial clauses? **Research question 3**: which type of temporal adverbial clause tends to be encoded more frequently by monofunctional restricted devices? Recall that restricted devices explicitly signal the semantic relation of the ground clause to the situation expressed in the figure clause (see §1.4.1). This is a cover term that has been used for describing various types of formal devices, which perform semantically restricted linkage functions.

The organization of this chapter is as follows. In §8.1, I analyze whether restricted devices are more common than strategies without restricted devices in the expression of *when*-relations, *while*-relations, *after*-relations, *before*-relations, and *until*-relations. Furthermore, I explore whether monofunctional devices are more frequent than polyfunctional devices. In §8.2, I turn my attention to the range of temporal clause systems that have been identified in the languages of the sample. These systems are based on the mono/polyfunctionality of restricted devices. A summary of the chapter as a whole is also provided (§8.3).

8.1 Restricted devices and strategies without restricted devices

In this section, I first analyze the frequency of restricted devices and strategies without restricted devices. Once I investigate this domain, I determine which of the five types of

temporal adverbial clause constructions taken into account in the present research tends to be encoded more frequently by monofunctional devices.

8.1.1 *When*-clauses

As can be observed in Table 5, *when*-clauses encoded by restricted devices (279/283=98.58%) are more common than *when*-clauses formed by strategies without restricted devices (4/283=1.42%).

Table 5. Frequency of 'when' clause-linkage patterns[73]

Type of clause-linkage pattern	**Frequency**	**Percentage**
Strategies without restricted devices	4	1.41
Restricted adverbial subordinators	111	39.22
Restricted deranking devices	71	25.08
Temporal nouns	71	25.08
Correlative patterns	9	3.18
Demonstratives used as clause-linking devices	7	2.47
Verbs used as clause-linking devices	7	2.47
Articles used as clause-linking devices	3	1.09
Total	283	100.00

[73] Because of rounding, adding up the percentages of the individual types does not always come to 100% in the tables used in this chapter.

Of the three types of semantically non-specific types of strategies introduced in Chapter 1, asyndesis is the only pattern used for conveying 'when' in the languages of the sample. Asyndetic 'when' clauses are only attested in various Australian languages of the sample (see Chapter 3). Regarding restricted devices, restricted adverbial subordinators, restricted deranking devices, and temporal nouns represent the commonest types of patterns. Note that articles used as clause-linking devices, verbs used as clause-linking devices, demonstratives used as clause-linking devices, and correlative patterns are the less common types.

8.1.2 *While*-clauses

As is shown in Table 6, *while*-clauses realized by restricted devices (213/235=90.63%) are more frequent than *while*-clauses encoded by strategies without restricted devices (22/235=9.37%).

Table 6. Frequency of 'while' clause-linkage patterns

Type of clause-linkage pattern	**Frequency**	**Percentage**
Strategies without restricted devices	22	9.36
Restricted adverbial subordinators	90	38.29
Restricted deranking devices	84	35.74
Temporal nouns	31	13.19
Correlative patterns	4	1.70
Verb-doubling	4	1.70
Total	235	100.00

This picture is similar to the one described for *when*-clauses in the previous subsection. Recall that, as was discussed in Chapter 4, two strategies without restricted devices are employed for conveying 'while': asyndesis and general coordinating devices. Of the range of restricted devices documented for *while*-clauses in the database, restricted adverbial subordinators and restricted deranking devices are the commonest types. Note that *while*-constructions marked by verb-doubling and correlative patterns are almost non-existent in the sample.

8.1.3 *After*-clauses

The occurrence of restricted devices (266/286=93%) is higher than the one shown by strategies without restricted devices (20/286=7%).

Table 7. Frequency of 'after' clause-linkage patterns

Type of clause-linkage pattern	**Frequency**	**Percentage**
Strategies without restricted devices	20	6.99
Restricted adverbial subordinators	71	24.82
Restricted deranking devices	77	26.92
'And then' coordinators	88	30.76
Verbs used as clause-linking devices	25	8.74
Nouns used as clause-linking devices	3	1.04
Adverb(ial)s meaning 'already'	1	0.34
Correlative patterns	1	0.34
Total	286	100.00

This is similar to the picture of *when*-clauses and *while*-clauses. With respect to strategies without restricted devices, recall that languages may use asyndesis, general coordinating devices, and general deranking devices (see Chapter 5). Of these, asyndesis is by far the most frequent semantically non-specific strategy. Among the most frequent types of restricted devices by which *after*-clauses are realized are 'and then' coordinators, restricted deranking devices, and restricted adverbial subordinators. *After*-clauses marked by correlative patterns, adverb(ial)s meaning 'already', and nouns used as clause-linking devices represent the less common patterns.

8.1.4 *Before*-clauses

Before-clauses realized by restricted devices (213/218=97.70%) are more common than *before*-clauses formed by strategies without restricted devices (5/218=2.30%).

Table 8. Frequency of 'before' clause-linkage patterns

Type of clause-linkage pattern	**Frequency**	**Percentage**
Strategies without restricted devices	5	2.29
Restricted adverbial subordinators	111	50.91
Restricted deranking devices	36	16.51
Adverb(ial)s meaning 'not yet'	16	7.33
Correlative patterns	30	13.76
Nouns used as clause-linking devices	15	6.88
Verbs used as clause-linking devices	5	2.29
Total	218	100.00

A look-alike scenario has also been observed for ‘when’, ‘while’, and ‘after’. *Before*-clauses are encoded by various types of restricted devices (Table 8). However, by far the most common pattern is that of restricted adverbial subordinators. Note that strategies without restricted devices and verbs used as clause-linking devices are almost non-existent in the database.

8.1.5 *Until*-clauses

Until-clauses formed by restricted devices (205/218=94.03%) are more frequent than *until*-clauses marked by strategies without restricted devices (13/218=5.97%).

Table 9. Frequency of ‘until’ clause-linkage patterns

Type of clause-linkage pattern	**Frequency**	**Percentage**
Strategies without restricted devices	13	5.96
Restricted adverbial subordinators	118	54.12
Restricted deranking devices	41	18.80
Verbs used as clause-linking devices	17	7.79
Nouns used as clause-linking devices	15	6.88
Adverb(ial)s meaning ‘only’	5	2.29
‘And then’ coordinators	5	2.29
Correlative patterns	4	1.83
Total	218	100.00

The frequency of the various types of restricted devices is not homogenous (Table 9). The most evident asymmetry can be detected between correlative patterns, 'and then' devices, and adverb(ial)s meaning 'only', with scarce occurrences, and restricted adverbial subordinators, which represent the most common clause-linking device. Regarding strategies without restricted devices, these are non-prominent ways for conveying 'until' in the languages of the sample.

8.1.6 General discussion

As discussed above, restricted devices are the commonest pattern in the expression of the five types of temporal adverbial relations taken into account in the present research. In this section, I address the following question: cross-linguistically, which types of temporal adverbial clauses tend to be encoded by monofunctional devices disproportionately more often than polyfunctional devices?

Table 10. Mono/polyfunctional devices in Hetterle's study (2015: 213)

Type of temporal clause	**Frequency of monofunctional devices**	**Frequency of polyfunctional devices**	**Total**
When-clauses	24 (25.80%)	69 (74.20%)	93 (100%)
While-clauses	18 (28.12%)	46 (71.88%)	64 (100%)
After-clauses	20 (44.44%)	25 (55.56%)	45 (100%)
Before-clauses	20 (62.5%)	12 (37.5%)	32 (100%)
Until-clauses	19 (65.51%)	10 (36.49%)	29 (100%)

One study that has explored the semantic mono/polyfunctional of restricted devices is Hetterle (2015: 213). She shows that *when*-clauses, *while*-clauses and *after*-clauses tend to be encoded by polyfunctional devices. On the other hand, *before*-clauses and *until*-clauses tend to be realized by monofunctional devices, as can be seen in Table 10.

The present study also contributes to exploring the theoretical domain sketched above by analyzing the types of temporal adverbial clauses that tend to be encoded by monofunctional devices or polyfunctional devices.

To the question above, the simplest way is to count the number of monofunctional and polyfunctional restricted devices used for encoding each of the temporal clause types in the languages of the sample. To measure the degree to which a clause type is skewed towards semantic monofunctionality or polyfunctionality (and to determine the reliability of this skew), one can then apply a chi-squared goodness-of-fit test. Because I am interested in the differences particular to each clause type, I performed one chi-squared test for each semantic type of temporal adverbial clause. Once I had a picture of the distribution of the dependent variable for each temporal adverbial clause (i.e. the *p*-values from the chi-squared tests), I estimated the effect size of the difference by taking the (absolute value of the) base-10 logarithm of the *p*-values.

Table 11. Frequency of mono/polyfunctional devices in the present study

Type of temporal clause	**Frequency of monofunctional devices**	**Frequency of polyfunctional devices**	**Total**
When-clauses	76 (27.24%)	203 (72.76%)	279 (100%)
While-clauses	100 (44.84%)	123(55.16%)	223 (100%)
After-clauses	190 (71.42%)	76 (28.58%)	266 (100%)
Before-clauses	159 (74.64%)	54 (25.36%)	213 (100%)
Until-clauses	153 (74.63%)	52 (25.37%)	205 (100%)

I first determined the number of monofunctional and polyfunctional restricted devices per semantic type of temporal clause attested in the languages of the present study. The resulting values are presented in Table 11.

Before carrying out the statistical analyses mentioned above, I should explicitly formulate the hypotheses. H0 postulates that monofunctional and polyfunctional restricted devices used in the encoding of each type of temporal clause are distributed evenly, meaning that both constructions occur equally often, i.e. 50% of the time. Thus:

H0: The frequencies of the two variable levels of CONSTRUCTION are identical–if I find a difference in my sample, this difference is just random variation; MONO_restricted devices = POLY_restricted devices.

H1: The frequencies of the two variable levels of CONSTRUCTION are not identical; MONO_restricted devices ≠ POLY_restricted devices.

Table 12. *P*-values for each temporal adverbial clause

Type of temporal adverbial clause	***P*-values**
When-clauses	x-squared=47.367, df=1, *p*-value=5.887e-12
While-clauses	x-squared = 2.3722, df= 1, *p*-value=1.2e-1
After-clauses	x-squared = 48.857, df =1, *p*-value=2.8e-12
Before-clauses	x-squared = 51.761, df=1, *p*-value=6.27e-13
Until-clauses	x-squared = 49.761, df=1, *p*-value=1.737e-12

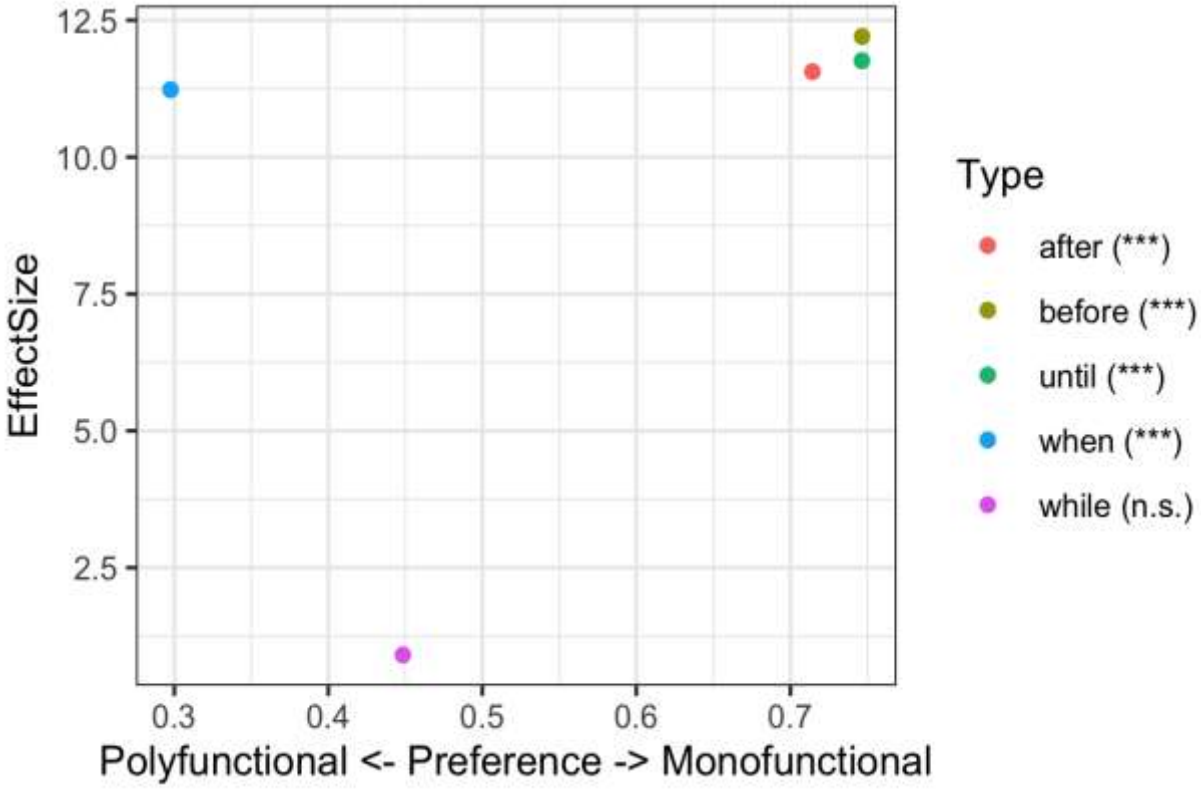
Having formulated the hypotheses, I proceeded to run the chi-squared goodness-of-fit tests for each type of temporal adverbial clause (assuming 50/50 expected distribution). Table 12 shows the *p*-values for each temporal adverbial clause.

After obtaining the *p*-values from the chi-squared tests of each temporal adverbial clause, I took the base-10 logarithm of each, and then took the absolute value of the logged *p*-values. The results of this analysis can be seen in Table 13. The logged *p*-values help us to have an estimate of the effect size, or how different from a 50/50 split between monofunctional and polyfunctional restricted devices the data are. This transformation has the advantage of indicating strength of association in a more intuitive scale (increasing values indicate increasing degrees of association; the threshold for significance falls at +1.30103). By convention, the direction of association is indicated by the sign of the logged *p*-value: positive values indicate association with monofunctional devices; negative values indicate association with polyfunctional devices.

Table 13. Logged *p*-values for each temporal adverbial clause

Type of temporal adverbial clause	**Logged *p*-values**
When-clauses	-11.230092
While-clauses	- 0.908287
After-clauses	11.560192
Before-clauses	12.202742
Until-clauses	11.760290

Figure 20. Mono/polyfunctionality of devices encoding temporal adverbial clauses



In Figure 20, the x-axis shows the difference between monofunctional and polyfunctional counts. The y-axis shows the absolute value of the effect size. Each semantic

type is plotted as a point. *While*-clauses are flexible in that they may be encoded by either monofunctional or polyfunctional devices (with a slight, non-significant trend towards polyfunctionality). Note that *after*-clauses, *before*-clauses, and *until*-clauses tend to be encoded by monofunctional devices in the sample of the present research. *When*-clauses tend to be polyfunctional.

The results suggest that *after, before,* and *until* meanings are strongly and similarly associated with monofunctional devices cross-linguistically (all are more than 70% monofunctional). *While* meanings are ambivalent, and *when* meanings are strongly encoded by polyfunctional devices (only 30% of *when* clauses are monofunctional, virtually the inverse of *after, before,* and *until*).

8.2. Temporal adverbial clause systems

Guerrero (2021) mentions that languages tend to have temporal adverbial clause systems encoded by specific and general markers, as can be seen in Table 14. While in a given language, some types of temporal adverbial clauses (e.g. *while*-clauses), are realized by specific markers, other types (e.g. *when*-clauses, *after*-clauses) are formed by general markers. Another common system in her study is the one in which all semantic types of temporal adverbial clauses are formally marked by general markers. Regarding temporal adverbial clause systems that are less common in her research, she notes that systems in which each type of temporal adverbial clause is formed with a specific marker are not common (e.g. Jamsay and Ojibwe). The other less common temporal clause system in Guerrero's research is the one in which all types of temporal adverbial clauses are realized by asyndesis (e.g. Yucatec Maya and Wardaman). Her cross-linguistic study provides an interesting typological picture in that it demonstrates that

languages have different types of systems based on the formal marking of each type of temporal adverbial clause. However, there are a couple of domains that are not defined in her research. First, Guerrero does not provide explicit information regarding the types of temporal clauses that she considers in her cross-linguistic investigation. Second, she employs the terms "specific marker" and "general marker" for exploring temporal adverbial clause systems. However, she does not provide explicit information regarding the way these notions are operationalized in her research.

Table 14. Types of systems of temporal clauses (Guerrero 2021)

Type of system	**Languages**
System 1: specific markers for each temporal relation	Jamsay, Ojibwe
System 2: specific and general markers	Abkhaz, Barbareño, Eton, Galo, Hup, Iquito, Ket, Kokama-Kokamilla, Konso, Lezgian, Manambu, Martuthunira, Northern Paiute, Papuan Malay, Slave, Tamil
System 3: general markers (all types of temporal clauses are encoded by general markers)	Cavineña, Goemai, Huasteca Nahuatl, Lamaholot, Mali, Manchu, Sandawe, Toqabaqita
System 4: there are no temporal markers	Yucatec Maya, Wardaman

This dissertation contributes to the theoretical proposal discussed above by exploring the range of temporal adverbial clause systems identified in the database. However, in contrast to Guerrero's study, the systems identified in the present research are based on the analysis of the mono/polyfunctionality of restricted devices used for expressing 'when', 'while', 'after', 'before', and 'until'. For the sake of consistency, I have only taken into account systems in which all types of temporal clauses are encoded by restricted devices. This excludes languages in which various types of temporal clauses are encoded by strategies without restricted devices (e.g. asyndesis). In what follows, I show the range of temporal adverbial clause systems proposed here and the ways in which they are operationalized.

Table 15. Rigid system of temporal clauses in Tommo So

Type of temporal clause	**Type of restricted device**
When-clause	Monofunctional temporal noun *wàgàdù* 'time' (McPherson 2013: 430)
While-clause	Monofunctional restricted deranking device *-gu* 'while' (McPherson 2013: 492)
After-clause	Monofunctional bound adverbial subordinator *=nɛ* 'after' (McPherson 2013: 477)
Before-clause	Monofunctional restricted deranking device *-mɔ* 'before' (McPherson 2013: 476)
Until-clause	Monofunctional free adverbial subordinator *hálè* 'until' (McPherson 2013: 451)

First, there are languages in which *when*-clauses, *while*-clauses, *after*-clauses, *before*-clauses, and *until*-clauses are formally distinguishable from one another in that each is marked by a separate monofunctional device. This type of system is called a 'rigid system'. An example comes from Tommo So (Dogon; Table 15). In this language, *when*-clauses are marked by the monofunctional temporal noun *wàgàdù* 'time'. Note that *while*-clauses and *before*-clauses are realized by monofunctional restricted deranking devices. The remaining temporal clauses are encoded by restricted adverbial subordinators: *after*-clauses appear with the monofunctional bound adverbial subordinator *=nɛ* 'after' and *until*-clauses occur with the monofunctional free adverbial subordinator *hálè* 'until'.

Table 16. Almost rigid system of temporal clauses in Udihe

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional free adverbial subordinator *edeisini* 'when' (Nikolaeva & Tolskaya 2001: 733)
While-clause	Monofunctional free adverbial subordinator *agdaduni* 'while' (Nikolaeva & Tolskaya 2001: 732)
After-clause	Monofunctional free adverbial subordinator *amäːdani* 'after' (Nikolaeva & Tolskaya 2001: 733)
Before-clause	Monofunctional free adverbial subordinator *zuliete* 'before' (Nikolaeva & Tolskaya 2001: 730)
Until-clause	Monofunctional free adverbial subordinator *dexi* 'until' (Nikolaeva & Tolskaya 2001: 730)

Second, another temporal adverbial clause system is that in which 4 temporal adverbial clauses are marked by monofunctional devices and 1 temporal adverbial clause is encoded by a polyfunctional device. This system is called an 'almost rigid system'. This pattern is illustrated in Table 16. In Udihe (Tungusic), *while*-clauses, *after*-clauses, *before*-clauses, and *until*-clauses are realized by monofunctional free adverbial subordinators. Note that 'when' clauses are the only temporal adverbial clause that occurs with a polyfunctional device.

Table 17. Mildly rigid system of temporal clauses in Worrorra

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional restricted deranking device *-ngku* 'when' (Clendon 2014: 389)
While-clause	Monofunctional restricted deranking device *-aanjanu* 'while' (Clendon 2014: 269)
After-clause	Monofunctional restricted deranking device *-nyale* 'after' (Clendon 2014: 270)
Before-clause	Polyfunctional restricted deranking device *-ngarri* 'before' (Clendon 2014: 388)
Until-clause	Monofunctional restricted deranking device *-nyini* 'until' (Clendon 2014: 241)

Third, languages may also have systems in which 3 temporal adverbial relations are expressed by monofunctional restricted devices and 2 temporal adverbial relations are conveyed by polyfunctional restricted devices. I adopt the term 'mildly rigid system'. An

example is attested in Worrorra (Worrorran; Table 17). In this language, *while*-clauses, *after*-clauses, and *until*-clauses are built around monofunctional restricted deranking devices. On the other hand, *when*-clauses and *before*-clauses are marked by polyfunctional restricted devices.

As was shown before, the analysis indicates that there are different types of rigid systems of temporal adverbial clauses: rigid, almost rigid, and mildly rigid systems. In what follows, I demonstrate that there are systems that can be analyzed as non-rigid.

Table 18. Mildly non-rigid system of temporal clauses in Dhimal

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional restricted deranking device *-lau* (King 2009: 227)
While-clause	Monofunctional restricted deranking device *-pa* (King 2009: 115)
After-clause	Polyfunctional restricted deranking device *-teŋ* (King 2009: 221)
Before-clause	Monofunctional correlative pattern (*lampha* 'first', *kalua* 'and then') (King 2009: 483)
Until-clause	Polyfunctional restricted deranking device *-sa* (King 2009: 236)

First, languages may have temporal adverbial clause systems in which 3 types of temporal adverbial clauses are marked by polyfunctional devices and 2 types of temporal adverbial clauses are encoded by monofunctional devices. This system is called a 'mildly non-

rigid system'. As is illustrated in Table 18, Dhimal (Sino-Tibetan/Dhimalic) shows this pattern. In this language, *when*-relations, *after*-relations, and *until*-relations are signaled by polyfunctional restricted deranking devices. On the other hand, *while*-relations are conveyed by the monofunctional restricted deranking device *-pa* and *before*-relations are expressed by a correlative pattern that can be characterized as monofunctional.

Table 19. Almost non-rigid system of temporal clauses in Ts'ixa

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional free adverbial subordinator *no* 'when' (Fehn 2016: 270)
While-clause	Polyfunctional bound adverbial subordinator *=se* 'while' (Fehn 2016: 270)
After-clause	Monofunctional sequential coordinator *thì.ʔà* 'and then' (Fehn 2016: 252)
Before-clause	Polyfunctional bound adverbial subordinator *=se* 'before' (Fehn 2016: 274)
Until-clause	Polyfunctional free adverbial subordinator *no* 'until' (Fehn 2016: 275)

Second, an 'almost non-rigid system' refers to a system in which 4 temporal adverbial meanings are denoted by polyfunctional devices and 1 temporal adverbial relation is conveyed by a monofunctional device. An example illustrating this pattern is attested in Ts'ixa (Khoe-Kwadi; Table 19). In this language, *when*-clauses and *until*-clauses are marked by the free

adverbial subordinator *no*.[74] *While*-clauses and *before*-clauses are encoded by the bound adverbial subordinator *=se*.[75] Note that temporal subsequence is indicated by the monofunctional sequential coordinator *thì.ʔà* 'and then'.

Table 20. Non-rigid system of temporal clauses in Boko

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional free adverbial subordinator *tó* 'when' (McCallum 1998: 257)
While-clause	Polyfunctional free adverbial subordinator *kɛ́* 'while' (McCallum 1998: 257)
After-clause	Polyfunctional sequential coordinator *ɔ̃* 'and then' (McCallum 1998: 296)
Before-clause	Polyfunctional free adverbial subordinator *ˈe* 'before' (McCallum 1998: 259)
Until-clause	Polyfunctional free adverbial subordinator *ˈe* 'until' (McCallum 1998: 259)

Third, there are languages in which *when*-clauses, *while*-clauses, *after*-clauses, *before*-clauses, and *until*-clauses are all encoded by polyfunctional devices. This type of system is

[74] In Ts'ixa, *when*-clauses are encoded by the free adverbial subordinator *no*. This device can also be used for expressing 'until'. However, in this scenario, constructions marked by the free adverbial subordinator *no* must occur with the adverb(ial) *ǀúí* 'only' in order for the *until*-interpretation to be possible (Fehn 2016: 275)

[75] In Ts'ixa, *before*-constructions appear with the bound adverbial subordinator *=sè*. The ground clause must be marked by a negated verb and by the focus particle *xàwèè* 'still, yet'. The bound adverbial subordinator *=sè* is polyfunctional and can be used for indicating 'while' when the ground clause shows positive polarity (see Chapter 6 for a more detailed discussion of the interaction between *before*-clauses and negative markers)

called a ‘non-rigid system’. An example can be found in Boko (Mande/Eastern Mande; Table 20). In this language, *when*-clauses and *while*-clauses are realized by polyfunctional free adverbial subordinators. *After*-clauses are marked by the polyfunctional sequential coordinator *ɔ̃* ‘and then’. Note that *before*-relations and *until*-relations are expressed by the same device: the free adverbial subordinator *e*.[76]

Table 21. Temporal clause systems

Type of system	**Definition**
Rigid system	*When*-clauses, *while*-clauses, *after*-clauses, *before*-clauses, and *until*-clauses are formally distinguishable from one another in that each is marked by a separate monofunctional device
Almost rigid system	4 temporal adverbial clauses are marked by monofunctional devices and 1 temporal adverbial clause is encoded by a polyfunctional device
Mildly rigid system	3 temporal adverbial relations are expressed by monofunctional devices and 2 temporal adverbial relations are conveyed by polyfunctional devices
Mildly non-rigid system	3 types of temporal adverbial clauses are marked by polyfunctional devices and 2 types of temporal adverbial clauses are encoded by monofunctional devices

[76] In this scenario, constructions encoded by the free adverbial subordinator *e* must: (1) appear in the perfective, (2) occur with the comitative postposition *ò*, and (3) be marked by the verb gɛ́ ‘to go’ in order for the *before*-interpretation to be possible (McCallum 1998: 259).

Almost non-rigid system	4 temporal adverbial meanings are denoted by polyfunctional devices and 1 temporal adverbial relation is conveyed by a monofunctional device
Non-rigid system	*When*-clauses, *while*-clauses, *after*-clauses, *before*-clauses, and *until*-clauses are all encoded by polyfunctional devices

Table 21 summarizes the types and definitions of the temporal adverbial clause systems discussed above. The question is: do the languages of the sample tend to have rigid systems or non-rigid systems? In the following section, I concentrate on this issue. The discussion explores temporal adverbial clause systems in each macro-area: Africa (§8.2.1), Australia (§8.2.2), Eurasia (§8.2.3), North America (§8.2.4), Papunesia (§8.2.5), and South America (§8.2.5).

8.2.1 Temporal adverbial clause systems in Africa

Table 22 shows the various types of temporal adverbial clause systems attested in the African languages of the sample. The six types of systems identified in the present research are all found in this macro-area. There are two main observations to be gleaned from Table 22.

Table 22. Frequency of temporal adverbial clause systems in Africa

Type of system	**Frequency**	**Percentage**
Rigid system	3	9.37
Almost rigid system	9	28.12
Mildly rigid system	11	34.37
Mildly non-rigid system	3	9.37
Almost non-rigid system	3	9.37
Non-rigid system	3	9.37
Total	32	100.00

Table 23. Mildly rigid system of temporal clauses in Kabba

Type of temporal clause	**Type of restricted device**
When-clause	Monofunctional temporal noun *kàrè* 'time' (Moser 2004: 175)
While-clause	Polyfunctional free adverbial subordinator *kàké* 'while' (Moser 2004: 195)
After-clause	Polyfunctional sequential coordinator *á* 'and then' (Moser 2004: 190)
Before-clause	Monofunctional free adverbial subordinator *bbá* 'before' (Moser 2004: 382)
Until-clause	Monofunctional free adverbial subordinator *sáráng* 'until' (Moser 2004: 139)

First, mildly rigid systems are the most frequent pattern in the African languages of the database. In Kabba (Central Sudanic/Bongo-Bagirmi; Table 23), *when*-relations, *before*-relations, and *until*-relations are expressed by monofunctional devices. Note that *while*-clauses and *after*-clauses are formed by polyfunctional devices.

Second, another common pattern in the African languages of the sample is that of almost rigid systems. In Sidaama (Afro-Asiatic/Highland East Cushitic), *when*-clauses, *after*-clauses, *before*-clauses, and *until*-clauses are encoded by monofunctional devices, as is illustrated in Table 24. The only temporal relation not expressed by a monofunctional device in this language is that of 'while'.

Table 24. Almost rigid system of temporal clauses in Sidaama

Type of temporal clause	**Type of restricted device**
When-clause	Monofunctional restricted deranking device *-wote* 'when' (Kawachi 2007: 448)
While-clause	Polyfunctional restricted deranking device *-nni* 'while' (Kawachi 2007: 381)
After-clause	Monofunctional noun *gedensa* 'last' (Kawachi 2007: 109)
Before-clause	Monofunctional noun *alba* 'face' (Kawachi 2007: 108)
Until-clause	Monofunctional noun *geešša* 'degree, extent' (Kawachi 2007: 112)

8.2.2 Temporal adverbial clause systems in Australia

In contrast to African languages, the Australian languages of the sample do not show all six types of temporal adverbial clauses proposed in the present study in that almost rigid systems and non-rigid systems are absent from this macro-area (Table 25).

Table 25. Frequency of temporal adverbial clause systems in Australia

Type of system	**Frequency**	**Percentage**
Rigid system	2	14.28
Almost rigid system	0	0
Mildly rigid system	7	50.00
Mildly non-rigid system	4	28.57
Almost non-rigid system	1	7.14
Non-rigid system	0	0
Total	14	100.00

The most common system of temporal adverbial clauses in Australian languages is that of mildly rigid systems. An example is attested in Kayardild (Tangkic). In this language, 'while', 'before', and 'until' are denoted by monofunctional devices. On the other hand, 'when' and 'after' are expressed by polyfunctional devices (Table 26).

Table 26. Mildly rigid system of temporal clauses in Kayardild

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional restricted deranking device *-jarrb* 'when' (Evans 1995: 508)
While-clause	Monofunctional restricted device *-ki* 'while' (Evans 1995: 309)
After-clause	Polyfunctional restricted deranking device *-ngarrba* 'after' (Evans 1995: 482)
Before-clause	Monofunctional free adverbial subordinator *ngarii* 'before' (Evans 1995: 306)
Until-clause	Monofunctional restricted deranking device *-mariij* 'until' (Evans 1995: 170)

8.2.3 Temporal adverbial clause systems in Eurasia

Eurasia shows an evident asymmetry between mildly non-rigid, almost non-rigid, and non-rigid systems with scarce occurrences, and rigid, almost rigid, and mildly rigid systems, which represent the most frequent patterns (Table 27). In what follows, I present some examples illustrating the most common systems in the Eurasian languages of the study.

Table 27. Frequency of temporal adverbial clause systems in Eurasia

Type of system	**Frequency**	**Percentage**
Rigid system	12	22.64
Almost rigid system	13	24.52
Mildly rigid system	17	32.07
Mildly non-rigid system	7	13.20
Almost non-rigid system	3	5.66
Non-rigid system	1	1.88
Total	53	100.00

Tamil (Dravidian/Southern Dravidian) has a mildly rigid system of temporal clauses (Table 28). In this language, *after*-clauses are encoded by the monofunctional free adverbial subordinator *appuram* ‘after’, *before*-clauses are formed by the monofunctional free adverbial subordinator *munnaal* ‘before’, and *until*-clauses are built around the monofunctional noun *varai* ‘end/limit’. Note that *when*-relations and *while*-relations are denoted by polyfunctional devices.

Table 28. Mildly rigid system of temporal clauses in Tamil

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional correlative pattern (Correlative clause appears with the generic temporal noun *pootu* 'time' and the correlate clause occurs with the generic temporal noun *pootu* 'time') (Lehmann 1993: 351)
While-clause	Polyfunctional restricted deranking device *-a* 'while' (Lehmann 1993: 351)
After-clause	Monofunctional free adverbial subordinator *appuram* 'after' (Lehmann 1993: 306)
Before-clause	Monofunctional free adverbial subordinator *munnaal* 'before' (Lehmann 1993: 306)
Until-clause	Monofunctional noun *varai* 'end/limit' (Lehmann 1993: 335)

A prototypical example of an almost rigid system is found in Mongsen Ao (Sino-Tibetan/Kuki-Chin), as in Table 29. In this language, monofunctional devices are used for expressing 'when', 'while', 'after', and 'until', and polyfunctional devices are used for denoting 'before'.

Table 29. Almost rigid system of temporal clauses in Mongsen Ao

Type of temporal clause	**Type of restricted device**
When-clause	Monofunctional restricted deranking device *-lìkàʔ* 'when' (Coupe 2006: 440)
While-clause	Monofunctional restricted deranking device *-(ə)k* 'while' (Coupe 2006: 425)
After-clause	Monofunctional restricted deranking *-əɹ* 'after' (Coupe 2006: 424)
Before-clause	Polyfunctional restricted deranking device *-ku* 'before' (Coupe 2006: 445)
Until-clause	Monofunctional restricted deranking device *-təni* 'until' (Coupe 2006: 122)

The third most frequent system of temporal adverbial clauses in Eurasia is that of rigid systems. Palula (Indo-European/Indo-Aryan) is among the languages of the database, in which 'when', 'while', 'after', 'before', and 'until' relations are indicated by monofunctional devices, as is shown in Table 30.

Table 30. Rigid system of temporal clauses in Palula

Type of temporal clause	**Type of restricted device**
When-clause	Monofunctional free adverbial subordinator *ta* 'when' (Liljegren 2016: 356)
While-clause	Monofunctional free adverbial subordinator *patugiraá* 'while' (Liljegren 2016: 360)
After-clause	Monofunctional free adverbial subordinator *pahúrta* 'after' (Liljegren 2016: 357)
Before-clause	Monofunctional free adverbial subordinator *muṣṭú* 'before' (Liljegren 2016: 361)
Until-clause	Monofunctional free adverbial subordinator *tií* 'until' (Liljegren 2016: 195)

8.2.4 Temporal adverbial clause systems in North America

As discussed above, mildly rigid systems of temporal adverbial are the most common type in Africa, Australia, and Eurasia. In contrast, the North American languages of the database tend to have almost non-rigid systems of temporal adverbial clauses, as can be seen in Table 31. Some examples illustrating this pattern follow here.

Table 31. Frequency of temporal adverbial clause systems in North America

Type of system	**Frequency**	**Percentage**
Rigid system	4	12.90
Almost rigid system	4	12.90
Mildly rigid system	4	12.90
Mildly non-rigid system	4	12.90
Almost non-rigid system	11	35.48
Non-rigid system	4	12.90
Total	31	100.00

Table 32. Almost non-rigid system of temporal clauses in Cupeño

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional restricted deranking device *-naq* 'when' (Hill 2005: 357)
While-clause	General deranking device *-nuk* 'while' (Hill 2005: 406)
After-clause	Polyfunctional sequential coordinating device *me aya* 'and then' (Hill 2005: 349) General deranking device *-nuk* 'after' (Hill 2005: 406)
Before-clause	Restricted deranking device *-nuk* 'before' (Hill 2005: 406)
Until-clause	Monofunctional restricted deranking device *-pi* 'until' (Hill 2005: 418)

In Cupeño (Uto-Aztecan/California Uto-Aztecan), polyfunctional devices are used for indicating *when*-relations, *after-relations*, and *before*-relations. Note that 'while' is indicated by a general deranking device (Table 32).[77] The only relation expressed by a monofunctional device is that of 'until'.

Table 33. Almost non-rigid system of temporal clauses in Tzeltal

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional free adverbial subordinator *k'alal* 'when' (Polian 2013: 887)
While-clause	Monofunctional restricted deranking device *-el* (Polian 2013: 839)
After-clause	Polyfunctional free adverbial subordinator *k'alal* 'after' (Polian 2013: 889)
Before-clause	Polyfunctional free adverbial subordinator *k'alal* 'before' (Polian 2013: 889)
Until-clause	Polyfunctional free adverbial subordinator *k'alal* 'until' (Polian 2013: 780)

Tzeltal (Mayan) shows a similar scenario to Cupeño in that it also has an almost non-rigid system. In Tzeltal, the monofunctional restricted deranking device *-el* is used for signaling

[77] Recall that the device *-nuk* in Cupeño is macro-functional (Jane Hill, personal communication).

a *while*-relation holding between clauses (Table 33). 'When', 'after', 'before', and 'until' relations are indicated by the polyfunctional free adverbial subordinator *k'alal*.[78]

8.2.5 Temporal adverbial clause systems in Papunesia

Papunesia is similar to Africa, Australia, and Eurasia in that mildly rigid systems are the most common pattern (Table 34). The other types of systems attested in this macro-area are: rigid, almost rigid, and almost non-rigid systems. However, they show a low frequency. There are no Papunesian languages showing a non-rigid system in the database.

Table 34. Frequency of temporal adverbial clause systems in Papunesia

Type of system	**Frequency**	**Percentage**
Rigid system	4	14.81
Almost rigid system	4	14.81
Mildly rigid system	11	40.74
Mildly non-rigid system	4	14.81
Almost non-rigid system	4	14.81
Non-rigid system	0	0
Total	27	100.00

[78] The free adverbial subordinator *k'alal* is used for expressing different temporal relations. There are morphosyntactic cues that aid in the interpretation of the different temporal relations. First, the ground clause of a construction marked by the free adverbial subordinator *k'alal* must appear in the incompletive aspect to be understood as 'when' (Polian 2013: 887). Second, a *k'alal*-clause must occur with the negative marker *ke* and *to* 'yet' to be understood as 'before' (Polian 2013: 889). Third, a *k'alal*-clause must occur in the completive aspect to be understood as 'after' (Polian 2013: 889). Fourth, the ground clause and the figure clause of a construction encoded by *k'alal* must appear in the completive aspect to be interpreted as 'until' (Polian 2013: 780).

In Puyuma (Austronesian/Puyuma), *when*-relations and *while*-relations are signaled by polyfunctional devices, as can be seen in Table 35.[79] In contrast, monofunctional devices indicate 'after', 'before', and 'until'.

Table 35. Mildly rigid system of temporal clauses in Puyuma

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional free adverbial subordinator *an* 'when' (Teng 2008: 405)
While-clause	Polyfunctional free adverbial subordinator *an* 'while' (Teng 2008: 405)
After-clause	Monofunctional spatial noun *LikuDan* 'behind' (Teng 2008: 410)
Before-clause	Monofunctional free adverbial subordinator *pakanguayan* 'before' (Teng 2008: 409)
Until-clause	Monofunctional verb *palu* 'to demarcate' (Teng 2008: 412)

8.2.6 Temporal adverbial clause systems in South America

Another macro-area where mildly rigid systems of temporal clauses are the most common pattern is South America (Table 36). Other common patterns are: rigid and mildly non-rigid systems. I discuss, in what follows, some examples illustrating these temporal adverbial clause systems.

[79] Constructions marked by the free adverbial subordinator *an* must appear in the progressive aspect to be interpreted as 'while' and must occur in the non-progressive aspect to be understood as 'when' (Teng 2008: 405).

Table 36. Frequency of temporal adverbial clause systems in South America

Type of system	**Frequency**	**Percentage**
Rigid system	6	21.42
Almost rigid system	4	14.28
Mildly rigid system	8	28.57
Mildly non-rigid system	6	21.42
Almost non-rigid system	3	10.71
Non-rigid system	1	3.57
Total	28	100.00

Table 37. Mildly rigid system of temporal clauses in Cholón

Type of temporal clause	**Type of restricted device**
When-clause	Monofunctional restricted deranking device *-te* 'when' (Alexander-Bakkerus 2005: 340)
While-clause	Monofunctional restricted deranking device *-he* 'while' (Alexander-Bakkerus 2005: 340)
After-clause	Polyfunctional restricted device *-nap* 'after' (Alexander-Bakkerus 2005: 340)
Before-clause	Polyfunctional restricted device *-nap* 'before' (Alexander-Bakkerus 2005: 340)
Until-clause	Monofunctional restricted device *-le* 'until' (Alexander-Bakkerus 2005: 340)

The Cholón (Hibito-Cholón) mildly rigid system of temporal clauses is formed by monofunctional devices indicating 'when', 'while', and 'until' and polyfunctional devices signaling 'after' and 'before'[80], as is illustrated in Table 37.

Cubeo (Tucanoan) has a rigid system of temporal clauses in that 'when', 'while', 'after', 'before', and 'until' are indicated by monofunctional devices, as in Table 38.

Table 38. Rigid system of temporal clauses in Cubeo

Type of temporal clause	**Type of restricted device**
When-clause	Monofunctional restricted deranking device *-ere* 'when' (Morse & Maxwell 1999: 162)
While-clause	Monofunctional restricted deranking device *-ereka* 'while' (Morse & Maxwell 1999: 159)
After-clause	Monofunctional restricted deranking device *-buru* 'after' (Morse & Maxwell 1999: 165)
Before-clause	Monofunctional restricted deranking device *-kije* 'before' (Morse & Maxwell 1999: 166)
Until-clause	Monofunctional free adverbial subordinator *pi* 'until' (Morse & Maxwell 1999: 169)

As illustrated in Table 39, Apinajé (Macro-Ge/Ge-Kaingang) has a mildly non-rigid system in that monofunctional devices convey *while*-relations and *until*-relations and a

[80] In Cholón, 'before' is expressed by a construction in which the ground clause is obligatorily negated syntactically. This construction includes the restricted deranking device *-nap* 'before', which is polyfunctional. That is, it denotes 'before' when the ground clause shows negative polarity. However, *-nap* can also be used for expressing 'after' when the ground clause shows positive polarity (Alexander-Bakkerus 2005: 340)

polyfunctional device is used for signaling *when*-relations, *after*-relations, and *before*-relations.[81]

Table 39. Mildly non-rigid system of temporal clauses in Apinajé

Type of temporal clause	**Type of restricted device**
When-clause	Polyfunctional free adverbial subordinator *ri* 'when' (Cunha de Oliveira 2005: 290)
While-clause	Monofunctional free adverbial subordinator *kutep* 'while' (Cunha de Oliveira 2005: 292)
After-clause	Polyfunctional free adverbial subordinator *ri* 'after' (Cunha de Oliveira 2005: 290)
Before-clause	Polyfunctional free adverbial subordinator *ri* 'before' (Cunha de Oliveira 2005: 290)
Until-clause	Monofunctional free adverbial subordinator *ga* 'until' (Cunha de Oliveira 2005: 377)

8.2.7 General discussion

As could be observed above, languages across macro-areas seem to differ with respect to their temporal adverbial clause systems. The mildly rigid system is the most common pattern in almost all macro-areas. The only exception to this tendency is North America, where most languages of the database tend to have almost non-rigid systems.

[81] Constructions encoded by the free adverbial subordinator *ri* must appear: (1) in the irrealis to be understood as 'when', (2) in the perfective to be understood as 'after', and (3) with the negative marker *ket* to be understood as 'before'.

Given the range of temporal adverbial clause systems attested in the languages of the world, the question arises as to what communicative factors may lead to particular temporal adverbial clause systems to be preferred. A competing motivations approach can shed some light on the question. Du Bois (2014: 264) mentions that competing motivations may be defined and explored in two ways. First, competing motivations may refer to the factors during the decision-making process that may lead a speaker to choose between two or more alternatives for expressing a particular communicative function (see Chapter 3 and Chapter 5). Second, competing motivations may be addressed by exploring how functional motivations compete with each other to shape grammatical structures (see Diessel 2005 on iconicity of sequencing, discourse-pragmatics, and processing to explain the order of clauses). In this chapter, I restrict my attention to the latter way of addressing competing motivations. The temporal adverbial clause systems discussed above are shaped by specific factors which come into conflict with others. First 'expressiveness' is related to the idea that one form covers one function (Haiman 1980). This functional motivation is for clarity, reducing ambiguity. Second 'paradigmatic economy' is concerned with the idea that one form covers multiple functions, thus saving on the number of distinct markers (Martinet 1964: 168-169).

Based on the discussion of the temporal adverbial clause systems addressed above, rigid systems are only shaped by expressiveness. On the other hand, non-rigid systems are only shaped by paradigmatic economy. Note that rigid systems and non-rigid systems are not common cross-linguistically. Instead, languages tend to have systems that fall in between these two extremes (e.g. mildly rigid systems). What this seems to indicate is that expressiveness and paradigmatic economy are often in competition with one another to shape temporal adverbial clause systems in the languages of the world.

8.3 Summary

In this chapter, I have shown that restricted devices are more frequent than strategies without restricted devices in the expression of 'when', 'while', 'after', 'before', and 'until'. Regarding the mono/polyfunctionality of restricted devices, I have demonstrated that *after*-clauses, *before*-clauses, and *until*-clauses tend to be encoded by monofunctional devices, *when*-clauses tend to be marked by polyfunctional devices, and *while*-clauses may be encoded by either monofunctional or polyfunctional devices (with a slight, non-significant trend towards polyfunctionality).

The present chapter has also proposed that languages have various types of temporal adverbial clause systems based on the mono/polyfunctionality of restricted devices: rigid, almost rigid, mildly rigid, mildly non-rigid, almost non-rigid, and non-rigid systems. While mildly rigid systems are the most pattern in Africa, Australia, Eurasia, Papunesia, and South America, non-rigid systems are the most common system in North American languages.

CHAPTER 9

Semantic polyfunctionality of restricted devices

As has been shown in various chapters of this dissertation (e.g. see Chapter 8), restricted devices may be polyfunctional, that is, they may be used for expressing different adverbial relations in specific contexts. Recall that a typical case of a polyfunctional restricted device is the English device 'since'. This device is polyfunctional in that it can be used for indicating temporal subsequence and causality. However, constructions including the temporal and causal 'since' are subject to distinct syntactic constraints (e.g. the temporal reading is only possible when the adverbial clause is in a past tense, but any tense form can appear with the causal reading; Hopper & Traugott 2008: 80-81). Most studies that have addressed the semantic polyfunctionality of restricted devices have only taken into account a particular type of restricted device or two types of restricted devices. Accordingly, it is not clear whether other restricted devices that have been traditionally disregarded will show polyfunctionality patterns not attested in previous studies. Given that the present investigation takes into account not only restricted adverbial subordinators and restricted deranking devices, but also other types of restricted devices (e.g. nouns used as clause-linking devices, 'and then' devices), it seems reasonable to explore this domain by addressing the following question. **Research question 4**: do the semantic polyfunctionality patterns attested in the present study align with those documented by other typological studies? Another domain that the present chapter explores is concerned with the relatedness of various adverbial meanings. It has been argued that the polyfunctionality between meanings provides evidence for the relatedness of the respective meanings. This suggests that, cross-linguistically, categories that share conceptual features

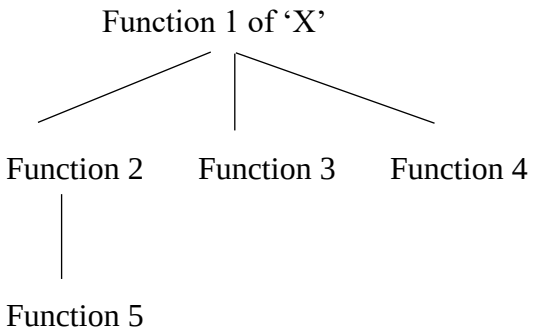
tend to be encoded by the same construction (Traugott 1989: 51; Hetterle 2015: 259). The present chapter investigates this domain by taking into account the following research question. **Research question 5**: what are the conceptual factors that motivate the semantic affinities among different types of polyfunctionality patterns of restricted devices? Recall that the polyfunctionality patterns of clause-linking devices are not random, in that they arise via metaphorization (Hetterle 2015: 260), that is, a process involving the conceptual transfer from one domain to another (see Chapter 2). This conceptual transfer from one domain to another is referred to as "mapping" or "associative leap" and is motivated by analogy and iconic relationships (Hopper & Traugott 2008: 84).

Chapter 9 is organized as follows. In §9.1, I introduce the semantic map model, a methodological tool that is employed, in the present investigation, for exploring the polyfunctionality patterns of restricted devices. The following sections discuss the polyfunctionality patterns of restricted devices encoding 'when' clauses (§9.2), 'while' clauses (§9.3), 'after' clauses (§9.4), 'before' clauses (§9.5), and 'until' clauses (§9.6). In analyzing the polyfunctionality patterns of restricted devices, I provide the frequency of the ranges of polyfunctionality patterns attested in the sample. Furthermore, I offer an analysis of how the range of functions of polyfunctional restricted devices are plausible. This will enable the reader to assess how the different adverbial interpretations of a polyfunctional device are computed or how the different polyfunctionality patterns have become conventionalized. Recall that these are the result of "conventionalization of implicatures" (see Chapter 2). A summary of the chapter as a whole is also provided (§9.7).

9.1 Semantic maps

A semantic map represents a network of functions in a space linked by connecting lines (Haspelmath 2003: 213). The main thrust of the semantic map method is that the semantic polyfunctionality of a grammatical morpheme occurs only when the various functions of the grammatical morpheme are similar (Haspelmath 2003: 215). Similarity is expressed by connecting lines, as in Figure 21. Semantic maps also shed light on chains of links. In Figure 21, Function 1 of 'X' is linked to Function 2, Function 3, Function 4, and Function 5. However, Function 1 of 'X' is only linked to Function 5 via Function 2. In the diachronic typological literature, it has been pointed out that a form expressing a particular conceptual situation is not extended simultaneously to both adjacent and nonadjacent conceptual situations on a conceptual space. Instead, a form expressing A will be extended to B before it is extended to C (Haspelmath 1997: 129). Figure 21 indicates is that if the same form is used for expressing Function 1 and Function 5, then it should be used for expressing Function 2.

Figure 21. Similarity of functions represented in a semantic map



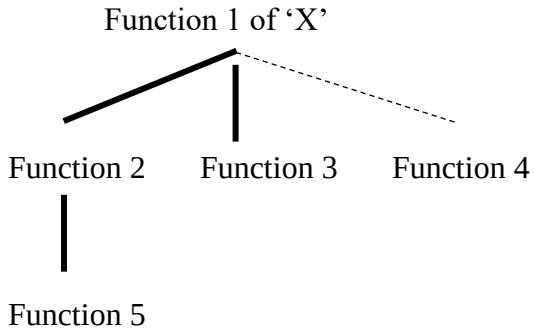
Semantic maps rely on cross-linguistic comparison in that exploring a large number of languages makes it possible to choose the relevant functions of a grammatical morpheme and

to arrange its functions on the map (Haspelmath 2003: 217). One of the main advantages of using semantic maps for exploring the polyfunctionality patterns of restricted devices has to do with the fact that they do not require the identification of a central prototypical function of a clause-linking device. In this regard, it has been suggested that identifying the prototypical function of a grammatical morpheme may not be straightforward in many instances. Accordingly, semantic maps are completely neutral in this respect (Haspelmath 2003: 232). Semantic maps can be used for exploring the directionality of diachronic change of polyfunctionality patterns of restricted devices. An arrow between two functions labels means that a temporal clause-linking device may extend its meaning in the direction shown. However, given that the diachronic data are far more difficult to obtain than the corresponding synchronic data, the present research can make only a modest contribution to the understanding of this diachronic domain.

In the present work, I employ the graph-based approach to drawing semantic maps. As noted by Cysouw (2007), the most common problem of the traditional approach to semantic maps is concerned with the fact that it cannot represent frequencies of polyfunctionality patterns, that is, the graph-based approach to drawing semantic maps cannot capture the difference between extremely widespread and extremely rare polyfunctionality patterns. The response by practitioners of the traditional approach to this issue is that semantic maps reflect most frequent polyfunctionality patterns in a certain domain. Thus, rare polyfunctional patterns would be factored out in a larger sample (Malchukov 2010: 176). Put another way, those polyfunctionality patterns that are rare and have been overlooked in the early work on semantic maps, based on small scale comparisons, are likely to be factored out in a larger sample. In the present study, I follow Locatell (2020), who explores restricted devices in Hebrew by using

semantic maps. He employs bold lines in semantic maps for indicating the most frequent connections between polyfunctional clause-linking devices in his study. Furthermore, he uses dashed lines for signaling the rarest connections between polyfunctional clause-linking devices, as is illustrated in Figure 22.

Figure 22. Similarity of functions represented in the present study



As is argued in Chapter 2, I adopt a functional-typological approach in which language form is shaped by language use (Comrie 1989). The polyfunctionality of restricted devices arises due to 'paradigmatic economy', that is, the preference for a reduced lexical inventory for the purposes of efficiency and simplicity (Haiman 1985; Croft 2003; Hetterle 2015: 252-253). Such polyfunctionality patterns of restricted devices are not random. Rather, they arise due to 'semantic affinities' that lead situations that share components of meaning to be encoded by the same restricted device (Hetterle 2015: 252-253). However, the question at this point is: are all polyfunctionality patterns of temporal clause-linking devices due to semantic affinities? Malchukov (2010: 177) mentions that rare polyfunctionality patterns are not indicative of (immediate) semantic relatedness of respective categories. Contrary to this, I argue that

'semantic affinity' is the factor responsible for rare polyfunctionality patterns attested in the present study.

Some of the conceptual factors that have been used in order to explain the semantic affinities of polyfunctionality patterns are the following. First, the development of simultaneity to contrastive meaning of 'while' in English (Kortmann 1997: § 10.3) has been explained by the fact that the meaning of simultaneity became enriched inferentially by the implicature that it is surprising that two contrastive situations occur simultaneously (Hetterle 2015: 253). Second, the development of the temporal *since* to the causal *since* in English (Kortmann 1997: § 10.3) has been motivated by the inference that sequence implies causality (Hetterle 2015: 254).

9.2 *When*-clauses: Polyfunctional restricted devices

Before I discuss the individual polyfunctional patterns of 'when' restricted devices, it is important to briefly explore the types of polyfunctionality of *when*-clauses.

Table 40. Types of polyfunctionality of *when*-clauses

Type of polyfunctionality	**Count**	**Percentage**
Bifunctional	138	67.98
Trifunctional	54	26.60
Quadrifunctional	11	5.41
Total	203	100.00

As is shown in Table 40, most polyfunctional restricted devices are bifunctional in that they are used for expressing not only ‘when’, but also another adverbial relation in a specific context (67.98%). Polyfunctional restricted devices may also be trifunctional (26.60%) and quadrifunctional (5.41%).

Table 41 shows that ‘when’ is involved in patterns of polyfunctionality with 9 adverbial relations. In total, ‘when’ is involved in 279 cases of overlap.

Table 41. Individual polyfunctional patterns of ‘when’ restricted devices

Relation	**Count**	**Percentage**
While-relations	105	37.63
If-relations	93	33.33
After-relations	30	10.75
Before-relations	25	8.96
Because-relations	9	3.22
Until-relations	8	2.86
Where-relations	6	2.15
Although-relations	2	0.71
As soon as-relations	1	0.35
Total	279	100.00

‘When’ constructions realized by polyfunctional devices are more frequently involved with other temporal relations (‘while’, ‘after’, ‘before’, ‘until’, and ‘as soon as’) than with non-temporal relations (e.g. ‘if’, ‘because’, ‘although’, and ‘where’). If a restricted device expresses

three relations (‘when’, ‘after’, ‘until’) or more relations, it contributes to the counts and percentages of all of the relations it covers. This is similar to the methodology that has been followed in other typological studies (see Hetterle 2015: 219). For instance, Kortmann (1997: 366) mentions that, in his investigation, polyfunctional devices may be counted several times, that is, the percentages can be calculated for the total of readings that a device in a relevant language may receive. In Kortmann’s study, the Albanian device *qëkurse* with its readings ‘since’, ‘after’, ‘as soon as’, ‘when’, ‘while’, ‘as long as’ was counted six times as a restricted device and the Albanian device *mbasi* was counted twice as a temporal device (‘after’, ‘as soon as’) and once as a causal device (‘as/because’). This process has also been followed for the temporal clauses discussed in the following subsections. As is indicated in Table 41, the most common patterns are between ‘when’ and ‘while’ (37.63%) and between ‘when’ and ‘if’ (33.33%).

Regarding the overlap between ‘when’ and ‘while’, this is not surprising in that *while*-constructions along with *when*-constructions have been described as two types of simultaneity (Xrakovskij 2009: 30). However, as is shown below, languages use various ways for differentiating a *when*-interpretation from a *while*-interpretation. Recall that *when*-clauses cover a large part of the semantic spectrum of temporal adverbial relations, with the precise reading essentially depending on the discourse context (including TAM) of the construction, and apart from that, on the degree of delicacy one wants to adopt in classifying the relevant reading in a given context (Kortmann 1997: 182). In contrast, *while*-constructions have a specific reference time in that they refer to a length of time (*time during*; Dixon 2009: 10) and can only show a reference time involving situations that occur absolutely or partially simultaneously (see Chapter 4 for a more detailed explanation). Most sources of the languages

of the sample explicitly indicate that 'while' meanings are derived from 'when' meanings. This suggests that an unspecific temporal meaning may develop into a specific temporal meaning (i.e. 'when' > 'while').

The second most frequent pattern is between 'when' and 'if'. It has often been suggested that clause-linking devices encoding *when*-clauses are often used for expressing generic/habitual conditional meanings (e.g. *When flowers are kept in the heat, they quickly wither away= If flowers are kept in the heat, they quickly wither away*; Comrie 1986: 82; Cristofaro 2003: 161; Thompson et al. 2007: 257-258; Dixon 2009: 14; Martowicz 2011: 204; Hetterle 2015: 219). This is in line with Kortmann (1997: 192) who demonstrates that if a marker of 'when' clauses develops an additional use as a marker of a non-temporal relation, this relation is most likely to be 'if'. The use of the same clause-linking device for expressing *when*-relations and *if*-relations is pervasive in languages from different areas of the world, such as African languages (cf. Nicolle 2016: 10) and Austronesian languages (cf. Jonsson 2012: 93), among others. Most sources of the languages of the sample show that 'when' develops into 'if' (i.e. 'when' > 'if'). This is in line with various studies that show that it is 'when' that develops an 'if' meaning (e.g. Heine & Kuteva 2002). This follows the tendency of less abstract meanings developing into more abstract ones, as discussed in §1.4.2. In this scenario, a 'when' relation is pragmatically enriched by the implicature that one of the situations is also the condition of the other situation (cf. Hetterle 2015: 256).

The polyfunctional patterns attested in the present investigation are almost similar to those found in other cross-linguistic studies (e.g. Hetterle 2015: 219; Kortmann 1997: 181). However, there are two types that, to the best of my knowledge, have not been explored before. First, there are languages in which a restricted device is used for expressing 'when' and

'where'. A case in point comes from Meryam Mir. In this language, the free adverbial subordinator *náde* 'when' can also be employed for denoting 'where'. The 'when' interpretation is only possible when the ground clause is preposed to the figure clause, as in (499). On the other hand, a *náde*-construction indicates 'where' when the ground clause appears postposed to the figure clause, as in (500) (Piper 1989: 199). From a diachronic perspective, it has been demonstrated that the direction of development has been from spatial via temporal, that is, from a concrete to a more abstract meaning (Kortmann 1997: 96; Jonsson 2012: 126). In this regard, space is stable and concrete, time is always ongoing and less concrete than space (cf. Jonsson 2012: 126). This is also indicated by the sources of the languages consulted for the present study.

Meryam Mir (Western Fly)

(499) ***náde*** *mitkat* *b-er-er*,
when a.lot PL-become-PRS.IPFV
'When there were a lot (of fish caught),

wi-ge-t-áys-lare…
3PL-DEIX-carry-PL.OBJ-PRS.IPFV.PL
they would bring (them)…' (Piper 1989: 199)

Meryam Mir (Western Fly)

(500) *máyk-em* *able* *mekir-em*

close-ALL DET almond.tree-ALL

'(They crawled up close) to the almond tree

náde *ge* *sarup*-ira *sárik* *kep-kem* *da-ra-rem.*

where DEIX castaway-GEN bow arrow-ASSOC 3-PL-be.sticking

where the castaway's bow and arrow were sticking up.' (Piper 1989: 199)

Second, there is one language in the sample in which a restricted device conveys 'when' and 'as soon as'. The overlap between 'when' and 'as soon as' has been documented for Somali. In this language, 'when' constructions are encoded by an attributive temporal clause that appears with the generic temporal noun *mar* 'time' (501).

Somali (Afro-Asiatic/Lowland East Cushitic)

(501) ***mar****-kii* *uu* *qol-kii* *ká* *baxáy,*

time-the 3SG.SBJ room-the from went

'At the time he left the room,

wáxaan *kú* *idhi* *nabád* *gélyo.*

1SG.SBJ to said peace enter.CAUS.OPT

I said goodbye to him.' (Saeed 1999: 218)

This clause-linkage pattern can also indicate ‘as soon as’ (502). This temporal noun must appear with the adposition *lá* ‘with’ to denote an ‘as soon as’ relation holding between clauses (Saeed 1999: 218).[82] The development of ‘when’ into ‘as soon as’ can be explained by the fact that there are contexts in which ‘when’ may implicate immediate temporal subsequence. Accordingly, the meaning of ‘when’ can become enriched inferentially by the implicature that the situation of the figure clause immediate follows the situation of the ground clause.[83] As can be seen in Table 41, it is more common that ‘when’ develops a non-specific time lapse range (i.e. ‘after) than a specific time lapse range (i.e ‘as soon as’). Therefore, this seems to explain why the polyfunctionality pattern between ‘when’ and ‘as soon as’ is rare in the database.

Somali (Afro-Asiatic/Lowland East Cushitic)

(502)	*is-**la***	***mar**-kii*	*uu*	*tegáy,*	*sháqàan*	*bilaabay.*
	REFL-with	time-the	3SG.SBJ	went	work.1SG.SBJ.FOC	began

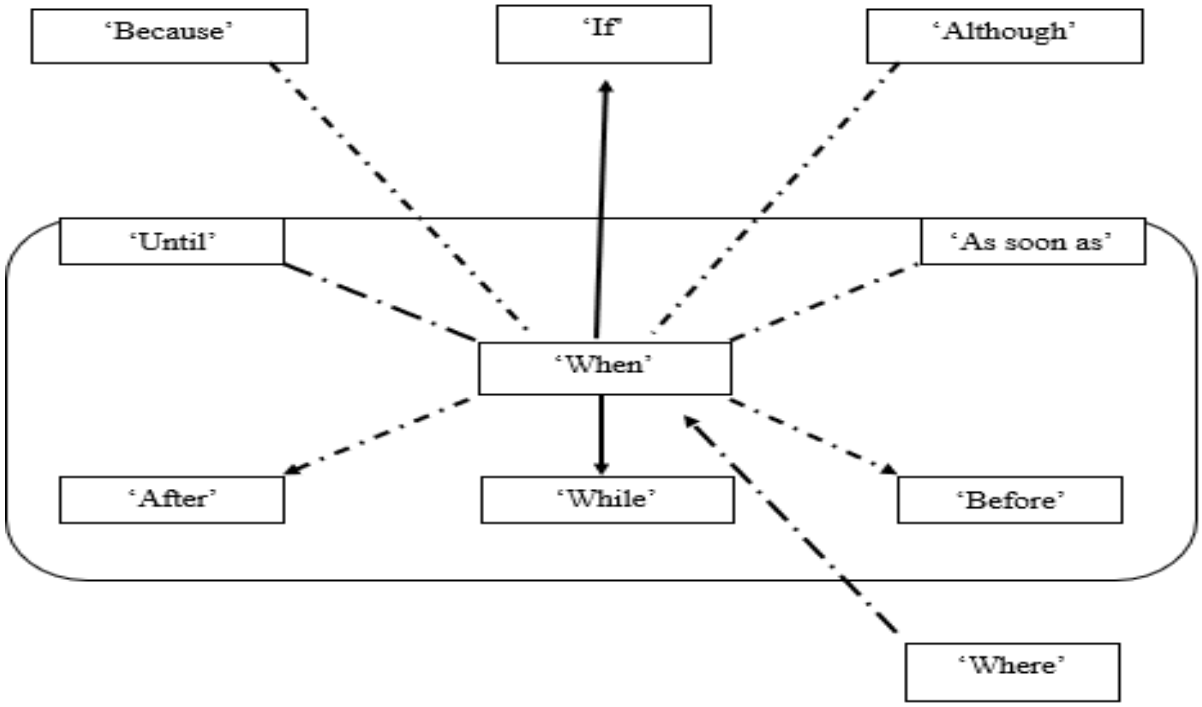
‘As soon as he left, I began working.’ (Saeed 1999: 218)

Figure 23 provides a visual representation of the information on polyfunctionality patterns of ‘when’ clauses. In order to avoid a potential confusion in the analysis of the semantic map in Figure 23, three comments are in order here. First, the largest box in the semantic map in Figure 23 groups together temporal interpretations. Non-temporal interpretations appear outside the larger box (i.e. ‘where’, ‘because’, ‘if’, and ‘although’).

[82] In the Somali example in (502), it is not clear what the role of the reflexive marker *is-* is.
[83] The device *so* in Old High German functioned as a marker of ‘when’ and ‘as soon as’. However, *so* has lost almost all functions as an adverbial subordinator that it had in earlier stages of German (Kortmann 1997: 371).

Second, the distance between the various small boxes is for ease of graphic representation and does not indicate any specific type of information. Third, the arrows indicate that the specific adverbial function has extended in the direction shown. As was discussed above, most sources of the languages taken into account in the present research indicate that: (1) 'where' developed into 'when' ('where' > 'when'), (2) 'when' developed into 'while' ('when' > 'while'), (3) 'when' developed into 'after' ('when' > 'after'), (4) 'when' developed into 'before' ('when' > 'before'), and (5) 'when' developed into 'if' ('when' > 'if'). The diachronic changes proposed in Figure 23, and other semantic maps proposed in this chapter, only hold for restricted devices involved in binary overlaps, that is, in cases where a restricted device in addition to being a marker of 'when' and 'if' is used for conveying other temporal meanings ('while', 'after'), it has not been possible to propose any more detailed scenarios given that the authors of the sources do not explain this type of development. An example comes from Puyuma. In this language, the free adverbial subordinator *an* is used for expressing 'when', 'while', 'if', and 'because' (Teng 2008: 409). In this type of scenario, there is not readily available evidence that would allow us to draw conclusions about the exact pathways of diachronic semantic change.

Figure 23. Semantic map of ‘when’ relations



I now provide an analysis of how the range of functions of polyfunctional restricted devices are plausible. To keep the scope of the discussion manageable, I focus only on the most common polyfunctional patterns attested in the sample. The following examples do not exhaust the whole range of ways in which the different adverbial interpretations of polyfunctional devices are computed or have become conventionalized. This stems from the fact that the range is too large. Accordingly, these examples should serve for discussion purposes only.

9.2.1 Polyfunctional pattern: ‘When’ and ‘while’

Languages may distinguish ‘when’ from ‘while’ based on specific TAM values. In particular, imperfective aspect plays a role here. Mbembe has an attributive temporal construction introduced by *ébɔ̄* ‘time’. This construction has a *when*-reading when the verbs of the ground clause and the figure clause do not appear with any aspectual markers (503).

Mbembe (Atlantic-Congo/Platoid)

(503) ***ébɔ̄*** *ñ=ta* *gbā* *gē,* *hú* *m̃=mbɔ* *yĩ̄ːs*.
time 1SG.SBJ=sieve finish 3SG.OBJ DEF.SG 1SG.SBJ=measure yeast
‘At the time I finish sieving it, I measure yeast.’ (Richter 2014: 377)

This construction has a *while*-interpretation when the ground clause and the figure clause are marked by the imperfective marker *yí* (504) (Richter 2014: 377). This indicates that ‘while’ constructions are encoded compositionally in Mbembe. This is in line with Hetterle (2015: 110), who shows that most typically, specific TAM forms combine with a polyfunctional restricted device to compositionally express an adverbial meaning. The Mbembe construction can also be used for indicating ‘until’ (see §9.6.2).

Mbembe (Atlantic-Congo/Platoid)

(504) *ē* ***yí*** *ɲá* *dʒwɔ̂,*
3SG.SBJ IPFV sing song
‘He sings,

ébɔ̄	*ē*	***yí***	*tɔ́*	*tʃwĉ*	*ŋɛ̀*	*àwè*	*hú*.
time	3SG.SBJ	IPFV	do	work	ADP	field	DEF.SG

while working on the field.' (Richter 2014: 378)

A quite similar exposition can be given for Momu. In this language, 'when' and 'while' are denoted by the bound adverbial subordinator =*b*. The 'when' interpretation is only possible when the figure clause or the ground clause appears in the perfective (505). On the other hand, the 'while' interpretation arises when the ground clause is marked by the imperfective marker *a-* (506) (Honeyman 2016: 498).

Momu (Baibai-Fas)

(505) *ereye=feno-fi-u=**b**,* *yeb* ***won***…

do.like.that=leave-3DU-NMLZ=when then go.up.PFV

'When they did it like that and left her, she then went…' (Honeyman 2016: 498)

Momu (Baibai-Fas)

(506) ***a**-ki-fi-u=**b**,* *abo* *eru* *nu* *onatin*.

IPFV-sleep-3DU-NMLZ=while frog that just one.separate.PFV

'While they were sleeping, the frog left them.' (Honeyman 2016: 497)

Another similar example can be found in Dhimal. In this language, 'when' and 'while' are expressed by the restricted deranking device *-lau*. King (2009: 227) mentions that constructions marked by *-lau* "may take either a 'when' or 'while' interpretation depending on

the semantics of the verb and the intentions of the speaker." However, he also mentions that one recent way in which speakers distinguish these meanings is by imperfective marking, as can be seen in (508), where the *while*-meaning arises due to the fact that the figure clause occurs with the imperfective marker *-khe*.

Dhimal (Sino-Tibetan/Dhimalic)

(507) *udini* *Āthīyābārī* *hane-**lau***, *khiniŋ* *niŋ-gha*.
two.days.ago Athiyabari go-when only get-1SG.SBJ
'When I went to Āṭhīyābārī the other day, I got it.' (King 2009: 227)

Dhimal (Sino-Tibetan/Dhimalic)

(508) *behaibeheni-ko* *gora* *am-**lau***,
parents.in.law-GEN alcohol drink-while
'While they drink the parent-in-law's liquor,

te-loŋ *majhi* *jom-li* *goi-**khe***.
ten-CL headman collect-INF must-IPFV
ten village headmen must assemble.' (King 2009: 227)

The last example comes from Awtuw. This language has a construction encoded by the restricted deranking device *-rek*, which can be understood as 'when' or 'while'. Interestingly, it is not imperfective marking that distinguishes 'when' from 'while'. Instead, temporal adverb(ial)s play an important role here. Feldman (1986: 167) mentions that the "Awtuw's

ability to code a variety of aspectual and adverbial categories compensates for its lack of conjunctions." In the examples in (509) and (510), both constructions are marked by imperfective markers and by the restricted deranking device *-rek*. Feldman (1986: 167) shows that the 'while' interpretation arises when the ground clause appears in the imperfective and also occurs with the adverb(ial) prefix *taw-* 'still'.

Awtuw (Sepik/Ram)

(509) *rey* *wans* *də-**k**-œy-**ey**-**rek*** *di-ik-i.*

3SG 1SG REAL-IPFV-go-IPFV-when REAL-sit-PST

'He sat down when I was going.' (Feldman 1986: 166)

Awtuw (Sepik/Ram)

(510) *yen* *nom* *œye* ***taw-k**-rokra-**y**-m-e-**rek***

2SG 1PL food still-IPFV-cook-IPFV-PL-PST-while

lape-ke *ma-wey-e.*

village-LOC go-arrive-PST

'You arrived in the village while we were cooking food.' (Feldman 1986: 167)

9.2.2 Polyfunctional pattern: 'When' and 'if'

Languages may also distinguish 'when' from 'if' by specific TAM markers. In Saaroa, 'when' and 'if' are expressed by the free adverbial subordinator *maaci*. *Maaci*-clauses are understood as 'when' when the ground clause is marked by the irrealis marker *a-* (511). On the other hand,

maaci-clauses convey ‘if’ when the ground clause is marked by the modal enclitic *=’ai* (512). This is an epistemic marker used for expressing uncertainty about a specific situation (Pan 2012: 70). Note that the figure clause may be marked by the irrealis marker *a-*. However, this marker is optional and can be omitted.

Saaroa (Austronesian/Tsou)

(511) *Eleke=na* ***maaci*** *um-**a**-ia-iape* *ia*, *m-au-auaua*.
Eleke=DEF when AV-IRR-RDP-study TOP AV-RDP-yawn
‘When Eleke is studying, she keeps on yawning.’ (Pan 2012: 294)

Saaroa (Austronesian/Tsou)

(512) ***maaci=’ai*** *usua=cu* *vulalhe* *ia*, ***a**-lhamare=c-isa*.
if=MOD two=ASP moon.month TOP IRR-set.fire.to.mountain=ASP-GEN
‘If (it is) February, they set fire to the mountains.’ (Pan 2012: 293)

Another example is found in Urarina. In this language, ‘when’ meanings are expressed by the bound adverbial subordinator *=ne* (513). There are contexts in which constructions marked by *=ne* could be interpreted as having a conditional habitual meaning (514). Note that the construction is not habitual aspect marked. Accordingly, the conditional habitual interpretation is derived from the context itself (Olawsky 2006: 738). In this example, it is only known from the discourse context that the situation occurred repeatedly and regularly (namely, each time when the father came home). Interestingly, the ‘when’ and ‘if’ meanings can be distinguished from one another by specific morphosyntactic make-up. Olawsky (2006: 738)

points out that although in many cases the distinction between temporal and conditional function of *=ne* is interpreted from the context, there is one factor that helps to distinguish these functions. In some constructions that involve *=ne*, the figure clause may be marked by the irrealis marker *-ki*. In these cases, a temporal reading is excluded and the clause involving *=ne* can be identified as having a conditional function (515).

Urarina (Isolate)

(513) *enanihja* *kʉane* *hauto-a=**ne**,* *ahariri* *ne-ĩ* *nerutu-e.*
canoe inside throw-3SG=when gamitana.fish be-PTCP turn.into-3SG
'(He caught a fish there, he quickly caught this sort of mojarra fish, and) when he threw it into the canoe, it turned into a gamitana fish.' (Olawsky 2006: 736)

Urarina (Isolate)

(514) *tʉrʉ-a* *ʉ-a* *raj* *ɲaka=**ne**,* *baaba* *baaba* *na-ĩ…*
arrive-NTR come-3SG POSS father=if daddy daddy say-PTCP
'(Therefore, as he was there,) if their father came home, they said "daddy, daddy"…' (Olawsky 2006: 737)

Urarina (Isolate)

(515) *be-i=**ɲe**=te,* *kanʉ* *nekwehe* *ʤanʉ-**ri**-ki=ĩ.*
tell-2SG=if=FOC 1SG shame make.feel-IRR-2SG=ASSERT
'(In the beginning, do not tell anything until you have taught ten women how to do it) if you tell, you will embarrass me.' (Olawsky 2006: 737)

In Alto Perené, *when*-clauses are marked by the free adverbial subordinator *arika* ‘when’. Constructions that appear with *arika* ‘when’ require irrealis status in both the ground clause and the figure clause (516) (Mihas 2015: 249). The *arika*-strategy is also used for indicating a condition which can be met in the future, and both clauses again require irrealis status (517). To distinguish a ‘when’ interpretation from an ‘if’ interpretation, clause order plays an important role. Mihas (2015: 249) mentions that formally, the ambiguity can be resolved by the clause order. When the ground clause appears preposed to the figure clause, it signals a ‘when’ relation (516). On the other hand, when the ground clause occurs postposed to the figure clause, it indicates an ‘if’ relation (517). As noted above, in this scenario, a ‘when’ relation is pragmatically enriched by the implicature that one of the situations is also the condition of the other situation (cf. Hetterle 2015: 256).

Alto Perené (Arawakan/Pre-Andine Arawakan)

(516) ***arika*** *o=santsa-t-an-ak-**e***, *n=anpinaik-imai-t-**ia**=ro*.
when 3SG=grow.big-EP-DIR-PFV-IRR 1SG=roll.up-INCH-EP-IRR=3SG
‘When it becomes big, I roll it up.’ (Mihas 2015: 249)

Alto Perené (Arawakan/Pre-Andine Arawakan)

(517) *pi=vitsa-t-ap-ak-**ia**=ro* *isha* ***arika*** *pi=ny-ak-**e**=ro*.
2SG=greet-EP-DIR-PFV-IRR=3SG grandma if 2SG=see-PFV-IRR=3SG
‘Say hi to grandma if you see her.’ (Mihas 2015: 249)

9.3 *While*-clauses: Polyfunctional restricted devices

While-clause are similar to *when*-clauses in that most polyfunctional devices tend to be bifunctional (73.17%), as can be seen in Table 42. Polyfunctional devices may also be trifunctional (20.32%) and quadrifunctional (6.51%), but these types of polyfunctionality are not frequent in the languages of the database.

Table 42. Types of polyfunctionality of *while*-clauses

Type of polyfunctionality	**Count**	**Percentage**
Bifunctional	90	73.17
Trifunctional	25	20.32
Quadrifunctional	8	6.51
Total	123	100.00

'While' is involved in patterns of polyfunctionality with 12 adverbial relations, as is illustrated in Table 43. In total, 'while' is involved in 164 cases of overlap. Note that 'while' shows overlaps with other temporal relations (e.g. 'when', before', 'after', 'until', 'since', and 'as soon as') and with non-temporal relations (e.g. 'if', 'although', 'in order to', 'without', 'because', and 'where'). Of these, 'while' shows more overlaps with other temporal relations. In particular, the most common overlap is with devices that also cover 'when' (64.02%). The polysemy with 'before' is the second most common type (15.24%).

Kortmann (1997: 192) mentions that if a marker of 'while' clauses develops an additional use as a marker of a non-temporal relation, this relation is most likely to be 'although'. The results of the present study echo Kortmann's results. However, it is also

interesting to observe that another non-temporal meaning that ‘while’ devices may develop is that of ‘if’, as in Table 43.

Table 43. Individual polyfunctional patterns of ‘while’ restricted devices

Relation	**Count**	**Percentage**
When-relations	105	64.02
Before-relations	25	15.24
After-relations	8	4.87
If-relations	6	3.65
Although-relations	6	3.65
In order to-relations	4	2.43
Until-relations	3	1.82
Without-relations	2	1.21
Because-relations	2	1.21
Since-relations	1	0.60
Where-relations	1	0.60
As soon as-relations	1	0.60
Total	164	100

As was discussed in §9.2, the overlap between ‘when’ and ‘while’ is not surprising in that *while*-constructions along with *when*-constructions have been described as two types of simultaneity. The second most common pattern is between ‘while’ and ‘before’. As was shown in Chapter 6, negative markers play an important role in that they serve as morphosyntactic

material aiding in the *before*-interpretation. This also holds for the overlap between 'while' and 'before' in that *before*-meanings are compositionally encoded by negative polarity together with a polyfunctional device (see §9.3.1). From a diachronic perspective, it has been suggested that 'before' meanings are derived from paraphrases involving 'while' and a negative marker or a negative adverb(ial) 'not yet' ('before' is roughly the same as 'while not yet'; Wälchli 2018).

The polyfunctional patterns documented in the present work are similar to those attested by Hetterle (2015: 220) and Kortmann (1997: 181). However, there is one polyfunctional pattern not described in their research. There are two Afro-Asiatic languages (i.e. Beja and Sidaama) in the sample of the present dissertation in which a restricted device is used for indicating 'while' and 'without' (also known as negative concomitance). An example of this pattern can be found in Sidaama. In this language, 'while' and 'without' are expressed by the restricted deranking device *-nni*.

Sidaama (Afro-Asiatic/Highland East Cushitic)

(518) *sagalé* *ra'-is-i-ɗ-ɗ-a-**nni***
food become.cooked-EP-CAUS-EP-MID-3SG.F-while
'While she was cooking,

angá *gii-ɗ-i-t-u.*
hand burn-MID-3SG.F-PFV-3SG.F
she burned her hand.' (Kawachi 2007: 381)

Note that the ‘without’ interpretation only arises when the ground clause appears with the negative marker *-kki,* as can be seen in (519).

Sidaama (Afro-Asiatic/Highland East Cushitic)

(519) *keeš-i-tto-**kki-nni*** *amo.*

stay.long-PFV-2SG.M-NEG-without come.IMP.2SG

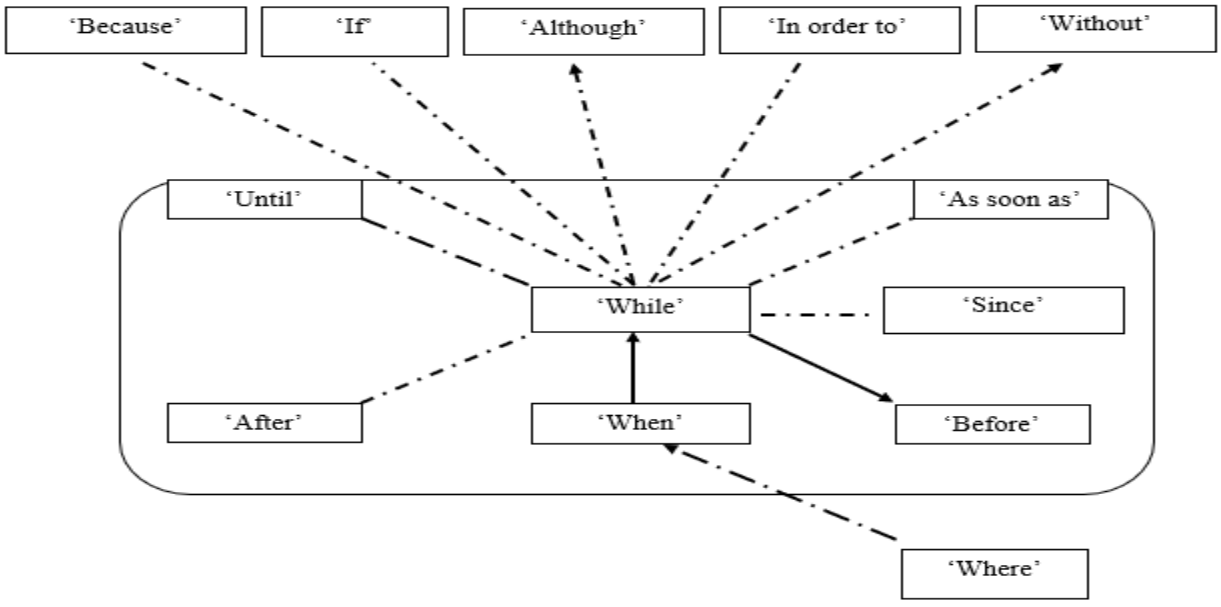
‘Come without staying long.’ (Kawachi 2007: 382)

The sources of the sample indicate that ‘without’ has been derived from ‘while’ (‘while’ > ‘without’), indicating a direction of development from a concrete to a more abstract meaning. The development of ‘while’ into ‘without’ can be explained by the fact that ‘without’ involves a simultaneous situation in which ‘p’ does not accompany ‘q’ (Kortmann 1997: 89). This situation more often than not runs counter to expectation, or is simply regarded as remarkable (e.g. ‘he went past me without greeting me’). ‘Without’ constructions in these languages appear with obligatory negative markers. Accordingly, from a diachronic perspective, ‘without’ meanings have been derived from paraphrases involving ‘while’ and a negative marker (‘without’ is roughly the same as ‘while not’).

The polyfunctionality patterns of ‘while’ clauses can be observed in more detail in the semantic map provided in Figure 24. The most frequent connections are between ‘while and ‘when’ and between ‘while’ and ‘before’. Most of the sources used in the present study indicate that ‘while’ has been derived from ‘when’ (‘when’ > ‘while’) and ‘while’ has developed into ‘before’ (‘while’ > ‘before’). There are other developments, attested in the languages of the sample, for which most of the authors of the sources provide evidence of their developments.

However, these developments are not frequent in the database. First, ‘while’ meanings may develop into ‘although’ meanings (‘while’ > ‘although’; see §9.3.4). Second, ‘while’ meanings may develop into ‘without’ meanings (‘while’ > ‘without’), as discussed above. Regarding the overlaps between ‘while’ and ‘until’, between ‘while’ and ‘as soon as’, between ‘while’ and ‘since’ and between ‘while’ and ‘after’, it has not been possible to establish any possible direction of development.

Figure 24. Semantic map of ‘while’ relations



In what follows, I discuss how the ranges of functions of polyfunctional restricted devices are plausible. Given that in §9.2.1, I already analyzed the polyfunctionality pattern between ‘when’ and ‘while’, I concentrate on the polyfunctionality pattern between ‘while’ and ‘before’ (§9.3.1), between ‘while’ and ‘after’ (§9.3.2), between ‘while’ and ‘if’ (§9.3.3), between ‘while’ and ‘although’ (§9.3.4), and between ‘while’ and ‘in order to’ (§9.3.5).

9.3.1 Polyfunctionality pattern: 'While' and 'before'

As was mentioned above, negative markers play an important role in that they serve as morphosyntactic material aiding in the *before*-interpretation. In Motuna, *before*-constructions appear with the restricted deranking device *-juu* (520). The ground clause must be marked by the negative marker *toku*. The restricted deranking device *-juu* is polyfunctional and can be used for expressing 'while' when the ground clause shows positive polarity (521). The change from 'while' to 'before' seems to be motivated by the inference that 'while not yet' implies that the situation of the figure clause happens before the situation expressed in the ground clause. Put another way, in this scenario, 'while' does not show a reference time involving situations that occur absolutely or partially simultaneously. Instead, it is employed for indicating a situation that has not yet been realized when the figure clause situation takes place.

Motuna (East Bougainville)

(520) *tii* ***toku*** *umuu-**juu**,* *na-mar-a-a-ni…*
there NEG come.1PL.EXCL-before say.to-1PL.EXCL.OBJ-3PL-REM.PST-DU
'Before we came there, they said to us…' (Onishi 1994: 476)

Motuna (East Bougainville)

(521) *ti* *pa-na* *ti-ki* *poo'-ki* *kuuto-woi-**juu***
ART.F 3SG.POSS-wife ART-ERG under.tree-ERG be.waiting-3SG-while
'While his wife was waiting under the tree,

Emmai *koto* *kiin-u-u-ng*.

Emmai up climb-3SG-REM.PST-M

Emmai climbed up.' (Onishi 1994: 475)

Another example is found in Oksapmin. In (522), 'before' is expressed by a construction in which the ground clause is obligatorily negated syntactically by *kəpen* 'not yet' and *na=*. This construction includes the restricted deranking device *-t* 'before', which is polyfunctional, that is, it denotes 'before' when the ground clause shows negative polarity.

Oksapmin (Oksapmin)

(522) ***kəpen*** *asup* ***na****=x-****t*** *pti-n* *jox,*

not.yet menstruation NEG=be-before stay.IPFV.PL-NMLZ TOP

'(It is said that) before (they) had gotten their period,

ap *x-sxe=li*.

house do-HAB.PFV.PL=REP

they used to make a house.' (Lough 2009: 333)

The restricted deranking device *-t* can also be used for signaling 'while' when the ground clause shows positive polarity (523).

Oksapmin (Oksapmin)

(523) *akwe-**t*** *pat-n=a* *lex,*

wait.and.look-while stay.IPFV.SG-NMLZ=LINK long.ago

'While he was waiting (for birds),

xənat *tit* *bəp* *jə-xən* *təxe…*

arrow INDEF so DEM.DIST-across throw

someone suddenly shot an arrow at him….' (Lough 2009: 464)

9.3.2 Polyfunctionality pattern: 'While' and 'after'

Languages may distinguish 'while' from 'after' by specific TAM values. An example is found in Ottawa, in which 'after' and 'while' are expressed by the restricted device *shkwaa-*. The 'after' interpretation is only possible when the ground clause and the figure clause appear in the past (524). The 'while' interpretation arises when the ground clause is marked by the change conjunct (525) (see §3.2.1 for a more detailed discussion of change conjunct). Note that for this overlap, it has not been possible to determine the conceptual factors that motivate this semantic affinity.

Ottawa (Algic/Algonquian)

(524) *gaa-**shkwaa**-maawnjihdi,* *n-**gii**-gchi-wiisnimi.*

PST-after-meet.together.1PL.CNJ IND-PST-greatly.eat-1PL.IND

'After we had our meeting, we went and had a big meal.' (Valentine 2009: 203)

Ottawa (Algic/Algonquian)

(525) *gojiing* *g-daa-bbaayaa-m* ***eshkwaa****-mnogiizhgad-g.*

outiside IND-MOD-be.around-2PL.IND CHANG.CNJ.while-be.nice.day-CNJ.OBJ

'You should be (spend time) outside while it is a nice day.' (Valentine 2009: 203)

An interesting example comes from Alto Perené. In this language, *while*-constructions are realized by the verb *kaNt* 'to happen' (526). This clause-linking device is polyfunctional in that it can also be used for expressing temporal subsequence (527). The 'after' interpretation arises when *kaNt* 'to happen' is repeated twice and the figure clause appears after the ground clause (Mihas 2015: 253).

Alto Perené (Arawakan/Pre-Andine Arawakan)

(526) ***i=kaNt-ta*** *i=shiNki-t-ak-i=ri*

3M.SBJ-happen-REAL 3M.SBJ=get.drunk-EP-PFV-REAL=3SG.OBJ

'While the men were getting him drunk,

ironyaaka *ashoshi=ra* *kiy-ak-i* *iroori.*

now armadillo=DEM dig-PFV-REAL 3SG.SBJ

the armadillo woman dug a hole.' (Mihas 2015: 252)

Alto Perené (Arawakan/Pre-Andine Arawakan)

(527) *i=shet-ak-a* *i=shet-ak-a,*

3M.SBJ=clean-PFV-REAL 3M.SBJ=clean-PFV-REAL

'He cleaned and cleaned his face,

i=kaNt-ta ***i=kaNt-ta*** *kam-ak-i.*

3M.SBJ-happen-REAL 3M.SBJ-happen-REAL die-PFV-REAL

and then he died.' (Mihas 2015: 252)

9.3.3 Polyfunctionality pattern: 'While' and 'if"

There are languages that use the same restricted device for expressing 'while' and 'if'. In Abau, the free adverbial subordinator *ankin* is used for denoting 'while', as in (528), and 'if', as in (529). When the restricted device *ankin* marks a 'while' clause, the ground clause is followed by a figure clause marked for the perfective (528). When the restricted device *ankin* indicates 'if', the ground clause is followed by a figure clause marked for the imperfective (529) (Lock 2011: 368). The affinity between 'while' and 'if' can be explained as follows. 'While' constructions involve situations that occur absolutely or partially simultaneously. These situations tend to be factual. However, there are contexts in which 'while' may implicate non-factual situations. In this scenario, 'while' constructions may involve situations as purely within the realm of thought, knowable only through imagination, that is, in this context, 'while' is inferentially enriched by the implicature that the occurrence of the situation of the ground clause is the condition for the occurrence of the situation of the figure clause.

Abau (Sepik/Upper Sepik)

(528) *huok* *ho-kwe* *sawk* *howk-oion* *mon* *nak-ley* ***ankin***,
pig M-TOP DIR lake-peninsula LOC ACC-go while
'While the pig was going to the lake-peninsula,

sawk *Kupe* *hiy* *so-h-e* *hin* ***pie***.
DIR Kupe 3SG.M DEM-3SG.M-OBJ shoot firstly.PFV
Kupe shot him for the first time.' (Lock 2011: 368)

Abau (Sepik/Upper Sepik)

(529) *ney* *hom-kwe* *aiopey* *hay* *lwak* ***ankin***,
child 3PL-TOP big very be if
'If the children are big,

hom-kwe *now* *ayaw* *mon* ***liê***.
3PL-TOP tree high LOC go.up.IPFV
they climb high in the trees.' (Lock 2011: 369)

Kalkatungu is another language in which 'while' and 'if' constructions are realized by the same clause-linking device. In this language, the restricted device *-ta* conveys 'while' (530). This device can also denote a conditional meaning when the figure clause occurs with the future marker *-mi* (531).

Kalkatungu (Pama-Nyungan)

(530) *maa-ci* *ŋai* *ari-li-ɲin-**ta**,* *unuŋkatika* *jaun* *tuna*.
food-DAT 1SG.SBJ eat-ANTIPASS-PTCP-while wind big blow
'While I was eating, a strong wind was blowing.' (Blake 1979: 60)

Kalkatungu (Pama-Nyungan/Northern Pama-Nyungan)

(531) *kuntu* *atii-ɲin-**ta**,* *caaka* *uli-**mi**.*
NEG fall-PTCP-if here die-FUT
'If it does not rain, it will die.' (Blake 1979: 60)

9.3.4 Polyfunctionality pattern: 'While' and 'although'

'While' meanings have developed a concessive interpretation in various languages of the sample. For instance, in English, 'while' developed a *but*-meaning and an *although*-meaning in contexts where clauses appeared with present-tense stative verbs e.g. 'while you like peaches, I like nectarines' (Hopper & Traugott 2008: 91). Another similar example is attested in Udihe. In this language, 'while' and 'although' are expressed by the restricted deranking device *-mi*, as can be seen in (532) and in (533). The concessive interpretation is only possible when the ground clause is marked by the focus particle *-gda* (533) (Nikolaeva & Tolskaya 2001: 728). The semantic affinity between 'while' and 'although' can be explained as follows. As has been pointed out above, 'while' constructions involve situations that occur absolutely or partially simultaneously. There are contexts in which 'while' can become enriched inferentially by the implicature that the two simultaneous situations show general

incompatibility and counter-expectation (e.g. ‘While I sympathize with your troubles, bring me a paper on Monday or else!; Sweetser 1990: 155).

Udihe (Altaic/Tungusic)

(532) *solo-**mi**,* *nua-ni* *uli-tigi* *ete:-ni.*
move.upstream-while 3SG.SBJ-3SG.OBJ water-LAT look.PST-3SG
‘He looked at the water while he moved upstream.’ (Nikolaeva & Tolskaya 2001: 726)

Udihe (Altaic/Tungusic)

(533) *nua-ni* *n̄’aula-**gda*** *bi-**mi**,*
3SG.SBJ-3SG.OBJ child-FOC be-although
‘Although he is young,

n̄ukte-ni *c’ama* *ede:ni*
hear-3SG.OBJ white become
his hair has become white.’ (Nikolaeva & Tolskaya 2001: 728)

9.3.5 Polyfunctionality pattern: ‘While’ and ‘in order to’

The overlap between ‘while’ and ‘in order to’ is cross-linguistically rare (Schmidtke-Bode 2009: 155; Hetterle 2015: 220). The results of the present in study are in line with this cross-linguistic finding in that it is not common to find languages in which a specific device is used for expressing both ‘while’ and ‘in order to’. One language showing this overlap is Jalkunan.

In this language, ‘while’ and ‘in order to’ constructions are encoded by the free adverbial subordinator *tɔ́rɔ́*. Constructions encoded by this clause-linking device are understood as ‘while’ when the figure clause is marked as imperfective (534). The purposive interpretation is only possible when the ground clause appears after the figure clause and the ground clause is not marked by any TAM values (535) (Heath 2017: 335). The affinity between ‘while’ and ‘in order to’ stems from the fact that ‘while’ constructions can inferentially be enriched by the implicature that one situation is being performed to achieve certain goals that match our intentions. Put another way, the figure clause can be conceptualized as the one that is being performed and is simultaneously provoking an intended outcome expressed by the ground clause.

Jalkunan (Mande/Western Mande)

(534) *mā* *cíɛ́* *bàrí-mèè* ***tɔ́rɔ́***,
1SG.SBJ speak.PFV conversation-do while
‘While I was conversing (elsewhere),

gbɔ̄-nɔ̄ *sà* ***sɔ́ɔ́*** *sàá* *tɔ̀*.
thief-NOM FUT enter.IPFV house in
the thief was entering the house.’ (Heath 2017: 310)

Jalkunan (Mande/Western Mande)

(535) *Zàkí=ì* *wèè* *kūmɛ̄ɛ́* *kùn* ***tɔ́rɔ́***.

Zaki=3SG go.PFV meal eat in.order.to

'Zaki went (there) to eat.' (Heath 2017: 335)

9.4 *After*-clauses: Polyfunctional restricted devices

After-clauses tend to be encoded by polyfunctional restricted devices that are bifunctional (78.94%), as can be observed in Table 44. This is similar to the picture of 'when' and 'while' clauses discussed above. *After*-clauses may also be realized by polyfunctional devices that can be characterized as trifunctional (6.59%) and quadrifunctional (14.47%).

Table 44. Types of polyfunctionality of *after*-clauses

Type of polyfunctionality	**Count**	**Percentage**
Bifunctional	60	78.94
Trifunctional	5	6.59
Quadrifunctional	11	14.47
Total	76	100.00

'After' is involved in patterns of polyfunctionality with 10 adverbial relations, as is shown in Table 45. In total, 'after' is involved in 103 cases of overlap. 'After' is involved in more overlaps with different types of non-temporal relations (i.e. 'as a result', 'because', 'if', 'although', 'in order to', and 'lest') than with other types of temporal relations (i.e. 'when', 'before', 'while', and 'until'). The most common overlaps are between 'after' and 'when'

(29.12%), between ‘after’ and ‘before’ (19.41%), and between ‘after’ and ‘as a result’ (16.50%). One comment on the polyfunctionality pattern between ‘after’ and ‘as a result’ is in order here. Kortmann (1997: 192) proposes that if a restricted device encoding ‘after’ clauses develops an additional use as a marker of some non-temporal relation, this relation is most likely to be ‘because’. As is illustrated in Table 45, the results of the present study are not in line with Kortmann’s proposal, in that the most frequent connection is between ‘after’ and ‘as a result’. One potential reason why the results of the present investigation are different from those attested in Kortmann’s study stems from the fact that I take into account ‘and then’ devices. This is one of the most common kinds of semantic polyfunctionality that ‘and then’ devices have developed in the languages of the sample.

Regarding the diachronic semantic changes of polyfunctional ‘after’ restricted devices, most sources mention that ‘when’ clauses may develop into ‘after’ clauses (‘when’ > ‘after’), ‘after’ clauses may develop into ‘before’ clauses (‘after’ > ‘before’), and ‘after’ clauses may develop into ‘as a result’ (‘after’ > ‘as a result’). One less common polyfunctionality pattern of the sample for which there is diachronic evidence is the overlap between ‘after’ and ‘because’. The authors of the sources of the sample indicate that ‘after’ clauses develop into ‘because’ clauses (‘after’ > ‘because’). This is in line with Thompson et al. (2007: 247), who show that two situations that are mentioned together as adjacent in time are often inferred to be causally related. Put another way, in a diachronic process in which the ‘after’ construction is inferentially enriched by the implicature that the ground clause is the cause or reason that brings about result expressed in the figure clause, the restricted device may acquire a ‘because’ meaning. Accordingly, this change fits the less abstract meaning > more abstract meaning semantic change.

Table 45. Individual polyfunctional patterns of ‘after’ restricted devices

Relation	**Count**	**Percentage**
When-relations	30	29.12
Before-relations	20	19.41
As a result-relations	17	16.50
While-relations	8	7.76
Because-relations	7	6.79
Until-relations	7	6.79
If-relations	5	4.85
Although-relations	4	3.88
In order to-relations	4	3.88
Lest-relations	1	0.97
Total	103	100.00

The polyfunctional patterns documented in the present work are similar to those attested by Kortmann (1997: 181), Martowicz (2011: 107-108), and Hetterle (2015: 220). However, there are two polyfunctional patterns not described in their research. First, there are languages that employ the same device for expressing ‘after’ and ‘until’. For instance, in Urim, ‘after’ and ‘until’ are expressed by the restricted device *pa*. In (536), the temporal subsequence relation is signaled by *pa* ‘and then’. To indicate that the action of the figure clause continues until something else happens or until the end of the situation of the figure clause is achieved, the verb of the figure clause must be repeated several times (Hemmilä & Luoma 1987: 26), as in (537). In this scenario, the meaning of ‘after’ has become enriched inferentially by the

implicature that the ground clause marks the endpoint of a situation expressed in the figure clause. This semantic affinity is only attested in the languages of the sample that employ a sequential coordinating 'and then' device.

Urim (Torricelli/Urim)

(536) *men* *lap* *namung* ***pa*** *plalng* *apis*.
1PL.EXCL roast.REAL banana and.then finish scrape.REAL
'We roasted the bananas and then scraped the ashes off.' (Hemmilä & Luoma 1987: 80)

Urim (Torricelli/Urim)

(537) *men* *ak* *yikal* ***or-or-or-or-or-or***,
1PL.EXCL do.REAL bow hit-hit-hit-hit-hit-hit
'I kept hitting and hitting it with the bow,

pa *amo*.
until die.REAL
until it died.' (Hemmilä & Luoma 1987: 26)

Second, there is one language in the sample that employs the same device for forming 'after' clauses and avertive 'lest' clauses.[84] In Gaagudju, 'after' and 'lest' are expressed by the

[84] Avertive 'lest' clauses convey the idea that a certain situation is performed in order to prevent another one from occurring (Lichtenberk 1995: 297; Cristofaro 2003: 158; Dixon 2009: 24). The presence of these constructions seems to be a salient feature of Australian languages, Oceanic languages, Amazonian languages, and languages from New Guinea (Aikhenvald 2009: 383).

restricted device *baleeru*. The 'after' interpretation arises when the figure clause appears in any tense (538). However, the 'lest' interpretation is only possible when the ground clause of a *baleeru*-constructions is marked by the evitative marker *-ya* (539). The evitative marker merely asserts that the predication is possible (Harvey 2002: 251). The semantic affinity between 'after' and 'lest' can be explained as follows. An 'after' construction involves a sequence of two clauses in which the situation of the figure clause happens after the situation expressed in the ground clause, 'After' can be pragmatically enriched by the implicature that the ground clause may invoke an undesired world (i.e. undesirable situation) that can be avoided by the situation described in the figure clause.

Gaagudju (Isolate)

(538) …***baleeru*** *ma-rraama* *djaamu*. *Ma-nee-nda* *mananggaarr* *nji-n-baloolburrbu*.
and.then 1SG-get.FUT tucker 2SG-FUT-eat that 2SG-FUT-full.up
'…And then I will get some tucker. You can eat it and then you will be full up.'
(Harvey 2002: 377)

Gaagudju (Isolate)

(539) *gooyida* *njing-gaama-y* *ilaawala*
NEG.IMP 2SG-say-PRS little
'Don't say (that), little boy!

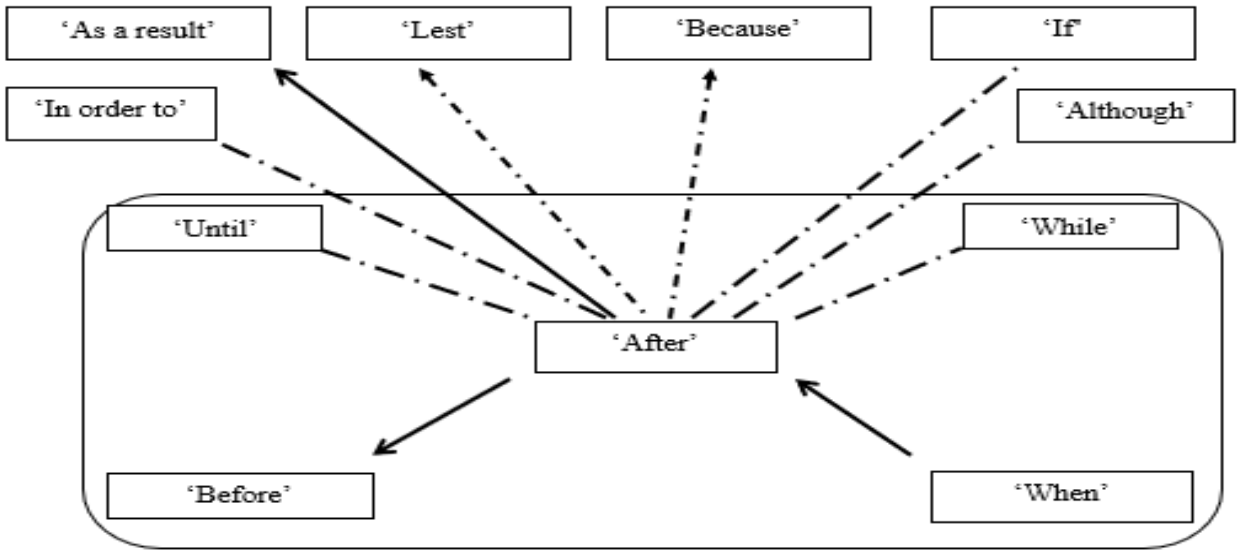
baleeru *nji-n-ngeewi* *yunggaalja* *nji-nbuu-**ya**.*

lest 3SG-hear-AUX devil 3SG-kill-EVIT

lest a devil hear you and kill you.' (Harvey 2002: 375)

The polyfunctionality patterns of 'after' clauses can be observed in more detail in the semantic map provided in Figure 25. As was discussed above, the most frequent connections are between 'after' and 'when', between 'after' and 'before', and between 'after' and 'as a result'. For these connections, the authors of the sources provide information regarding the directionality of development. There are other connections for which there is also evidence regarding the directionality of development (i.e. 'after' > 'lest'; 'after > 'because'). However, these are not frequent in the sample.

Figure 25. Semantic map of 'after' relations



In what follows, I discuss how the ranges of functions of polyfunctional restricted devices are plausible. I concentrate on the most frequent polyfunctionality patterns: 'after' and 'when' (§9.4.1), 'after' and 'before' (§9.4.2), and 'after' and 'as a result' (§9.4.3).

9.4.1 Polyfunctionality pattern: 'After' and 'when'

The range of ways by which the languages of the sample distinguish 'after' from 'when' is diverse. Accordingly, this subsection cannot do justice to this diversity. In what follows, I only provide a couple of examples illustrating these ways. In Musqueam, 'after' and 'when' constructions are formed by a ground clause appearing with the nominalizing prefix *s-* and a preposed article that indicates the nominal status of the ground clause, as in (540) and (541) (see §3.2.1 for a more detailed discussion of these constructions in Salishan languages). The 'after' meaning only arises when the ground clause occurs with the temporal adverb(ial) *wəɬ* 'already' (Suttles 2004: 436), as is shown in (540). Without this temporal adverb(ial), the interpretation is that of 'when', as in (541).

Musqueam (Salishan/Central Salish)

(540) ***kʷə*** ***s-mi-s*** *técəl* *kʷθeʔ* *məstáyəxʷ* *ni*,

ART NMLZ-AUX-3SG.POSS arrive.here that person AUX

'When that person got here,

ʔə *čxʷ* *k̓ʷec-nəxʷ*.

Q you look-TRANS

did you see him?' (Suttles 2004: 104)

Musqueam (Salishan/Central Salish)

(541) ***kʷə*** ***s-wəɬ-ʔíkʷ*** *tə* *x̌áʔx̌t̓θə̀ltən,*

ART NMLZ-already-be.lost ART Pierre

‘After Pierre died,

ʔə́wəteʔ *ƛ̓* *qəl̓ét* *sƛ̓éləqəm* *šxʷnéʔem.*

be.not ART again powerful shaman

there was no longer any powerful shaman.’ (Suttles 2004: 436)

The fact that ‘when’ lends itself to pragmatic enrichment with other temporal relations is not surprising in that ‘when’ can convey any reference time. However, recall that the reference time can only be recovered from the discourse context. With respect to the affinity between ‘after’ and ‘when’, ‘when’ can easily be enriched interpretatively in certain contexts and receive an ‘after’ interpretation. In this scenario, ‘when’ is pragmatically enriched by the implicature that the situation of the figure clause happens after the situation expressed in the ground clause.

Another example is attested in Crow. In this language ‘when’ and ‘after’ relations are expressed by the demonstrative *hinne*, as is shown in (542) and (543). The temporal subsequence relation is only possible when the figure clause is marked by sequential coordinating device *kalakoon* ‘and then’ (Graczyk 2007: 339), as is illustrated in (543). Constructions appearing without this sequential coordinating device are only understood as ‘when’, as in (542).

Crow (Siouan/Core Siouan)

(542) ***hinne*** *óhchikaapee-sh,* *iilápaache-lak* *áxpiisshii-lak* *iláa-k.*
this find-DET her.friends-and neighbors-and talk-SS
'When she has found it, she will talk to her friends and neighbors.' (Graczyk 2007: 339)

Crow (Siouan/Core Siouan)

(543) ***hinne*** *Jesus* *Galilee* *kuss-chisshiia-sh,* ***kalakoon*** *kala-hawass-dáaw-ak.*
this Jesus Galilee GO-return-DET then then-around-travel-SS
'After Jesus' return to Galilee, he traveled around.' (Graczyk 2007: 339)

9.4.2 Polyfunctionality pattern: 'After' and 'before'

Another common polyfunctionality pattern is between 'after' and 'before'. Some examples illustrating how languages distinguish 'after' from 'before' follow here. As can be seen in (544), Lango has the option of construing a complex sentence indicating 'before' by the restricted device *àmɛ̂* in combination with the negative marker *pé rʊ́* 'not yet'. When the ground clause shows positive polarity and appears in the perfective, the restricted device *àmɛ̂* is used for denoting 'after', as in (545) (Noonan 1992: 243). The overlap between 'after' and 'before' is to a certain degree surprising in that 'after' and 'before' are inverses of each other. However, 'after' can be enriched interpretatively in certain contexts and receive a 'before' interpretation. In particular, this is possible when the ground clause appears with a negative marker that is obligatory. This holds for all the languages of the sample that show this polyfunctionality pattern. In this scenario, 'after' is pragmatically enriched by the implicature the ground clause

situation has not yet been realized when the figure clause situation takes place. Accordingly, from a diachronic perspective, 'before' meanings have been derived from paraphrases involving 'after' and a negative marker.

Lango (Western Nilotic)

(544) *dákô* *òcèmò* ***àmɛ̂*** ***pé*** ***rʊ*** *òlwòkérɛ̂*
woman 3SG.eat.PFV before NEG yet 3SG.wash.MID.PFV
'The woman ate before she washed.' (Noonan 1992: 243)

Lango (Western Nilotic)

(545) *dákô* *òlwòkérɛ̂* ***àmɛ̂*** ***òcèmò***
woman 3SG.wash.MID.PFV after 3SG.eat.PFV
'The woman washed after she ate.' (Noonan 1992: 243)

A similar situation can be found in Moskona. In this language, the ground clause of a *before*-construction is marked by the verb *okuk* 'be like' and must appear with *néesa* 'not yet', as in (546). This clause-linking device can also be used for indicating 'after' when the ground clause shows positive polarity, as in (547) (Gravelle 2010: 374).

Moskona (East Bird's Head)

(546) *…**okuk*** *no-ma-i* *néesa*
be.like DEIC.NMLZ-far-GIV not.yet
'Like that not yet (before the kid singed the hair from the pig),

ekok *oduk* *efer* *no-ma-i* *ni* *ok* *mergej* *owok.*

father send child DEIC.NMLZ-far-GIV for bear firewood branch

the father sent the kid to bring firewood.' (Gravelle 2010: 374)

Moskona (East Bird's Head)

(547) *...**okuk*** *no-ma-i* *edá* *bua* *bi-ejij* *dif* *edá* *bi-okog* *jig.*

be.like DEIC.NMLZ-far-GIV then 2SG 2SG-twist 1SG then 2SG-precede LOC

'…after that, you should go around me and then precede (me).'

A quite similar exposition can be given for Cholón. In this language, 'before' is expressed by a construction in which the ground clause is obligatorily negated syntactically by *-pa*, as in (548).

Cholón (Hibito-Cholón)

(548) *kasalaŋ* *mi-ki-**pa**-č-**nap**,*

marriage 2SG-do-NEG-FACT-ABL

'Before you marry,

mi-l-Ø-aŋ-ko *tač-Ø*

2SG-3SG-do-INCOMPL-DEM 3SG.see-IMP

look what you do.' (Alexander-Bakkerus 2005: 341)

This construction includes the restricted deranking device *-nap* ‘before’, which is polyfunctional, that is, it denotes ‘before’ when the ground clause shows negative polarity. However, *-nap* can also be used for expressing ‘after’ when the ground clause shows positive polarity (549).

Cholón (Hibito-Cholón)

(549) *mi-ye-y* *ki-khe-**nap**,* *nem* *Ø-poho-w*.
2SG-sleep-PST do-SIM-ABL day 3SG-dawn-PST
‘After you finished sleeping, the day dawned.’ (Alexander-Bakkerus 2005: 340)

9.4.3 Polyfunctionality pattern: ‘After’ and ‘as a result’

The third most common polyfunctionality pattern in the database is between ‘after’ and ‘as a result’. This overlap is not surprising in that *after*-constructions may imply that the figure clause not only happened after the realization of the ground clause situation, but that it is also the result or consequence of the ground clause situation. Languages use various ways for distinguishing ‘after’ from ‘as a result’. In particular, TAM markers play an important role here. An example comes from Bilua. In this language, ‘after’ constructions and ‘as a result’ constructions are formed with the restricted device *ti*, as in (550) and (551). The ‘after’ interpretation of a *ti*-construction is only possible when the ground clause is marked by the present tense marker *=a* and the figure clause appears with the continuity marker *=beta* and the present tense marker *=a*, as in (550) (Obata 2003: 240). The ‘as a result’ interpretation of

a *ti*-construction only arises when the ground clause and figure clause occur in the present tense (551).[85]

Bilua (Solomons East Papuan/Bilua)

(550) *ko=bori=v=**a*** *vo=a* *bakisa,*

3SG.F=carry=3SG.M.OBJ=PRS 3SG.M=LIG custom.money

'She carried the custom money,

ti *ko=**beta*** *ol=**a*** *inio* *matu-peuru* *kale.*

and.then 3SG.F=CONT go=PRS FOC big-village in

and then she went on to the big village.' (Obata 2003: 240)

Bilua (Solomons East Papuan/Bilua)

(551) *ko=ta* *surai=**va**,*

3SG.F=SCM heal=PRS

'It heal,

ti *ko=ta* *poda=k=**a**.*

as.a.result 3SG.F=SCM come.out=3SG.F=PRS

as a result, it came off.' (Obata 2003: 239)

[85] The Bilua example in (550) is interesting in that the construction appears with present tense markers. However, the temporal interpretation is not present time reference. After I consulted the source of this language, it is not clear to me why the temporal interpretation is not present time reference.

9.5 *Before*-clauses: Polyfunctional restricted devices

Before-clauses tend to be realized by polyfunctional devices characterized as bifunctional (64.81%), as in Table 46. Polyfunctional devices used for indicating 'before' may also be trifunctional (26.77%) and quadrifunctional (7.40%). However, these are not common in the database of the present study.

Table 46. Types of polyfunctionality of *before*-clauses

Type of polyfunctionality	**Count**	**Percentage**
Bifunctional	35	64.81
Trifunctional	15	27.77
Quadrifunctional	4	7.40
Total	54	100.00

'Before' is involved in patterns of polyfunctionality with 5 adverbial relations, as is shown in Table 47. Note that 'before' is involved in 77 cases of overlap. In particular, 'before' shows overlaps with other temporal relations (e.g. 'while', 'when', 'after', and 'until'). There is only one overlap with a non-temporal relation. As can be seen in Table 47, *before*-clauses may overlap with avertive 'lest' clauses. This is an interesting finding in that it has been proposed that if a marker used in the expression of 'before' develops an additional use as a marker of some non-temporal meaning, this relation is most likely to be preference (e.g. 'rather than go there by plane, I would take the slowest train'; Kortmann 1997: 192).[86]

[86] Preference constructions are a type of adverbial construction in which of two alternatively possible situations *p* and *q*, *q* is preferred (by the generally volitional subject referents) and renders *p* unnecessary or improbable (Kortmann 1997: 89).

Table 47. Individual polyfunctional patterns of ‘before’ restricted devices

Relation	**Count**	**Percentage**
While-relations	25	32.46
When-relations	21	27.27
After-relations	20	25.97
Until-relations	6	7.79
Lest-relations	5	6.49
Total	77	100.00

As is illustrated in Table 47, the most common overlaps are between ‘before’ and ‘while’ (32.46%), between ‘before’ and ‘when’ (27.27%), and between ‘before’ and ‘after’ (25.97%). As has been demonstrated in §9.3.1 and §9.4.2, languages distinguish ‘before’ from ‘while’, and ‘before’ from ‘after’ by means of negative markers, that is, negative markers serve as morphosyntactic material aiding in the *before*-interpretation.

The polyfunctional patterns attested in the present investigation are similar to those that have been documented by Hetterle (2015: 222) and Kortmann (1997: 181). However, there is one polyfunctional pattern not described in their studies. There are five languages in the sample in which the same restricted device is used for expressing ‘before’ and ‘lest’. The authors of the sources indicate that *before*-clauses developed into avertive ‘lest’ clauses (‘before’ > ‘lest’). In particular, this seems to be common in cases in which a *before*-clause shows an implicature that an undesirable situation is to be avoided. Put another way, the meaning of ‘before’ became enriched inferentially by the implicature that the ground clause invokes an undesired world that can be avoided by the action described in the figure clause. An example illustrating this

development comes from Virgin Islands Dutch Creole. Kuteva et al. (2019b: 864) mention that this language offers a semantically transparent example of how a structure which initially involved a 'before' clause (552), gave rise over time, to the avertive 'lest' construction (553). This has also been documented for other Creole languages (e.g. in Casamancese Creole, the device *antu ku* 'before' developed into an avertive 'lest' device; Michaelis 2018).

Virgin Islands Dutch Creole

(552) *ju fo bli een jaa mi ons,* ***fo*** *ju nee am fa ons.*
2SG MOD stay INDEF year with 1PL before 2SG take 3SG of 1PL
'You must stay with us for one year, before you take her from us.' (Kuteva et al. 2019b: 864; cf. Van Sluijs 2015)

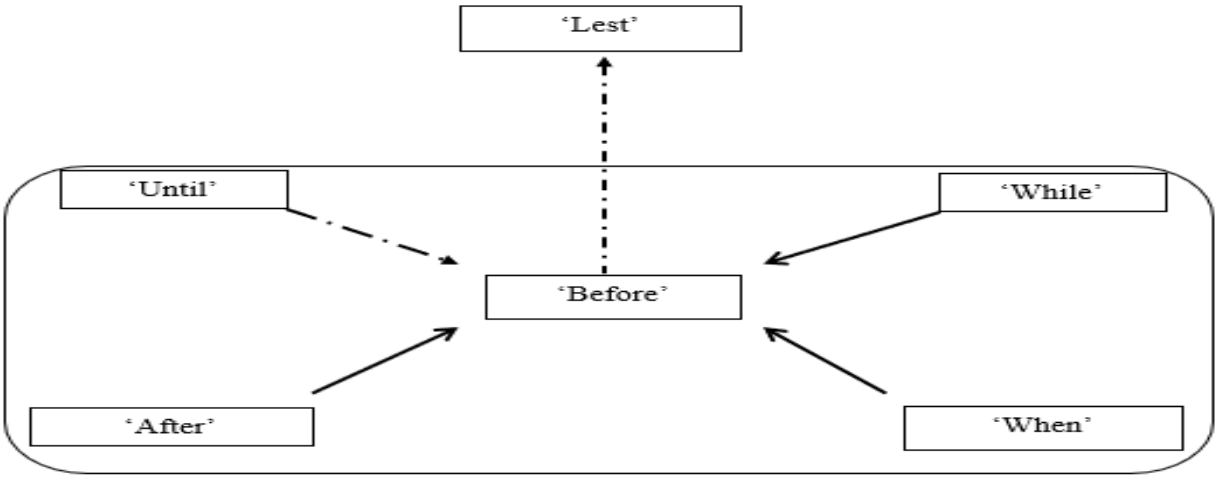
Virgin Islands Dutch Creole

(553) *dan Anáánsi a ho fo loo bet padún,* ***fo*** *sini du am a fort.*
then Anansi PST have for go ask pardon lest 3PL do 3SG LOC prison
'Then Anansi had to ask for forgiveness, lest they put him in prison.' (Kuteva et al. 2019b: 864; cf. Van Sluijs 2015)

The polyfunctionality patterns of 'before' clauses can be seen in more detail in Figure 26. As was shown above, the most frequent overlaps are between 'before' and 'while', between 'before' and 'when', and between 'before' and 'after'. For these connections, the authors of the sources indicate that 'before' developed from 'while' ('while' > 'before'), 'before'

developed from ‘when’ (‘when’ > ‘before’), and ‘before’ developed from ‘after’ (‘after’ > ‘before’).

Figure 26. Semantic map of ‘before’ relations



There is also evidence regarding the directionality of development for the overlaps between ‘before’ and ‘until’ and between ‘before’ and ‘lest’. In these cases, ‘until’ developed into ‘before’ (i.e. ‘until’ > ‘before’) and ‘before’ developed into ‘lest’ (‘before’ > ‘lest’). However, these overlaps are not frequent in the sample.

In what follows, I discuss how the ranges of functions of polyfunctional restricted devices are plausible. Given that I have already discussed the overlaps between ‘while’ and ‘before’ (see §9.3.1) between ‘after’ and ‘before’ (see §9.4.2), and between ‘before’ and ‘lest’ (see above), I focus on the ‘before’ and ‘when’ polyfunctionality pattern (§9.5.1) and on the ‘before’ and ‘until’ polyfunctionality pattern (§9.5.2).

9.5.1 Polyfunctionality pattern: 'Before' and 'when'

To distinguish 'before' from 'when', speakers of many languages use negative markers. In (554), the *before*-clause consists of the restricted device *kur* 'time', which must appear with a 'not yet' marker formed compositionally by the standard negative marker *ɗé* and the adverb(ial) *ɓey* 'still'.

Lele (Afro-Asiatic/East Chadic)

(554) ***kur*** *wèl* *kay* ***ɗé*** ***ɓey*** *ná*,
time pass finish NEG still ASSOC
'Before the day ended (lit. at the time the day has not ended yet),

tamá *na* *du* *è* *sógú* *ni*.
woman HYP 3SG.F go toilet LOC
the wife pretended that she was going to the toilet.' (Frajzyngier 2001: 266)

The restricted device *kur* 'time' is polyfunctional in that it can also be used for denoting another adverbial relation when the ground clause shows positive polarity (555), where the interpretation of the construction marked by *kur* 'time' is that of 'when'. The development of 'when' into 'before' is easy to identify here. In this scenario, a construction appearing with a device meaning 'when' plus a negative marker (i.e. 'when not yet') is pragmatically enriched by the implicature that the situation of the ground clause has not yet been realized when the figure clause situation takes place.

Lele (Afro-Asiatic/East Chadic)

(555) ***kur*** *ro* *gúnyé* *ágì-ì* *jè* *na-ì* *è* *jéèé-ì* *dà* *kama-ŋ,*

time REF spider take.FUT-3SG VEN HYP-3SG go throw-3SG LOC water-DEF

'At the time the spider was about to take him to throw him into the water,

ni *dàì* *kàyo-ŋ* *se* *an* *ná* *galmbo* *kíin-dì…*

LOC 3SG squirrel-DEF INCEP leave ASSOC bag hole-3SG

the squirrel left through the hole in the bag...' (Frajzyngier 2001: 266)

A similar example is found in Mongsen Ao. In this language, *before*-relations are conveyed by *-ku* (556). This construction must appear with the negative marker *mə-*, which is obligatory for expressing 'before'.

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(556) *tə-ku* *lítʃá-pàʔ* *ki* *phi<tʃu>nə* ***mə****-khàp-tsəŋta-****ku****…*

RELAT-uncle Lichaba-M house <DIST>ABL NEG-depart-between-before

'Before he departs from the house of Uncle Lichaba… (Coupe 2006: 447)

When the ground clause shows positive polarity, the restricted deranking device *-ku* is used for signaling a *when*-relation holding between the ground clause and the figure clause (557).

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(557) *a-ki* *tʃhá-thùŋ-**ku**…*

NON.RELAT-house make-reach-when

'When (he) was building his house… (Coupe 2006: 183)

9.5.2 Polyfunctionality pattern: 'Before' and 'until'

Speakers of various languages may also use negative markers for distinguishing 'before' from 'until'. An example comes from Burushaski. In this language, *before*-constructions are formed by a polyfunctional free adverbial subordinator that must appear with a negative marker. In (558), the *before*-meaning does not reside exclusively in the polyfunctional device *qháas* 'before', but it is compositionally encoded by the negative polarity marker *a-* together with *qháas* 'before'.

Burushaski (Isolate)

(558) *baadšáa* *ké* *zizí* *ɣénis-Ø* ***a**-d-é-s* ***qháas**,*

king LINK mother queen-ABS NEG-TEL-get.up-OPT before

'Before the king and his queen woke up,

sínda-c-ar *n-a-n…*

river-ADESS-DAT go.PTCP-1SG-PTCP

I used to go to a river....' (Noboru 2012: 223)

When *qháas* appears in a ground clause in positive polarity, the meaning is that of 'until' (559).

Burushaski (Isolate)

(559) *šaríik* *man-i* *sén-as-at* *šuá* *n-sén* *teíl* *ité*
joining become-IMP.SG say-INF-DAT good PTCP-say in.that.way that

gar-Ø *garoóni-Ø* *bas-s* ***qháas*** *iné-Ø* *ité* *ha-al-e*
marriage-ABS bridal-ABS settle-OPT until that-ABS that house-LOC-ESS

hurút-m-i *jót* *iné* *i-i-Ø.*
sit-NON.PRS-3SG small that 3SG-son-ABS

'On his saying "take part (in my wedding)", (the youngest son) said: "Good!", and so remained in his house until the completion of the marriage, that little son.' (Noboru 2012: 223)

The semantic affinity between 'before' and 'until' can be explained as follows. Constructions encoded by a device meaning 'until' and a negative marker (i.e. 'not until') are pragmatically enriched by the implicature that one of the situations happens before the situation expressed in the other clause. For instance, in the example *not until the rain stopped, could the boys see the view of the ocean*, the implicature is that the rain first stopped and then the boys could see the view of the ocean. In this scenario, the clause *could the boys see the view of the*

ocean can be understood as a situation that has not yet been realized when the other clause situation (i.e. *the rain stopped*) takes place.

9.6 *Until*-clauses: Polyfunctional restricted devices

As was discussed above, 'when' clauses, 'while' clauses, 'after' clauses, and 'before' clauses tend to be encoded by polyfunctional devices characterized as bifunctional. As is shown in Table 48, 'until' clauses show a similar situation in that bifunctional restricted devices (80.76%) outweigh trifunctional devices (13.46%) and quadrifunctional devices (5.76%).

Table 48. Types of polyfunctionality of *until*-clauses

Type of polyfunctionality	**Count**	**Percentage**
Bifunctional	42	80.76
Trifunctional	7	13.46
Quadrifunctional	3	5.76
Total	52	100.00

'Until' is involved in patterns of polyfunctionality with 8 adverbial relations, as in Table 49. In total, 'until' is involved in 65 cases of overlap. 'Until' shows more overlaps with other temporal relations ('when', 'after', 'before', 'while', and 'as long as') than with non-temporal relations (e.g. 'in order to', 'as a result', and 'where). The most frequent polyfunctionality pattern is between 'until' and 'in order to' (44.61%). This is an interesting finding in that Hetterle (2015: 223) shows that if a restricted device encoding 'until' clauses develops an additional use as a marker of some non-temporal relation, this relation is most

likely to be ‘as a result’. The overlap between ‘until’ and ‘in order to’ has been explored in other typological studies. Schmidtke-Bode (2009: 106) shows that this overlap is attested mainly in African languages, such as Noon, Koyra Chiini, and Khoekhoe. In contrast, the overlap between ‘until’ and ‘in order to’ is mainly attested in the Australian languages of the sample of the present research (e.g. Kalkatungu; Blake 1979: 103; Miriwung; Kofod 1978: 142; Nakkara; Eather 1990: 329; Wagiman; Cook 1987: 131; Wambaya; Nordlinger 1993: 86).

Table 49. Individual polyfunctional patterns of ‘until’ restricted devices

Relation	**Count**	**Percentage**
In order to-relations	29	44.61
When-relations	8	12.30
After-relations	7	10.76
Before-relations	6	9.23
As a result-relations	6	9.23
While-relations	3	4.61
As long as-relations	3	4.61
Where-relations	3	4.61
Total	65	100

The ‘until’ overlaps documented here are almost the same as those found in Hetterle (2015: 223) and in Kortmann (1997: 181). One exception is the polyfunctionality pattern between ‘until’ and ‘where’. In three languages of the sample, ‘until’ and ‘where’ are expressed by the same restricted device. An example is attested in Ket. In this language, ‘until’ clauses

and ‘where’ clauses are realized by the free adverbial subordinator *baŋdiŋa*, as in (560) and (561).

Ket (Yeniseian)

(560) *ū* *ab-ɨŋa* *d-ik-s-bess* ***baŋdiŋa***,
1SG 1SG.POSS-DAT 1SG-here-NON.PST-move until
‘Until you come to me

ād *kiséŋ* *as* *di-k-a-doq*.
1SG here FUT 1SG-THEM-NON.PST-live
I will be living here.’ (Nefedov 2015: 181)

Ket (Yeniseian)

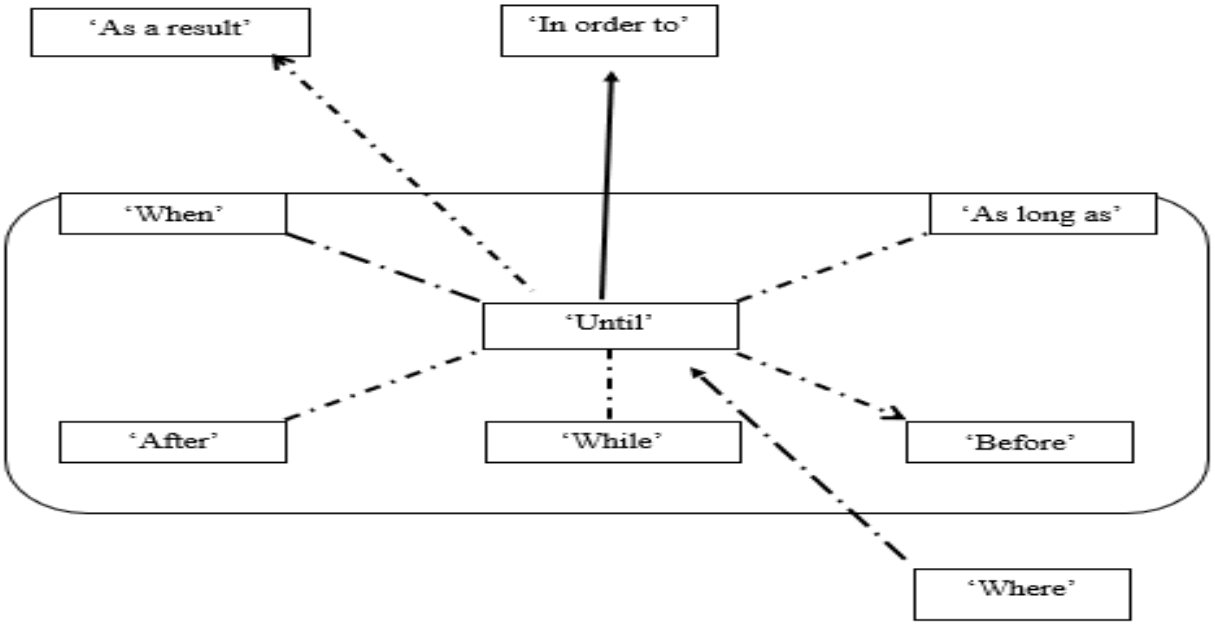
(561) *tib* *du-ses-o-l-ta* ***baŋdiŋa***,
dog 3SG-place-PST-PST-be.in.position where
‘Where the dog sat,

būŋ ***tuniŋa*** *du-ik-n-bes-in*.
3PL there 3PL-here-PST-move-PL
they came.’ (Nefedov 2015: 181)

Nefedov (2015: 180) mentions that “in addition to marking temporal boundary, *baŋdiŋa* can mark locative relations. In the latter case, it requires the presence of a correlative

element in the main clause like, for example, *tuniŋa* 'there'." Accordingly, 'where' meanings are distinguished from 'until' meanings by *tuniŋa* 'there' (561). Note that for this overlap, it has not been possible to determine the conceptual factors that motivate this semantic affinity.

Figure 27. Semantic map of 'until' relations



The polyfunctionality patterns of 'until' clauses are arranged in the semantic map in Figure 27. As was noted above, the most frequent overlap is between 'until' and 'in order to'. Most authors of the sources mention that 'in order to' developed from 'until' (i.e. 'until' > 'in order to'), indicating a direction of development from a concrete to a more abstract meaning. The conceptual factors that motivate this semantic affinity could be explained as follows. Temporal clauses expressing terminal boundary mark the endpoint of a situation expressed in the figure clause. 'Until' can be pragmatically enriched by the implicature that the ground clause is also the purpose of the situation encoded in the figure clause (e.g. 'I did it until she

felt better'). In this scenario, the situation of the figure clause is performed with the intention of obtaining the realization of the situation of the ground clause.

There are other less frequent polyfunctionality patterns (i.e. between 'until' and 'as long as').[87] Of these, the authors of the sources mention the directionality of development of three overlaps. First, 'where' meanings develop into 'until' meanings (i.e. 'where' > 'until'). This indicates that the direction of development has been from space to time. Second, 'until' meanings develop into 'as a result' meanings (i.e. 'until' > 'as a result'). This has not gone unnoticed and echoes Hetterle (2015: 261), who mentions that 'until' and 'as a result' are likely to be related via the context-dependent conventionalized implicature that the endpoint specified in the *until*-clause is also the result or consequence of the figure clause action. Third, 'before' meanings are derived from 'until' (i.e. 'until' > 'before') (see §9.5.2).

In what follows, I focus on how the functions of 'until' and 'in order to' (§9.6.1) and 'until' and 'when' (§9.6.2) are plausible.

9.6.1 Polyfunctionality pattern: 'Until' and 'in order to'

Languages may form 'until' clauses and 'in order to' clauses by the same restricted device. An example is found in Noon. As can be seen in (562) and (563), this language encodes 'until' constructions and 'in order to' constructions by the free adverbial subordinator *bi*. To distinguish the 'until' meaning from the 'in order to' meaning, the ground clause must be

[87] Kortmann (1997: 178) notes that *until*-linking devices may be polyfunctional with *as long as*-relations. He explains that this link stems from the fact that the two relations can to some extent be viewed as complements of each other. For *as long as*-relations, the ground clause situation opens up a time interval for the whole of which the situation of the figure clause is true. On the other hand, *until*-relations introduce the endpoint of the time interval at which the situation of the figure clause is true. This polyfunctionality has also been noted by Wälchli (2018: 190). He mentions that the same device used in the expression of *until*-relations is also used in *as long as*-relations. This is attested in almost all modern Slavic languages, Hindi, Maithili, Hungarian, and Mordvin.

marked by the irrealis marker *-aa* (Soukka 1999: 279), as can be seen in the example in (562). These examples do not exhaust the whole range of ways in which the 'until' and 'in order to' interpretations of polyfunctional devices are computed or have become conventionalized. This stems from the fact that the range is too large.

Noon (Atlantic-Congo/Cangin)

(562) *tíid-aa* ***bi*** *fu* *hot* *boh-**aa***.
walk-IMP until 2SG see baobab-IRR.SUB
'Walk until you see the baobab.' (Soukka 2000: 279)

Noon (Atlantic-Congo/Cangin)

(563) *fu* *tumee* *na* ***bi*** *fu* *laak-ka* *miis* *gayind-e*.
2SG do.PST how in.order.to 2SG get-NARR milk lion-Q
'How did you do in order to get a lion's milk?' (Soukka 2000: 279)

9.6.2 Polyfunctionality pattern: 'Until' and 'when'

There are various languages in the sample that form 'until' clauses and 'when' clauses by the same restricted device. In this scenario, one common way by which languages distinguish 'until' from 'when' is by repeating the verb of the figure clause. An example illustrating this pattern is found in Mbembe. In this language, the primary way for denoting 'until' and 'when' is a relative clause that occurs with the generic head noun of time *ébɔ̄* 'time', as in (564) and (565). The 'until' interpretation is only possible when the verb of the figure clause is reiterated several times (565). The semantic affinity between 'until' and 'when' stems from the fact that

there are contexts in which a 'when' construction may become enriched inferentially by the implicature that the ground clause of the 'when' construction is also the endpoint specified in the figure clause situation.

Mbembe (Atlantic-Congo/Platoid)

(564) ***ébɔ̄*** *ñ=ta* *gbā* *gē,* *hú* *m̃=mbɔ* *yḭ̃ːs*.
time 1SG.SBJ=sieve finish 3SG.OBJ DEF.SG 1SG.SBJ=measure yeast
'At the time I finish sieving it, I measure yeast.' (Richter 2014: 377)

Mbembe (Atlantic-Congo/Platoid)

(565) *ā* ***dū*** ***dū*** ***dū*** ***dū***
2SG.SBJ stir stir stir stir
'You stir, stir, stir, and stir

ébɔ̄ *édɔ* *ē* *ké* *yā* *má* *ékpūrū* *hṹ*
time DEM.ANAPH 3SG.SBJ PROX.FUT come be thick DEF.SG
until it becomes thick.' (Richter 2014: 378)

9.7 Summary

This chapter has demonstrated that polyfunctional devices of temporal adverbial relations may be bifunctional, trifunctional, and quadrifunctional. However, most polyfunctional devices are bifunctional in the sample of the present study.

I have made several observations regarding the polyfunctionality patterns of restricted devices. First, ‘when’ is involved in patterns of polyfunctionality with 9 adverbial relations. The most common patterns are between ‘when’ and ‘while’ and between ‘when’ and ‘if’. I have shown that if a marker of ‘when’ develops an additional use as a marker of a non-temporal relation, this relation is most likely to be ‘if’. The analysis has also discussed two polyfunctionality patterns that have not been addressed in previous typological studies, i.e. the polyfunctionality pattern between ‘when’ and ‘where’ and the polyfunctionality pattern between ‘when’ and ‘as soon as’.

Second, ‘while’ is involved in patterns of polyfunctionality with 12 adverbial relations. The most common patterns are between ‘while’ and ‘when’ and between ‘while’ and ‘before’. The analysis indicates that if a device signaling ‘when’ develops an additional use as a marker of a non-temporal relation, this relation is most likely to be ‘if’ or ‘although’. The investigation has also revealed one polyfunctionality pattern not described in previous typological studies: a couple of Afro-Asiatic languages have a restricted device used for expressing ‘while’ and ‘without’.

Third, ‘after’ is involved in patterns of polyfunctionality with 10 adverbial relations. The most common overlaps are between ‘after’ and ‘when’, between ‘after’ and ‘before’, and between ‘after’ and ‘as a result’. I have demonstrated that if a restricted device encoding ‘after’ clauses develops an additional use as a marker of some non-temporal clause, this non-temporal clause is most likely to be ‘as a result’. The investigation has also uncovered two patterns not addressed in previous research, i.e. the polyfunctionality pattern between ‘after’ and ‘until’ and the polyfunctionality pattern between ‘after’ and ‘lest’.

Fourth, ‘before’ is involved in patterns of polyfunctionality with 5 adverbial relations. In particular, ‘before’ shows overlaps with other temporal relations (e.g. ‘while’, ‘when’, ‘before’, and ‘until’). I have proposed that if a restricted device encoding ‘before’ clauses develops an additional use as a marker of some non-temporal relation, this relation is most likely to be ‘lest’. I have also discussed one pattern not explored in previous studies. There are languages in which the same restricted device conveys ‘before’ and ‘lest’.

Fifth, ‘until’ is involved in patterns of polyfunctionality with 8 adverbial relations. The most frequent polyfunctionality pattern is between ‘until’ and ‘in order to’. I have proposed that if a restricted device encoding ‘until’ clauses develops an additional use as a marker of some non-temporal relation, this relation is most likely to be ‘in order to’. One polyfunctionality pattern attested in the present study, but not addressed in previous investigations, is the overlap between ‘until’ and ‘where’. In exploring the polyfunctionality patterns of restricted devices, I have also discussed the range of ways by which the different adverbial interpretations of polyfunctional devices are computed or have become conventionalized. In particular, TAM values, negative markers, and clause order play an important role here.

In this chapter, I have established the directionality of development of various patterns (e.g. ‘where’ > ‘when’; ‘when’ > ‘if’; ‘when’ > ‘while’; ‘when’ > ‘after’; ‘when’ > ‘before’; ‘while’ > ‘before’; ‘while’> ‘although’; ‘while > ‘without; ‘after’ > ‘before’; ‘after’ > ‘because’; ‘after’ > ‘lest’; ‘after’ > ‘as a result’; ‘before’ > ‘lest’; ‘where’ > ‘until’; ‘until’ > ‘before’; ‘until’ > ‘as a result’; ‘until’ > ‘in order’). For many polyfunctionality patterns, it was possible to explain the conceptual factors that motivate specific semantic affinities. For instance, ‘after’ clauses may develop into ‘because’ clauses. This development stems from the

fact that two situations that are mentioned together as adjacent in time are often inferred to be causally related (cf. Thompson et al. 2007: 247). Another example is the overlap between 'after' and 'as a result'. This pattern is not surprising in that *after*-constructions may imply that the figure clause not only happened after the realization of the ground clause situation, but that it is also the result or consequence of the ground clause action. The overlap between 'until' and 'as a result' is likely to be related via the context-dependent conventionalized implicature that the endpoint specified in the *until*-clause is also the result or consequence of the figure clause action (cf. Hetterle 2015: 261).

CHAPTER 10

Areality of temporal clause-linking strategies

In the last decade, linguistic typology has become more interested in asking questions, such as "What's where why?", What linguistic structures are there in human languages, and how can we compare them? Where do we find these structures, i.e. are they areally or genealogically restricted, or are they universally preferred or dispreferred? Why do we find the structures where they are? (Bickel 2015: 901). The present chapter is concerned with precisely the question: why do we find the structures where they are? That is, why are specific patterns only attested in specific areas? How can we explore the directionality of spread of a linguistic pattern in a specific area?

As was shown in most chapters of this dissertation, various rare temporal clause-linking devices occur in areal clusters, suggesting that language contact may have a played a role in their distribution (e.g. consecutive constructions in Australian languages; §5.2.2). The following question is concerned with this domain. **Research question 6**: how can we determine the directionality of spread of rare temporal clause-linking devices attested in the sample of the present study?

This chapter is organized as follows. In §10.1, I introduce the readers to the steps that are followed to examine the areality of temporal clause-linking strategies. In §10. 2, I turn my attention to eight temporal clause-linking strategies that appear in areal clusters in the languages of the sample. I start by exploring the areality of correlative attributive temporal clauses (§10.2.1) and verb-doubling constructions used for indicating 'while' (§10.2.2) in South Asian languages. §10.2.3 focuses on the areality of consecutive constructions in African languages, in particular, special attention is paid to consecutives in Ik and Nilotic languages.

After this, I investigate the areality of 'and then' devices consisting of a demonstrative plus an ablative marker (§10.2.4) and consecutive constructions (§10.2.5) in Australian languages. This is followed by a discussion of the areality of 'only' used for indicating 'as soon as' (§10.2.6) and 'to get tired' used for signaling 'for a long time' (§10.2.7) in languages spoken in Mali. §10.2.8 discusses the areality of 'only' used for indicating 'until' in Australian languages. Finally, the chapter concludes by providing a brief summary of the main findings of the chapter as a whole (§10.3).

Before I proceed, two remarks are in order here. First, I use the term 'model' to refer to the language that serves as the source of diffusion of 'X'. Furthermore, I use the term 'replica' to refer to the language that copied 'X' from a model language. Second, the present chapter only takes into account temporal clause-linking strategies that are the result of pattern replication (i.e. strategies replicated with native material; see §10.1). Accordingly, I use the term 'copying' (Johanson 2008) and not "borrowing". This stems from the fact that the term borrowing has been used for the most part to refer to linguistic transfers involving phonological material/phonetic substance (Heine & Kuteva 2006; Matras & Sakel 2007).

10.1 Exploring areal clusters

To explore the areality of temporal clause-linking strategies, I have adopted a series of methodological steps primarily inspired by Comrie (2007, 2008b, Comrie 2016) and Mithun (1992, 2005, 2007, 2008a, 2008b, 2012a, 2012b, 2012c, 2013).

The first step in this study was to determine the cross-linguistic diversity of temporal clause-linking strategies expressing: (1) *when*-relations (Chapter 3), (2) *while*-relations (Chapter 4), (3) *after*-relations (Chapter 5), (4) *before*-relations (Chapter 6), and (5) *until*-

relations (Chapter 7). This step has been important in that it has revealed the range of strategies encoding temporal adverbial clauses and their cross-linguistic distribution. Furthermore, exploring their distribution has enabled me to determine which strategies are common or rare cross-linguistically (Cysouw 2011: 412). The notion 'rare' refers to the individual strategies used for expressing temporal adverbial relations.

The second step was to determine whether rare temporal clause-linking strategies show areal clusters. When two languages come into contact, that is, when speakers use two languages, this may lead to the transfer of linguistic material from one language to the other. Such linguistic transfer constitutes contact-induced language change (Bickel 2015: 911; Kuteva 2017: 163). In this dissertation, an areal cluster may be composed of two or more languages in a designated geographic region. The ideal areal cluster is one in which the languages are grouped together in very close geographical proximity. Furthermore, it is composed of strategies not attested in other areas of the world or strategies rarely attested cross-linguistically (Comrie 2007: 20; Cysouw 2011: 422). If neighboring languages have similar rare patterns encoding temporal adverbial clauses, it is statistically unlikely that these languages have undergone such a rare developmental process independently of one another (Comrie 2007: 21; Comrie 2016: 374; Heine & Kuteva 2008: 69). Exploring this type of areal cluster is important for explaining the historical development of language and the synchronically observable diversity of languages (Seifart 2019: 13). The areality of temporal clause-linking strategies is a puzzle because speakers seem to have replicated these strategies with native material. This is known as pattern replication. In this scenario, only the patterns of the other language are replicated, i.e. the organization, distribution, and mapping of grammatical or semantic meaning, while the form itself is not borrowed (Heine & Kuteva

2006; Matras & Sakel 2007). Put another way, no phonetic substance is involved but rather the transfer of patterns or structural templates (Kuteva 2017: 166).

Three types of replication are identified in the literature: (1) contact-induced grammaticalization, (2) polysemy copying, and (3) restructuring (i.e. rearrangement) (Heine & Kuteva 2005: 100). First, contact-induced grammaticalization refers to a grammaticalization process that is due to the influence of one language on another, e.g. the grammaticalization development of a *wh*-interrogative word into a relative clause marker in Europe (Kuteva 2017: 175). This is represented as a development along a grammaticalization path with three distinct stages: interrogative stage, complementizer stage, relativizer stage (see Heine & Kuteva 2006: 204). Second, by polysemy copying is meant those instances in which both the lexical (or less grammatical) structure and the grammatical (or more grammatical) structure(s) that the same linguistic expression has given rise to in the model language are replicated in the replica language (see Heine & Kuteva 2005: 100). Third, restructuring refers to those cases of linguistic transfer where, as a result of contact with the model language, an existing structure in the replica language is rearranged (see Heine & Kuteva 2005: 111). It has not been possible to determine whether the examples discussed in this chapter are the result of contact-induced grammaticalization or polysemy copying. To explore this issue, it is necessary to analyze whether 'X' involves intermediate stages of evolution, that is, what distinguishes polysemy copying from canonical instances of contact-induced grammaticalization is that the former does not appear to involve intermediate stages of evolution (Heine & Kuteva 2005: 102). However, the sources used in the present study do not provide enough data to explore this issue. Accordingly, this chapter can only make a modest contribution to this domain.

An example of pattern replication comes from languages spoken in northeastern Africa. As discussed in §5.4.6, in the Ethiopian Cushitic language Kambaata, the similative enclitic morpheme =*g* 'like' is used for introducing temporal clauses expressing immediate temporal subsequence (566) (Treis 2017: 108).

Kambaata (Afro-Asiatic/Highland East Cushitic)

(566) *qoomaax-í* *móos-u* *yoo-ssá* *ann-iichchí-i*
leprosy-M.GEN disease-M.NOM COP-3PL.OBJ.REL father-M.ABL-ADD

am-aachchí-i *qal-an-táa* *ciil-l-áta*
mother-F.ABL-ADD bear-PASS-3F.IPFV.REL infant-PL-F.ACC

*qal-an-tóo=**g**-a-n* *qal-antáa* *ass-éen*.
bear-PASS-3.PFV.REL=as.soon.as-M.OBL-NTR separate-M.ACC do-3SG.HON
'Infants are separated from their leprous father and mother as soon as they are born.'
(Treis 2017: 109)

Intriguingly, many northeastern African languages also use similative 'like' markers for expressing 'as soon as' (Treis 2017: 91-133). The probability of chance resemblance is low given the rarity of this strategy. Olguín Martínez et al. (2019) show that this type of temporal clause-linking device is attested only in this area of the world. Therefore, this is an ideal feature for the purposes of the present study. The clusters composed of rare features seem to be the result of event-based triggers (inducers), that is, historical events that led patterns to spread

due to intensive language contact. In this particular scenario, patterns have been copied not because they have a universally high probability of developing, but out of mere fashion (Bickel 2017). Bickel (2015: 911) mentions that "event-based theories account for those processes of copying and replication that are not grounded in how well structures fit with the way our brain or communication works, but that instead result from whatever happens to be popular and en vogue in a given situation during a given time." Put another way, event-based theories explain that the relevant structures were replicated by speakers just for their popularity at the time, and not for any functional reason. For example, relative pronouns and *have*-based perfects are extremely rare in that they do not seem to develop in different areas of the world. They appear to have spread because of specific historical contingencies that left a signal only in a single region in Europe (Bickel 2017).

The third methodological step, followed in this chapter, is to explore the internal diversity of the genera composing the areal cluster. Bickel (2008) mentions that for many typological research questions, it has become crucial to study intra-genetic variance. This is essential, for example, if one wants to estimate historical stability, transition probabilities, and direction of spread of a pattern. Accordingly, once an areal cluster is identified, it will be necessary to explore the internal diversity of each genus (Foley 1986: 263; Heine & Kuteva 2005: 185).

The fourth step is to establish the possible places from which a particular development could have originated. Little is known about the criteria we can adopt to determine the directionality of spread of a pattern (i.e. who passed it to whom) once an areal cluster is identified. In what follows, I adopt the following criteria to propose the directionality of spread of a pattern. It seems that if a phenomenon is found in language "X" but not its closest relatives

and also in a whole group of languages “Y”, then it is more likely a particular feature has spread from “Y” to “X”. For instance, Mithun (2012a: 30) notes that Yuki has sentence connectors that serve an important role in reference tracking. She mentions that the elaborate Yuki system has no counterpart in Wappo, the other language genetically related to Yuki. Interestingly, the neighboring Pomoan languages contain clause-linking devices that are strikingly similar to those in Yuki, and are reconstructible to Proto-Pomoan, which seems to suggest that Pomoan languages may have served as the model languages. Heine & Kuteva (2005: 23-24) mention that Estonian grammaticalized the verb *tulema* ‘to come’ to a modal auxiliary for the deontic modality of necessity (‘must’, ‘have to’). They note that the Baltic language Latvian also grammaticalized the verb for ‘come’ in its reflexive form to a modal auxiliary (*nākties*) also expressing the deontic modality of necessity. They explain that since Estonian and Latvian are not genetically related, language contact is the most plausible hypothesis. Interestingly, Finnish, a language closely related to Estonian, also uses the verb for ‘come’ as a modal auxiliary for deontic modality. They conclude that the most plausible hypothesis is that this transfer proceeded from a Finnic to a Baltic language, that is, from Estonian to Latvian, rather than the other way round. Although it is more likely that a particular feature has spread from “Y” to “X” under the scenario introduced above, exploring the time depth of the languages composing the areal cluster can also be helpful. If a phenomenon is found in language “X” but not its closest relatives and also in a whole group of languages “Y”, then it is more likely that this feature spread from “Y” to “X”. However, if the time depth of “Y” is rather shallow, then presumably something could have been copied from X’s ancestor into Proto-Y. This is an issue that is also taken into account here to explain the directionality of spread.

Fifth, further evidence that a language has copied a pattern also comes from the additional functions that a specific pattern may have. If a language has copied not only the pattern, but also the whole range of additional functions of the pattern, this represents strong evidence that language contact has played a role. Daniels & Brooks (2019) propose that an enclitic =*a* spread through language contact across unrelated Papuan languages spoken along the lower Sogeram River in the Middle Ramu region of present-day Madang Province, Papua New Guinea. One type of evidence they provide is that the languages that have copied the enclitic =*a* have also copied the range of functions of this item, in particular its exclamative function and its clause-linking function. It is important to note that if a pattern develops more functions in 'X' than in 'Y', this does not necessarily provide information about the antiquity and direction of areal diffusion. This idea was proposed by Jacobsen (1980) who mentions that if a particular trait is "better installed" in 'X' than in 'Y', this indicates that the trait spread from 'X' to 'Y'. By "better installed' is meant a pattern found in 'X' that has developed a larger range of functions than in 'Y' (Campbell 1985: 31). The main thrust of this theoretical notion is that more time is required to produce a good or "deep installation" (Campbell 1985: 31). Although this criterion is plausible for determining the direction of spread, caution needs to be exercised. With this in mind, "installation" should not be employed as a definitive criterion Instead, Comrie (2007: 31) mentions that historical linguistic research is needed in order to uncover where a particular pattern arose and how it spread via language contact.

Sixth, another piece of evidence that is used for further supporting the hypothesis that a pattern may have spread through language contact comes from cultural practices or historical events. Bickel (2017) mentions that areal clusters that have been formed due to event-based triggers can be explored by adopting causal theories based on social/cultural history,

anthropology, language spreads, contact events, and migration patterns as revealed for example through population genetics.

Seventh, the last piece of evidence that is employed in this chapter comes from the formal properties of the syntactic construction in which the temporal clause-linking device appears. One example illustrating this scenario comes from causal clauses in Mixtec languages. This type of adverbial clause is encoded by markers based on body-part terms meaning 'foot', 'stomach', and 'nape' (Hollenbach 1995: 186-187), a strategy that seems not to be attested in other parts of the world. Note that markers based on body-part nouns used for expressing causal relations may be followed by a complementizer, as in (567) or (568).

Jamiltepec Mixtec (Oto-Manguean/Mixtecan)

(567)	*kwahan*	*ra*	*nunduva*	***chaha***	***cha***	*vátyí*	*kwātyi*	*ra*.
	go.CONT	3SG.SBJ	Oaxaca	foot	COMP	exist.CONT	sin	3SG.POSS

'He went to Oaxaca because he is guilty.' (Johnson 1988: 130)

Yosondúa Mixtec (Oto-Manguean/Mixtecan)

(568)	*kúsɨ̄ɨ̄*	*dā*	***sɨ̃kɨ̄***	***xā***	*nihi*	*dā*	*kwaha*	*shuhun*.
	be.happy.CONT	3SG.POSS	nape	COMP	get.COMPL	3SG.SBJ	much	money

'He is happy because he received a lot of money.' (Farris 1992: 153)

Huasteca Nahuatl, a language not genetically related to Mixtec languages, seems to have copied a pattern similar to the one attested in Mixtec languages for encoding causal adverbial clauses. As can be seen in (569), Huasteca Nahuatl may employ a construction that

occurs with the body-part noun *chotl* ‘foot’, followed by the complementizer *para* ‘that’. Interestingly, Huasteca Nahuatl also seems to have copied other constructional properties. In various Mixtec languages, when the causal clause appears before its figure clause, the figure clause appears with a linking device meaning ‘as a result’ or ‘therefore’. Note that the figure clause in the Huasteca Nahuatl example in (569) occurs with *yekah* ‘consequently’. Accordingly, this seems to indicate that Huasteca Nahuatl copied various constructional properties of the Mixtec causal adverbial construction (e.g. a marker based on a body-part term noun meaning ‘foot’, a complementizer following the linking device, and the figure clause appears with a linker meaning ‘as a result’).

Huasteca Nahuatl (Uto-Aztecan/Aztecan)[88]

(569) ***chotl*** ***para*** *ni-mits-maki-li-k*,
foot that 1SG.SBJ-2SG.OBJ-hit-APPL-PFV
‘Because I hit you,

yekah *ti-choca-k*.
thus 2SG.SBJ-cry-PFV
you cried.’

This section has provided a detailed explanation of the methodology that is followed to analyze areal clusters for which multiple strands of evidence thus converge to explain the directionality of spread.

[88] The Huasteca Nahuatl example comes from own fieldwork.

10.2 Areal clusters of temporal clause-linking strategies

In this section, I follow the methodology sketched above for exploring the areality of eight temporal clause-linking strategies that appear in areal clusters in the languages of the sample. Note that as far as possible an attempt is made to establish the directionality of spread of a linguistic pattern, although a number of difficult cases remain.

10.2.1 Correlative attributive temporal clauses: South Asian languages

Correlative constructions are constructions in which the head noun appears in a full form within the relative clause and appears again in the main clause in a pronominal or non-pronominal form (see §3.3.1). This type of construction is very common in Indo-Aryan languages. Note that their use is not limited to relative clauses in that formally identical constructions are also used for various types of adverbial clauses, including *when*-clauses (see §3.3.1). In particular, this type of construction is frequent when a generic temporal noun appears in the correlative clause and this generic temporal noun is taken up again in the correlate clause, as is shown in the Kashmiri example in (570).

Kashmiri (Indo-European/Indo-Aryan)

(570) *Aslaːm aːv* ***tami saːti***,
Aslam come.PST REL time
'At the time Aslam came,

yemi ***saːtɨ*** *Mohan* *doːraːn* *oːs*.

CORR time Mohan run.PRS.PTCP was

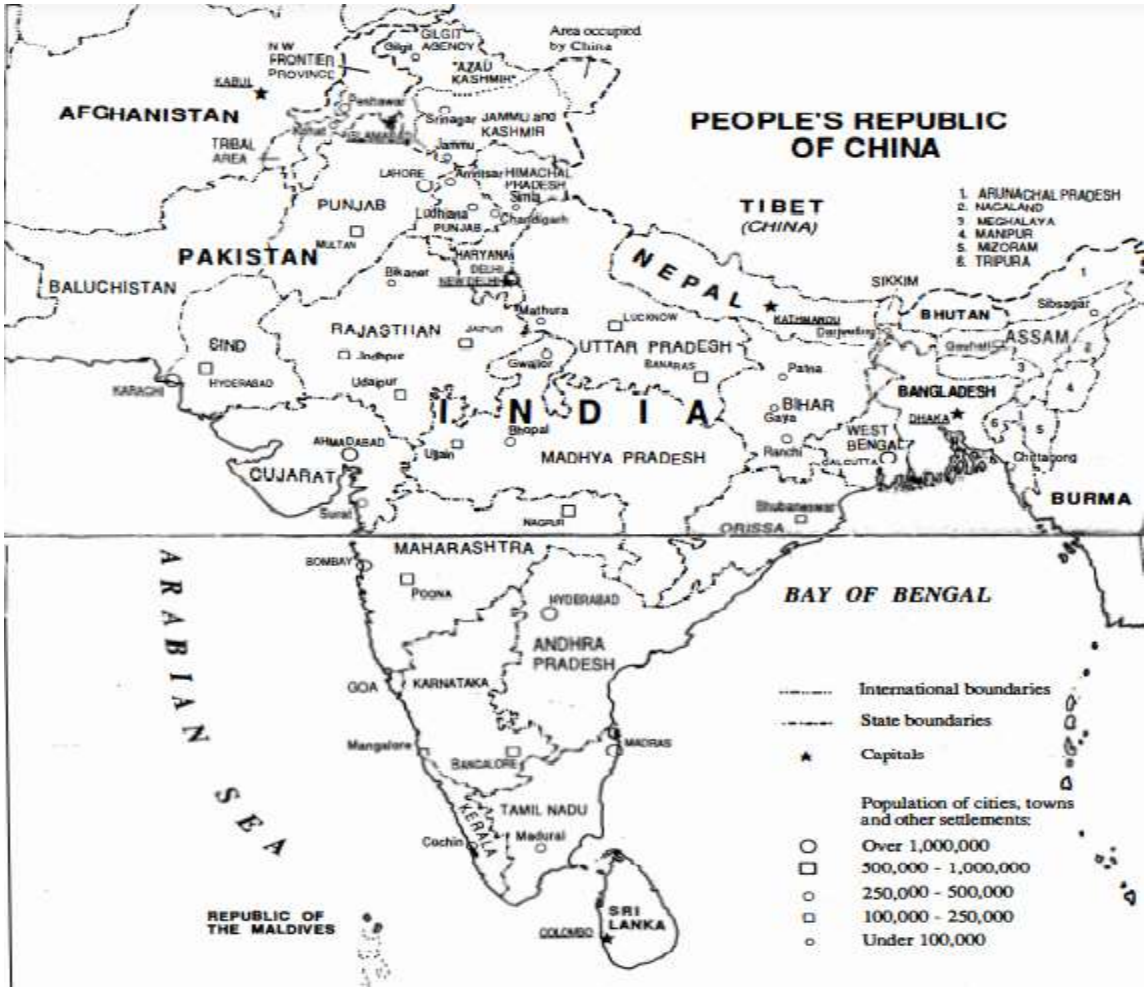
Mohan was running.' (Koul & Wali 2006: 159)

Recall that other languages of the sample with a similar pattern are Tamil (Dravidian/South Dravidian), Kharia (Austro-Asiatic/Munda), and Cholón (Hibito-Cholón). Given that this pattern is rare in that it is mainly attested in South Asian languages not genetically related (i.e. Tamil, Kashmiri, and Kharia), it is likely that it may have spread through language contact. In what follows, I explore the internal diversity of each of the genera comprising this areal cluster and then I proposed several hypotheses regarding the directionality of diffusion of this clause-linkage pattern.

10.2.1.1 Correlative attributive temporal clauses: Indo-Aryan

The Indo-Aryan languages are a sub-branch of the Indo-European family (Masica 1991: 3). They are spoken mainly in South Asia. The countries represented by this area include India, Pakistan, Bangladesh, Nepal, Bhutan, and the islands of Sri Lanka and the Maldives (Cardona & Jain 2007: 1; see Map 25).

Map 25. Indo-Aryan languages (Masica 1991: 15)



Besides Kashmiri, other Indo-Aryan languages with correlative attributive temporal clauses are the following. In Rajbanshi, the correlative clause appears with the generic temporal noun *kʰuna* ‘time’ and the relative pronoun *jei-*, as in (571). Note that the correlate clause appears with the same generic temporal noun *kʰuna* ‘time’ accompanied by the demonstrative *ʌi-* ‘that’.

Rajbanshi (Indo-European/Indo-Aryan)

(571) ***jei-kʰuna*** *mo-r* *gʰʌr-er* *lok-tʌ* *ni* *rʌhʌ-b-ɪ* *gʰʌr-ʌt,*

which-time 1SG-GEN house-GEN man-CL NEG be-FUT-3SG house-LOC

'At the time that my husband is not at home,

ʌi- kʰuna *ja-ba* *hʌ-b-ɪ.*

DEM-time go-INF must-FUT-3SG

I will have to go.' (Wilde 2008: 328)

A similar example is attested in Maithili. In this language, 'when' is expressed by a construction in which the correlative clause is marked by *khən* 'time' and *jə-* 'which'. The correlate clause appears with *khən* 'time' and *tə* 'that', as in (572).

Maithili (Indo-European/Indo-Aryan)

(572) ***jə-khən*** *həm* *pəhũc-l-əhũ,* ***tə-khən*** *əhã* *nəi* *ch-əl-əhũ.*

which-time 1SG arrive-PST-1SG that-time 2SG NEG be-PST-2SG

'At the time I arrived, you were not (there).' (Yadav 1997: 361)

Bangla also encodes 'when' constructions by a correlative pattern. In (573), the correlative clause appears with the generic temporal noun *khon* 'time' and *jɔ* 'which'. Note that the correlate clause is marked by the same generic temporal noun (i.e. *khon* 'time') and the demonstrative *tɔ* 'that'.

Bangla (Indo-European/Indo-Aryan)

(573) *apni* ***jɔ-khon*** *Baŋladés-e* *chi-l-en,*

2SG.HON.NOM which-time Bangladesh-LOC be-PST-3SG.HON

'At the time you were in Bangladesh,

tɔ-khon *ki* *Baŋla-e* *kɔtha* *bol-t-en.*

that-time Q Bangla-LOC word say-PST.HAB-3SG.HON

did you speak Bangla?' (David 2015: 286)

Hindi shows different types of correlative constructions used for indicating 'when'. First, this language has a construction in which the ground clause is marked by *jab* 'when' and the figure clause appears with *tab* 'then', as in (574).

Hindi (Indo-European/Indo-Aryan)

(574) ***jab*** *mɛ̃* *ja:ta:* ***tab*** *vah* *bhi:* *ja:ta:* *hɛ.*

when 1SG go.PTCP then 3SG too go.PTCP is

'When I go, he goes too.' (Koul 2009: 198)

Second, there are correlative constructions in which the correlative clause is marked by the generic temporal noun *samay* 'time' and *jis* 'which', and the correlate clause occurs with the generic temporal noun *samay* 'time' and *us* 'that', as in (575).

Hindi (Indo-European/Indo-Aryan)

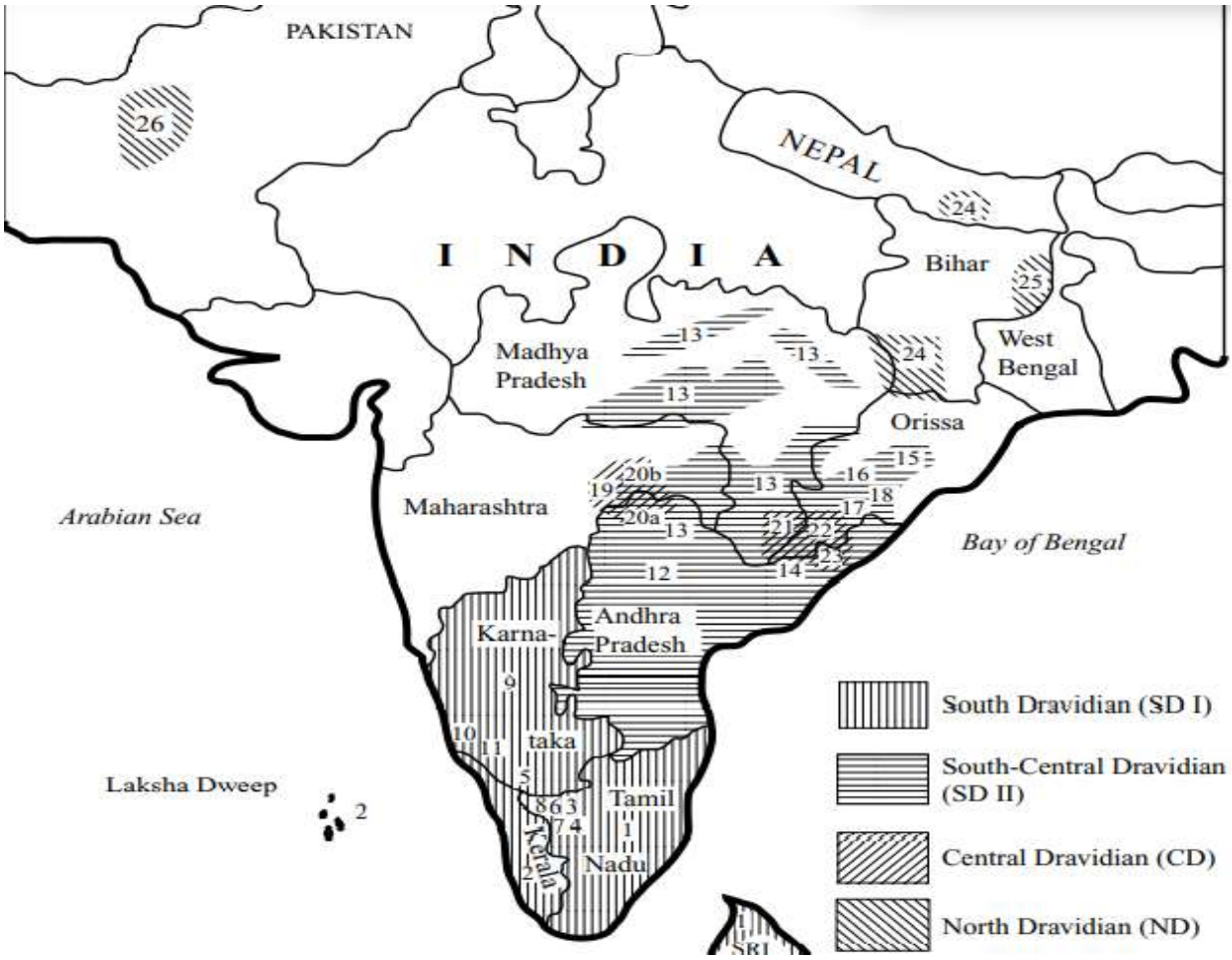
(575)	*Mohan*	***us***	***samay***	*aːya*	***jis***	***samay***	*vah*	*dɔr-raha*	*thaː*.
	Mohan	that	time	come.PST	which	time	3SG	run-PROG	was

‘Mohan came at the time he was running.’ (Koul 2009: 200)

10.2.1.2 Correlative attributive temporal clauses: Dravidian

The Dravidian language family comprises at least twenty-three languages spoken primarily in South Asia by as many as 220 million people. The majority of the Dravidian languages are concentrated in southern and central India, spreading south from the Vindhya Mountains across the Deccan Plateau all the way to Cape Cormorin. Elsewhere, they are spoken in Bangladesh, Nepal, Pakistan, and Sri Lanka (Steever 1998: 1). The Dravidian language family has four genera: South Dravidian (e.g. Badaga, Irula, Kannada, Kodagu, Malayalam, and Tamil); South-Central Dravidian (e.g. Gondi, Konda, Manda, Pengo, and Telugu); Central Dravidian (e.g. Gadaba, Kolami, and Naiki); and North Dravidian (e.g. Brahui and Malto).

Map 26. Dravidian languages (Krishnamurti 2003: 18)



Dravidian languages encode ‘when’ clauses by various types of clause-linking strategies, such as deranking devices (Krishnamurti 2003: 440). One strategy that is common in languages of this language family is the correlative construction. As was mentioned in §10.2.1, Tamil has a construction, where the correlative clause appears with the generic temporal noun *pootu* ‘time’ marked by *e-* ‘which’ and the correlate clause occurs with the generic temporal noun *pootu* ‘time’ marked by the demonstrative *a-* ‘that’ (Lehmann 1993: 351). Other Dravidian languages with a similar pattern are Telugu, as in (576), Brahui, as in (577), and Kurux, as in (578).

Telugu (Dravidian/South Dravidian)[89]

(576) ***eppuDu*** *aakal(i)* *ay-tee,* ***appuD-ee*** *annam* *tin-aali.*

time hunger exist-COND time-FOC food eat-OBLIG

'One should eat only at the time one gets hungry.' (Krishnamurti & Gwynn 1985: 362)

Brahui (Dravidian/North Dravidian)

(577) ***eekaa*** ***ullaa*** *niim* *atti* *oonoor,* ***a*** ***ullaa*** *nuu* *kheeor.*

which day you that eat.FUT that day you die.FUT

'The day you will eat it, you will die.' (Lakshmi Bai 1985: 185)

Kurux (Dravidian/North Dravidian)

(578) ***ekʔam-biːri-m*** *iːd* *xacrʔ-oː,* ***aː-biːri-m*** *kʰeʔ-oy* *kaːl-oy.*

any-time-FOC this go.off-3SG.FUT that-time-FOC die-2SG.FUT go-2SG.FUT

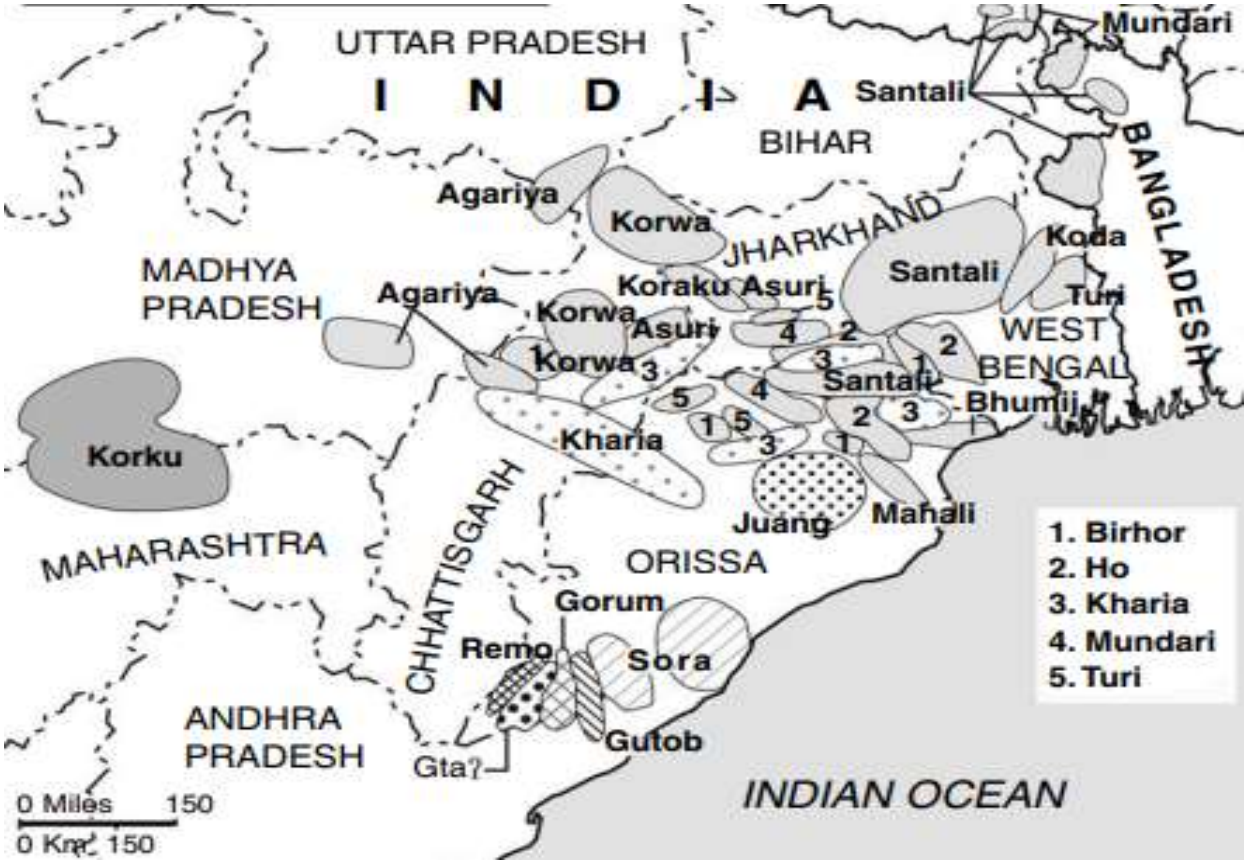
'At the time this (string) comes off, you are going to die.' (Kobayashi & Tirkey 2017: 185)

10.2.1.3 Correlative attributive temporal clauses: Munda

Munda languages belong to the Austroasiatic language family and are spoken in eastern central India (see Map 27). They are the westernmost Austroasiatic genus, and, together with the Meghalayan (Khasian, Khasic) and Nicobarese languages, the only Austroasiatic languages spoken outside the Mainland Southeast Asian linguistic area (Polančec 2018: 60).

[89] Glosses of the sample provided by Siva Kalyan (personal communication).

Map 27. Munda languages (Anderson 2008: 2)



One Munda language of the sample forms ‘when’ constructions with a correlative pattern. In Kharia, while the correlative clause is marked by *bhere* ‘time’ and *ata*, the correlate clause is marked by the demonstrative *hin* ‘that’ and *bhere* ‘time’, as in (579).

Kharia (Austro-Asiatic/Munda)

(579) ***ata*** ***bhere*** *bulbul* *poɾda* *raja* *Nãwkod* *Najor* *Israeli* *lebu=ki=te*

CORR time Babylon village king Nawkod Najor Israeli person=PL=OBL

bãdi *bay=kon* *misar* *raij* *ɖoˀɖ=na* *laɾ=ki*,

imprisonment make-SEQ Egypt kingdom take=INF IPFV=MID.PST

'At the time Nawkod Najor, king of the village of Babylon, imprisoned the Israelis and was taking them to Egypt,

hin ***bhere*** *ho=ki* *purkha=ki* *Khaɽiya* *buŋ=ga* *aw=ki=may*.

that time that=PL ancestor=PL Kharia INSTR=FOC love-MID.PST-3PL

these ancestors (of the Israelis) lived with the Kharia.' (Peterson 2011:186)

Another Munda language with a similar pattern is Santali. In this language, one primary way for expressing 'when' is a construction where the correlative clause occurs with *jɔkhɔn* 'time' and the correlate clause appears with *jɔkhɔn* 'time' and *un-* 'that', as in (580).

Santali (Austro-Asiatic/Munda)

(580) ***jɔkhɔn*** *uni-iɲ* *met-a-e-kan* *tahɛ̃kan-a*,

time 3SG-1SG tell-APPL-3SG.OBJ-COP COP.PST-FIN

'At the time I was telling him,

un-jɔkhɔn	*uni*	*bhəgi-ɔkɔc'-tɛ*	*aɲjɔm-et'-tahɛ̃kan-a.*
that-time	3SG	good-attentive-INSTR	hear-IPFV-COP.PST-FIN

he was listening to it attentively.' (Ghosh 2008: 84)

Other Munda languages do not seem to encode 'when' clauses with a correlative pattern. Saora indicates 'when' by an attributive temporal clause marked by *ābelā* 'time' (Nayak 1995: 200). A similar pattern is found in Juang, in which 'when' is signaled by an attributive temporal clause marked by *beḷɔte* 'time' (Patnaik 2008: 533). Mundari forms 'when' clauses by the restricted deranking device *-re* (Osada 2008: 150). In a similar fashion, 'when' clauses are marked by the restricted deranking *-re* in Ho (Anderson et al. 2008: 235). In Korku, the restricted deranking device *-ki* conveys 'when' (Zide 2008: 293).

10.2.1.4 Discussion

I have shown that correlative attributive temporal clauses are attested mainly in Indo-Aryan and Dravidian languages. Note that only a couple of Munda languages seem to express 'when' by a correlative pattern. The question is: is it possible to determine the directionality of spread of this pattern?

Let us first discuss the scenario of correlative attributive temporal clauses in Munda languages. The contiguity of Indo-Aryan languages with other language families has had significant consequences on these languages, an outcome of long-standing multilingualism (Cardona & Jain 2007: 7). It is widely recognized that Indo-Aryan languages (e.g. Sadri, Hindi, Bengali) have had an enormous impact on the Munda languages of eastern-central India, especially with respect to their syntax and the lexicon (Peterson 2010: 56). These languages

are spoken in the state of Jharkhand, which is one of the linguistically most diverse regions of India (Abbi 1997). The level of multilingualism is relatively high in Jharkhand, at least in southwestern Jharkhand. In this region most speakers of Munda languages are fluent in their native language as well as Sadri and Hindi (Peterson 2010: 59).

As was mentioned in §10.2.1.3, speakers of Kharia signal 'when' with a correlative pattern. Kharia is often spoken in multilingual communities, where its speakers are in daily contact with speakers of Sadri, the traditional lingua franca of the region, and Hindi (both Indo-Aryan), and Kurux (North Dravidian). All speakers of Kharia are multilingual and speak Kharia, Sadri and Hindi fluently. Conversely, speakers of other languages in the region occasionally have some degree of fluency in Kharia if they live in predominantly Kharia-speaking areas (Peterson 2011: 5). As mentioned earlier, Hindi encodes 'when' constructions by a correlative pattern. In a similar fashion, Kurux conveys 'when' by a correlative pattern. With respect to Sadri, 'when' constructions are formed by a correlative pattern in which the correlative clause appears with *khən* 'time' and *jə* 'which', and the correlate clause occurs with *khən* 'time' and *tə* 'that' (Srivastava 1989: 309). One hypothesis is that Kharia copied the correlative pattern from either Sadri or Hindi. Peterson (2011: 26) explain that there is little doubt that the correlative attributive temporal clause in Munda languages has been copied from Indo-Aryan languages. This stems from the fact that the correlative pattern is widespread in Indo-Aryan languages and rare in Munda languages.

As for Santali, the other Munda language with a correlative attributive temporal clause, it is also likely that speakers of this language copied the pattern from an Indo-Aryan language. This stems from the fact that speakers of Santali have copied many linguistic traits from

neighboring Indo-Aryan languages (i.e. Bengali in West Bengal, Hindi in Jharkhand and Bihar, Oriya in Orissa, and Assamese in Assam; Ghosh 2008: 15).

The discussion now turns to correlative attributive temporal clauses in Dravidian languages. One hypothesis is that Dravidian languages copied the correlative pattern from Indo-Aryan languages. In this regard, many researchers think that correlative clauses occur in Dravidian through diffusion from Indo-Aryan (Sridhar 1990:47; Asher & Kumari 1997: 53). However, care should be taken with this hypothesis. Steever (1998: 33) mentions that it is not likely that the Dravidian correlative pattern was copied from Indo-Aryan in that it is attested in the early written records and this phenomenon is reconstructible for Proto-Dravidian. Note, however, that for some Dravidian languages, it is clear that they borrowed the correlative pattern from Hindi. In Malayalam, one primary way for conveying 'when' is a construction in which the correlative clause appears with *ētu* 'which' and *samay* 'time', and the correlate clause occurs with *ā* 'that' and *samay* 'time', as in (581). Recall that Hindi has a similar correlative attributive temporal construction (i.e. the correlative clause appears with the generic temporal noun *jis* 'which' and *samay* 'time', and the correlate clause occurs with *us* 'that' and the generic temporal noun *samay* 'time'). Note that the Malayalam correlative construction is intriguing in that the use of indigenous words meaning 'which' and 'that' are the result of pattern replication. However, the generic temporal nouns that appear in both clauses are not the result of pattern replication in that the linguistic transfer involves phonological material/phonetic substance.

Malayalam (Dravidian/Southern Dravidian)[90]

(581) *Aslām* ***ētu*** ***samay-attə*** *ānō* *va-nn-atə*
Aslam which time-LOC be come-PST-PTCP
'At the time Aslam came,

ā ***samay-attə*** *Mōhan* *ōt-uk* *āy-irunnu*.
that time-LOC Mohan run-INF be-PST
Mohan was running.'

10.2.2 Verb-doubling in the expression of 'while': South Asian languages

While' constructions are formed by verb-doubling in four languages of the sample (see §4.3.2). This construction is mainly attested in South Asian languages not genetically related (i.e. Malto, Kharia, and Dhimal). Given that this pattern is not frequent in other areas of the world, it is very likely that it spread through language contact. Verb-doubling may appear either as an exact copy of the verb, or as a partial copy of it, and the verbs do not have to appear adjacent to one another (see §1.4.1.1). In what follows, I analyze whether the languages genetically related to Malto, Kharia, and Dhimal also express 'while' in a similar way and then I propose several hypotheses regarding the directionality of spread of the verb-doubling pattern.

10.2.2.1 Verb-doubling in the expression of 'while': Dravidian

Speakers of Malto indicate 'while' by a verb-doubling construction. In (582), the verb of the ground clause is doubled. This pattern may also be used for signaling manner, as is shown in

[90] Example provided by P. Sreekumar (personal communication).

(583). In this example, the ground clause specifies the manner in which the situation expressed in the figure clause is carried out. Other Dravidian languages with a similar pattern are Kodava and Kannada (Abbi 1991: 37) in that verb-doubling indicates 'while' and manner.

Malto (Dravidian/Northern Dravidian)

(582) *eːn* ***ʈunɖ*** ***ʈunɖ-n-i,*** *aːh* *muluh-ɾ-aːh.*

1SG.NOM see see-PRS-SIM 3SG.NOM.M drown-PASS-3SG.M

'While I was looking, he drowned.' (Puttaswamy 2009: 206)

Malto (Dravidian/Northern Dravidian)

(583) *a:d* ***lap-n-i-lap-n-i****-i:d-i:* *avɖ-a:d.*

3SG eat-PRS-SIM-eat-PRS-SIM-3SG-EMPH speak-3SG

'She spoke eating.' (Puttaswamy 2009: 206)

There are Dravidian languages in which verb-doubling is used only for signaling manner and not 'while'. In Betta Kurumba, manner constructions are encoded by a verb-doubling pattern, as is shown in (584), where the ground clause verb *koŋɖayr* 'behave' is doubled. These verbs must occur with the restricted deranking device *-i*. 'While' constructions are marked by the restricted deranking device *-ən*, as in (585). Other Dravidian languages with a similar pattern are Telugu and Malayalam (Abbi 1991: 37). In these languages, verb-doubling is only used for signaling manner and not 'while'.

Betta Kurumba (Dravidian/Southern Dravidian)

(584) *a:ngi tana* ***koɳɖayr-i*** ***koɳɖayr-i*** *mu:ru erji gutnu…*

thus EMPH behave-CVB behave-CVB three year until

'They did that for up to three years carrying on like that…' (Coelho 2003: 91)

Betta Kurumba (Dravidian/Southern Dravidian)

(585) *erg-i:r-pu-**ən**, pina i uɖgiti maɳɖi-əl pya:nu nəyr-i:r-d-ədə.*

sleep-STAT-IRR-while then this woman head-LOC louse look-STAT-REAL-SG

'While he was sleeping, this woman was looking for lice on his head.' (Coelho 2003: 82)

There are Dravidian languages that do not use verb-doubling for expressing manner, but only 'while'. In Tamil, manner is signaled by the deranking device *-i*, as in (586), and 'while' is indicated by the verb *kol* 'to hold', as in (587) (Lehmann 1993: 271) or by a verb-doubling pattern (e.g. *pesə pesə* 'while she talked…'; Abbi 1991: 37).

Tamil (Dravidian/Southern Dravidian)

(586) *Kumaar oot-**i** va-nt-aan.*

Kumar run-CVB come-PST-3SG

'Kumar came running.' (Lehmann 1993: 274)

Tamil (Dravidian/Southern Dravidian)

(587) *Kumaar* *kuli-ttuk* ***kon****-tu,* *paat-in-aan.*

Kumar bathe-PTCP hold-PTCP sing-PST-3SG

'While Kumar was taking a bath, he sang.' (Lehmann 1993: 271)

10.2.2.2 Verb-doubling in the expression of 'while': Munda

Kharia denotes 'while' by a verb-doubling pattern. In the example in (588), the verb *ɖoko* 'sit down' is doubled. Peterson (2011: 331) mentions that sometimes both verbs may be marked by the imperfective converb *-na*. Verb-doubling may also be used for expressing manner, as can be seen in (589). A closer look reveals that verb-doubling is also attested in other Munda languages. However, this pattern is only used there for indicating manner, and not 'while' (e.g. Santali; Ghosh 2008: 82).

Kharia (Austro-Asiatic/Munda)

(588) *Raʈa=te* ***ɖoko*** ***ɖoko*** *lemeʔɖ* *laʔ=ki.*

Rata=OBL sit.down sit.down sleep EMOT=MID.PST

'While he was seated, Rata became tired.' (Peterson 2011: 333)

Kharia (Austro-Asiatic/Munda)

(589) *ro* *ho* *kuda* *koloŋ=aʔ* *daru* *sumbhoʔ=te* ***iɲam=ga*** ***iɲam=ga*** *goj.*

and that millet bread=GEN tree base=OBL cry=FOC cry=FOC die

'She just dies at the base of the millet bread tree crying.' (Peterson 2011: 332)

10.2.2.3 Verb-doubling in the expression of 'while': Sino-Tibetan

'While' constructions formed by a verb-doubling pattern seem to be very common in Sino-Tibetan languages, in particular, this pattern is common in Sino-Tibetan languages spoken in Nepal and India. In Dhimal, the doubled verbs of the ground clause must appear with the restricted deranking device *-pa* 'while', as in (590).

Dhimal (Sino-Tibetan/Dhimalic)

(590) *ota* ***hane-pa*** ***hane-pa***, *belhaʔt-a* *wa*.
there go-while go-while be.dusk-FUT DED
'While going there, dusk may fall.' (King 2009: 115)

A similar pattern is found in Lhomi. In this language, verb-doubling is used for signaling 'while', as is shown in (591).

Lhomi (Sinot-Tibetan/Bodic)

(591) *tɕheppa* ***dʑak-kin*** ***dʑak-kin*** *Sempuŋ-nala* *juŋ-en*.
rain rain-CVB rain-CVB Sempung-ALL come-PST
'I came around Sempung while it was raining.' (Vesalainen 2016: 318)

There are other languages in which verb-doubling does not indicate 'while'. Instead, this pattern signals manner. An example comes from Meithei. In this language, manner constructions are formed by a verb-doubling pattern, as in (592), where the verb of the ground clause is doubled.

Meithei (Sino-Tibetan/Kuki-Chin)

(592) *mə-hák* *kwá* ***yon-nə*** ***yon-nə*** *wá* *ŋáŋ-ləm-li*.
3SG-here betel.nut sell-CVB sell-CVB word speak-EVID-PROG
'He spoke selling betel nut.' (Chelliah 1997: 267)

10.2.2.4 Discussion

I have shown that 'while' constructions formed by verb-doubling are common in Dravidian, Munda, and Sino-Tibetan languages. It was also pointed out that in some languages, verb-doubling can be employed for indicating 'while' and manner, and in other languages, this pattern can be used only for one of them, 'while' or manner. One hypothesis is that Dravidian, Munda, and Sino-Tibetan languages copied the verb-doubling pattern from Indo-Aryan languages.

Indo-Aryan languages have a verb-doubling construction used for indicating manner (see Abbi 1991; for a detailed treatment of verb-doubling and clause-linkage in Indo-Aryan languages). In Hindi, verb-doubling constructions are used for indicating the manner in which the situation expressed in the figure clause is carried out, as in (593). In this example, the verb *rote* is doubled and both verbs are marked by a deranking device.

Hindi (Indo-European/Indo-Aryan)

(593) *vah* ***rote*** ***rote*** *aːyaː*.
3SG.SBJ weep.CVB weep.CVB came
'He came crying.' (Koul 2009: 201)

In a similar fashion, Kashmiri indicates a manner adverbial relation with a verb-doubling construction. In (594), the verb form *doːraːn* is doubled. Note that in Hindi and Kashmiri the doubled verb is marked by a deranking device.

Kashmiri (Indo-European/Indo-Aryan)

(594) *su* *aːv* ***doːraːn*** ***doːraːn***.
3SG.SBJ came run.CVB run.CVB
'He came running.' (Koul & Wali 2006: 159)

The verb-doubling construction is also attested in other Indo-Aryan languages, such as Maithili, as in (595) and Bangla, as in (596), among others. Unlike Hindi and Kashmiri, doubled verbs in Maithili and Bangla must appear with imperfective markers.[91]

[91] Dogon languages also seem to have a similar construction for expressing manner. In this construction, the verb of the ground clause is doubled, as in the Nanga example in (i). In this example, at first glance, it looks like the verb of the ground clause is repeated three times. However, Heath (2016a: 319) mentions that the first item should be considered a noun and not a verb. That is, the initial *gìyé* is a cognate nominal that is not part of the iteration *gíyè-gìyè*. A similar example can be found in Togo Kan. In (ii), the initial *wìrɛ̌ⁿ* is a cognate nominal that is not part of the iteration *wírɛ̀-wírɛ̀* (Heath 2015b: 303). This construction has been called "backgrounded durative verb-iterations" (Heath 2016a: 319).

(i) Nanga (Dogon)
gìyé ***gíyè-gìyè*** *yèː-ø*.
dance dance-dance come.PFV-3SG.SBJ
'He came dancing.' (Heath 2016a: 319)

(ii) Togo Kan (Dogon)
wó ***wìrɛ̌ⁿ*** ***wírɛ̀-wírɛ*** *ñá* *sùg-è*.
3SG.SBJ whistle whistle-whistle ground go.down-PFV
'He came down whistling.' (Heath 2015b: 291)

Maithili (Indo-European/Indo-Aryan)

(595) *məugi* ***bəj-əit*** ***bəj-əit*** *kan-ə* *lag-əl*.
woman speak-IPFV speak-IPFV weep-INF attach-PST
'The woman began to cry talking.' (Yadav 1997: 369)

Bangla (Indo-European/Indo-Aryan)

(596) *śoŋgit* ***śun-te*** ***śun-te*** *nac-a* *bhalo* *lag-ø-e*.
music hear-IPFV hear-IPFV dance- VBL.N good strike-PRS-HON
'I like to dance listening to music.' (Yadav 1997: 279)

Other Indo-Aryan languages with a similar pattern are Assamese, Gujarati, Punjabi, Sadari, Dogri, and Oraon, among others (Abbi 1991: 34). It is worth mentioning that verb-doubling in Indo-Aryan languages is also used for expressing 'while' (e.g. 'while we were talking, tears came into her eyes'). For instance, 'while' constructions are formed in Nepali by a construction in which the verb of the ground clause is doubled, as in (597). In a similar fashion, manner is indicated by a verb-doubling pattern, as in (598). Accordingly, this indicates that the verb-doubling pattern can be used for signaling manner and 'while' in Indo-Aryan languages. The verb-doubling pattern can be reconstructed for Proto-Indo-Aryan (Abbi 1991).

Nepali (Indo-European/Indo-Aryan)

(597) ***soc-daa*** ***soc-day*** *usko* *kalpanaa-maa,* *u* *ekdam* *risaa-yo*.
think-CVB think-CVB GEN imagination-LOC 3SG very.much angry-3SG.PST
'While he was daydreaming, he got angry.' (Ichihashi-Nakayama 1994: 49)

Nepali (Indo-European/Indo-Aryan)

(598) ***khaa-daa*** ***khaa-day*** *u* *mar-yo*.

eat-CVB eat-CVB 3SG die-3SG.PST

'He died eating.' (Slater 1994: 156)

For Munda languages, I have been able to determine the Indo-Aryan languages from which the verb-doubling pattern was copied. Recall that all speakers of Kharia are multilingual and speak Kharia, Sadri and Hindi fluently. One hypothesis is that Kharia copied the pattern from Sadri or Hindi. As for Santali, the verb-doubling construction may have been copied from Bengali, Hindi, Oriya, or Assamese.

For Sino-Tibetan languages, the picture is more diverse. For instance, the verb-doubling construction in Dhimal may have been copied from Bengali or Maithili. Culturally and linguistically, Dhimals have been more heavily influenced by and feel more akin to neighboring lowland indigenous groups such as the Northern Bengali-speaking Rajbangsi to the east and the Dehati Maithili-speaking Tharu to the west (King 2009: 3). The Dhimal verb-doubling construction may have also been copied from Nepali. Dhimals usually teach their children to speak Nepali (King 2009: 16). With respect to Lhomi, the verb-doubling construction may have been copied from Nepali. Note that Lhomi grammar has been heavily influenced by Nepali (Vesalainen 2016: 12). Due to extensive cultural contact with Bengali and in recent times Assamese and Hindi, Meithei contains a large number of borrowed lexical items (Chelliah 1997: 2). Accordingly, it is very likely that the Meithei verb-doubling construction was copied from any of these Indo-Aryan languages.

For Dravidian languages, the picture is not entirely clear. The Malto verb-doubling constructions may have been copied from Bengali or Hindi. Malto has been heavily influenced by Hindi and Bengali. There is a growing tendency towards language shift which is seeing Hindi and Bengali gradually replacing Malto (Puttaswamy 2009: 18). Hindi and Bengali are used for communication beyond the Malto speaking community. It is unknown for the speakers of other languages to attempt to speak in Malto. Puttaswamy (2009: 20) mentions that "the probable reason for asymmetric multilingualism in the region and the lack of motivation for the speakers of the dominant languages to learn Malto may be because of the lower social and economic status of the community and the lack of visibility, institutional support and recognition for Malto as a language." The Malto verb-doubling construction may have also been copied from Santali, a Munda language that has also influenced various domains of Malto grammar. The Santals were brought in by the then British administration, from the Chotanagpur plateau to reside around the foothills of the Rajmahal hills in the 19th century (Puttaswamy 2009: 19).

10.2.3 Consecutive constructions: Ik and Nilotic languages

As was discussed in Chapter 5, consecutive constructions are attested in many African languages, such as Atlantic-Congo languages (e.g. Bantu languages) and Afro-Asiatic languages, etc. Recall that by a consecutive construction, I mean a construction in which only the first clause shows the formal characteristics of an independent clause, and the following clause or clauses are characterized by a reduction or lack of verbal inflection, and/or by the use of a restricted deranking device called the consecutive (see §5.2.2.1 for a more detailed discussion of consecutive markers in African languages).

As was mentioned in §5.2.2.1, Lopit and Ik are two languages of the sample that use consecutive constructions for expressing temporal subsequence. In Lopit, the consecutive marker *x-* is used for indicating temporal subsequence, as in (599) (Moodie & Rosey Billington 2020: 269).

Lopit (Eastern Nilotic)

(599) *e-ìyánì* *xíwarʊ́* *ŋàmà* ***x*-*o*-*ìsìérè*** *dè=xùróxó.*
3SG-bring leopard.NOM sorghum.ABS SEQ-3SG-give to=goat.kids.ABS
'The leopard brought the sorghum and then gave it to the young goats.' (Moodie & Rosey Billington 2020: 269)

In Ik, consecutive markers are used for signaling that the situation of the figure clause follows in sequence after the situation encoded in the ground clause, as in (600). Given that the two languages are spoken in the same region, they are not genetically-related, and they share several linguistic traits (e.g. Schrock 2014: 36), it is very likely that the consecutive pattern may have spread through language contact. The question is: did the consecutive pattern spread from Lopit to Ik or the other way around? In the following subsections, I analyze the range of ways by which temporal subsequence is expressed in Nilotic languages and Kuliak languages.

Ik (Kuliak)

(600) *ɪtsʊ́ŋ-ḵɔ-ɛsɛ* *ríj-ík-a* *ɔkɔ́b-ɪma-**k**ᵊ′.*

burn-COMPL-SPS forest-PL-NOM cultivate-1PL.EXCL-SEQ

'The forest areas are burned and then we cultivate.' (Schrock 2014: 395)

10.2.3.1 Nilotic languages

Nilotic is a family with a three-way division: Eastern Nilotic, Southern Nilotic, and Western Nilotic (Vossen 1981; Grimes & Grimes 1996), as can be seen in Map 28. As was mentioned above, Lopit, an Eastern Nilotic language, encodes 'after' constructions by a consecutive pattern. The speakers of Lopit live in the Lopit Mountains, northeast of Torit in the Eastern Equatoria Province of South Sudan, as well as in diaspora communities (Moodie & Rosey Billington 2020: 2). In the following subsections, I analyze whether other Eastern Nilotic languages also have a consecutive pattern used for indicating temporal subsequence. Furthermore, I explore whether Southern and Western Nilotic languages also have consecutive constructions.

Map 28. Nilotic languages (Mietzner 2009: 21)

10.2.3.1.1 Eastern Nilotic languages

Consecutive markers have been called “subsecutive mood markers” or “narrative markers” in the linguistic tradition of Eastern Nilotic languages. This kind of marker is relatively common in Eastern Nilotic languages (Moodie & Rosey Billington 2020: 269). In particular, consecutive constructions are attested in Teso-Turkana languages. In Ateso, the consecutive

marker *kà-* is used for talking about a situation in the past, mostly in narratives. In (601), the sequential situation is expressed by a construction that appears with a finite verb followed by a clause that carries the consecutive marker *kà-*. Note that the finite verb, always occurring in sentence-initial position, carries the TAM marking (Barasa 2017: 245).

Ateso (Eastern Nilotic)

(601) *é-péé* *ékúrùdìdì* ***kà**-kìŋàm*
3SG-roast.PST maize.ABS CONS-eat
'She roasted the maize and then ate it.' (Barasa 2017: 245)

Another Teso-Turkana language with a similar pattern is Toposa. In this language, as is shown in (602), a typical consecutive construction starts with a finite clause that is inflected for TAM and the following clause carries the consecutive marker *to-*/*ki-* which signals the TAM dependency on the finite verb and the temporal subsequence relation holding between clauses (Schröder 2013: 27)

Toposa (Eastern Nilotic)

(602) *abu* *Nyakuju,* *to-limoki..*
came.PST God CONS-tell
'God came, and then told….' (Schröder 2013: 27)

Turkuna is another Teso-Turkana language with a consecutive construction. In this language, temporal subsequence is indicated by the consecutive marker *k-*, as can be seen in the example in (603).

Turkana (Eastern Nilotic)

(603) *ɛ̀-à-ìmùj-i'* *ekàsukowùt* ***k**-iyar-a-kin-ɻ̀*.
3SG-PST-eat-ASP old.man CONS-belch-EP-DAT-V
'The old man ate and then belched.' (Dimmendaal 1983: 174)

The Lotuxo-Maa languages of Eastern Nilotic, also have consecutive constructions. As was mentioned earlier, one Lotuxo-Maa language with a consecutive pattern is Lopit, as can be seen in (604), where the temporal subsequence relation holding between clauses is signaled by *x-*.

Lopit (Eastern Nilotic)

(604) *e-ìyánì* *xíwarʊ́* *ŋàmà* ***x**-o-ìsìérè* *dè=xùróxó.*
3SG-bring leopard.NOM sorghum.ABS SEQ-3SG-give to=goat.kids.ABS
'The leopard brought the sorghum and then gave it to the young goats.' (Moodie & Rosey Billington 2020: 269)

A similar construction has also been documented in Maa (Lotuxo-Maa). In this language, 'after' is signaled by *n-* (Tucker & Mpaayei 1955: 65). The verb of the first clause in (605) "carries a non-indicative tone morpheme, and the listener understands that the hearing

event directly and perhaps immediately precipitates the following event (Payne 2015: 32)." Payne (2015: 30) explores many discourse contexts in which the Maa *n-* marker appears and finds out that the marker is not limited to indicating temporal subsequence. She notes that *n-* can also be found in independent main clauses. In particular, it can be used for expressing meta-comments, as in (606).

Maa (Eastern Nilotic)

(605) *ɛ-ibʊŋ-ák-i* *in=kíshú* *ɛnyénā,*
3SG-grab-PFV-PASS PL=cattle 3SG
'His cattle had been grabbed,

n*-é-pūkū* *a-ló* *a-sʊj.*
CONN-3SG-emerge INF.SG-go INF.SG-follow
'and then he went following them.' (Payne 2015: 31)

Maa (Eastern Nilotic)

(606) ***n****-é-ish-ʊnyɛ* *ɛnk=átiní* *âî* *tɛ* *íne.*
CONN-3SG-finish-VEN.MID F.SG=story.NOM my.NOM OBL there.NOM
'(And) my story ends there.' (Payne 2015: 31)

Other Lotuxo-Maa languages do not express temporal subsequence with a similar pattern. For instance, in Otuho, 'after' constructions are formed with the sequential

coordinating device *et꞉e* ‘and then’ (Muratori 1938: 163-164; cf. Moodie & Rosey Billington 2020: 271).

Before I leave the present subsection, it should be noted that Barian languages, another group of languages of Eastern Nilotic, do not encode ‘after’ constructions with a consecutive pattern. Instead, other clause-linking devices are used for signaling temporal subsequence (e.g. Mandari indicates temporal subsequence by the sequential coordinating device *a* ‘and then’ or *kurut* ‘and then’; Lutwori et al. 2013: 131). Accordingly, consecutive constructions are only attested in several Teso-Turkana languages and in several Lotuxo-Maa languages.

10.2.3.1.2 Southern Nilotic languages

Consecutive constructions are attested mainly in Datooga languages. There are two patterns by which consecutive constructions are formally marked: (1) a tonal pattern and (2) the verbal form *á(k)*-.

Consecutive constructions in Asimjeeg Datooga are formally marked by tone only. In (607), the first clause features the regular non-consecutive low-low tonal pattern. The second clause in the same example occurs with the high-low consecutive tonal pattern, indicating that the consecutive situation occurred after the completion of the previously referred situation.

Asimjeeg Datooga (Southern Nilotic)

(607) *q-à:-jì-t* *à:* *g-á:-**dʒì:l:***.

AFF-1SG-arrive-DIR and AFF-1SG-give.birth.CONS

‘I arrived and then gave birth.’ (Griscom 2019: 201)

Consecutive constructions have also been reported for other varieties of Datooga, such as Gisamjanga Datooga (Rottland 1982: 176; Kießling 2007; Kießling et al. 2008; cf. Griscom 2019: 201). The formal properties of the consecutive construction in Asimjeeg Datooga are distinct from those consecutive constructions reported for other varieties. While the consecutive construction in Asimjeeg Datooga is encoded by a tonal pattern, the consecutive construction is marked by the marker *á(k)-* in other Datooga language varieties (e.g. Gisamjanga Datooga; Griscom 2019: 258).

Gisamjanga Datooga (Southern Nilotic)

(608) *qóo-húudâan* *máaŋée-cêepta*, ***á**-kòo-ŋwêers-ạ*

3SG-tear.off front.leg-child CONS-3SG-look.at-TERM

'She tore off the child's arm, and then she looked at it.' (Kießling 2007: 131)

The Kalenjin languages of Kenya, also belonging to Southern Nilotic, do not seem to express temporal subsequence with a consecutive pattern. For instance, Akie has two 'and then' coordinators that convey temporal subsequence (i.e. *kóto* 'and then' and *ko* 'and then'; Heine et al. 2015: 49). Ogiek, another Kalenjin language, employs the free adverbial subordinator *koinon* 'after' (Micheli 2018: 91). Nandi conveys temporal subsequence by means of asyndesis (Creider & Creider 1989: 130-131) or by the free adverbial subordinator *kíːng* 'after' (Creider & Creider 1989: 150).

10.2.3.1.3 Western Nilotic languages

Western Nilotic consists of Burun laguages, Dinka-Nuer languages, and Lwoo languages. Of these, I have not identified any language that employs a consecutive pattern for expressing temporal subsequence. For instance, Lwoo languages tend to use sequential coordinating devices. In Luwo, 'after' constructions are encoded by the sequential coordinating device *éc* 'and then' (Storch 2014: 54). In Acholi, temporal subsequence is conveyed by the sequential coordinating device *ci* 'and then' (Bavin 1982: 243). In Dholuo, 'after' is expressed by *kendo* 'and then' (Okoth Okombo 1997: 65). In Anywa, 'after' is signaled by the sequential coordinator *óo* 'and then'. Sequential clauses encoded by *óo* 'and then' are particularly frequent in narrative and in procedural discourse. They have the pragmatically important function of pushing a story or the description of a processing technique forward. The device *óo* 'and then' is most probably derived from the verb 'to come'. The succession of a number of related situations is, thus metaphorically conceptualized as a series of situations moving towards the speaker or point of reference (Reh 1996: 422). Note that there seems to be dialectal variation in that other Anywa dialects do not employ *óo* 'and then'. Instead, speakers of other dialects (e.g. Pacolo Anywa) used the sequential coordinator *nī* 'and then' (Reh 1996: 422)

As for Dinka-Nuer languages, speakers of these languages encode 'after' constructions with 'and then' coordinating devices or free adverbial subordinators (e.g. Dinka forms 'after' constructions with *lɔk* 'and then' or with *cɔk* 'after'; Nebel 1948: 169; Nuer expresses temporal subsequence by *kə* 'and then' or by the free adverbial subordinator *kɛ kɔɔr* 'after'; Grossman & Faust, in preparation).

For Burun languages, I have only identified a dictionary that explicitly indicates that Jumjum 'after' constructions are realized by the sequential coordinating device *i* 'and then'

(Fadul et al. 2016: 15) or by the sequential coordinating device *wäättana* ‘and then’ (Fadul et al. 2016: 23).

Bavin (1982: 245) mentions that Lango has a consecutive pattern that indicates temporal subsequence, as in (609), where the ‘and then’ relation is expressed by the restricted deranking device -*tɛ*. However, Noonan, in his grammar of Lango, explicitly states that this is not a restricted deranking device. Instead, he mentions that *tɛ* is a verb used as clause-linking device, as in (610). This clause-linking device is use for advancing the narrative, indicating continuity in the linear sequence (Noonan 1992: 231). Accordingly, it is not clear whether this form should be characterized as a consecutive marker or not.

Lango (Western Nilotic)

(609) *gin* *o-rego* *o-**tɛ**-biddo*…
3PL 3PL-grind 3PL-CONS-soak
‘They grind it (millet) and then soak it…’ (Bavin 1982: 245)

Lango (Western Nilotic)

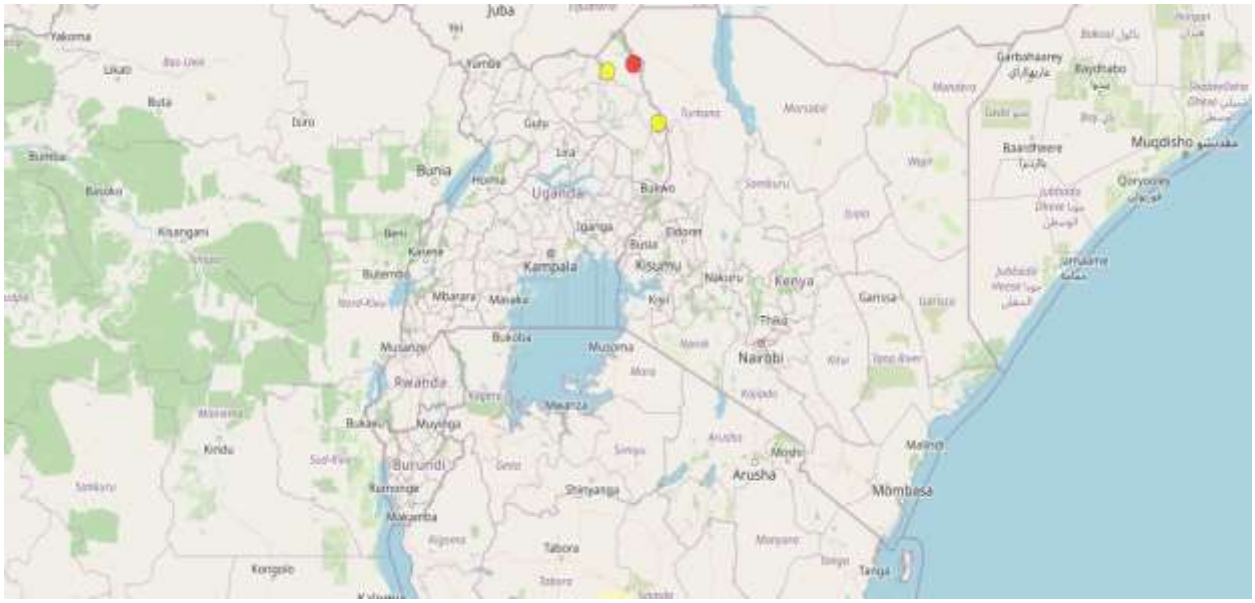
(610) *án* *àtédò* *rìŋó* ***àtɛ̂*** *càmmò*.
1SG 1SG.cook.PFV meat 1SG.go.HAB eat.INF
‘I cooked the meat and then ate it.’ (Noonan 1992: 231)

10.2.3.2 Kuliak languages

Heine (1976), based on shared traits and internal reconstruction, proposes that Ik, Nyang’ía, and So/Tepeth must be grouped together into the Kuliak language family (see Map 29).

However, it should be noted that there have been conflicting classifications of Kuliak. While some linguists have proposed that the Kuliak languages belong to the Afro-Asiatic language family (e.g. Cushitic; Lamberti 1988), others have proposed that they belong to Nilo-Saharan (Greenberg 1963). However, it has been recently proposed that the Kuliak languages should not be classified as Afroasiatic or Nilo-Saharan (Schrock 2014: 16).

Map 29. Kuliak languages



As was mentioned in §10.2.3, Ik indicates temporal subsequence by a consecutive pattern. In this language, consecutive markers signal that the situation of the figure clause follows in sequence after the situation encoded in the ground clause, as in (611). The consecutive construction in this language is marked in two concurrent ways: (1) a floating high tone (in all but the third person singular and third person plural paradigm members) and (2) a handful of suppletive suffixes making up an irregular paradigm (Schrock 2014: 361). The consecutive pattern may also be found in independent main clauses. This pattern may be used

for expressing polite commands, instructions, or requests (Schrock 2014: 365). In addition to the polite imperative usage, the consecutive pattern is also used in a deontic or 'should/must' sense, or in an impersonal passive sense (Schrock 2014: 365).

Ik (Kuliak)

(611) *ɪtsóŋ-ḱɔ-ɛsɛ* *ríj-ík-a* *ɔkɔ́b-ɪma-**k**ᵊ′*.
burn-COMPL-SPS forest-PL-NOM cultivate-1PL.EXCL-SEQ
'The forest areas are burned and then we cultivate.' (Schrock 2014: 395)

Other Kuliak languages also seem to have a construction with the formal properties of a consecutive pattern. In Nyang'i, there are constructions appearing with the restricted device *-(e)se*, as in (612). In this type of construction, the first clause contains TAM information. The second clause, however, has no TAM information besides the *-(e)se* marker. The context of all examples suggests that the same TAM information present in the first clause is in effect in the *-(e)se*-marked clauses (Beer 2017: 118). However, it is not clear whether *-(e)se* is used for indicating temporal subsequence. In (612), the *-(e)se*-marked clause indicates a reiterated situation that exemplifies the things that were said in Nyang'i. This type of verbal form may also be used in contexts expressing an afterthought that gives further information about the situation expressed in the first clause, as in (613).

Nyang'i (Kuliak)

(612) *diɛcɛ=sɛkɛ* *di* *nene* *mutu=seke* *ɲaŋi* *n-ake* *ate,*

say=PST matter these be=PST Nyang'i REL-EXIS EXCL.M

'These things I said were Nyang'i,

*die-**se*** *amane* *ka* *amane*.

bring-SEQ like.this and like.this

I talked like this and like this.' (Beer 2017: 118)

Nyang'i (Kuliak)

(613) *camɪka* *ɲerukude*.

want main.road

'They need/want a main road.'

*aʊg-**ese*** *ɲerukude*, *mut* *naa* *au* *na* *Lobalaŋɪt* *tan* *darɛ* *Kaiceri*.

go-SEQ main.road be SUB go SUB Lobalangit to there Kaiceri

'A main road that goes from Lobalangit to Kaiceri.' (Beer 2017: 118)

So, the other language genetically related to Ik and Nyang'i, has a consecutive construction that conveys temporal subsequence (Carlin 1993:147; Heine & Carlin 2010). In this language, consecutive constructions are marked by *na-*, *nɔ-*, in (614). Heine & Carlin (2010), in their dictionary of So, call this verbal form the "narrative" and show examples where this clause-linking device is used for signaling temporal subsequence. Furthermore, they show

examples in which this verbal forms appears in imperative constructions (e.g. *Stay nearby*!; Heine & Carlin 2010: 13).

So (Kuliak)

(614)	*…it-ac*	*akayon*	***na**-ac*	*nao*	*tuenen.*
	reach-VEN	morning	SEQ-come	raiders	there

'…the morning came, and then the raiders came there.' (Carlin 1993:167)

10.2.3.3 Discussion

As was shown above, Lopit is not the only Nilotic language with a consecutive pattern. Furthermore, I have shown that Ik is not the only Kuliak language with a consecutive construction. Based on linguistic, socio-cultural, and anthropological evidence, it is likely that the pattern spread from Nilotic to Kuliak and not the other way around. In particular, Teso-Turkana languages seem to have played an important role in the diffusion of the consecutive pattern. In recent centuries, an influential contact with Eastern Nilotic languages, in particular with Teso-Turkana languages, has led to a massive influx of vocabulary and calqued grammatical structures in the Ik language. Accordingly, the consecutive pattern did not spread to Ik via Lopit, but via Teso-Turkana languages. Schrock (2014: 366) mentions that the Ik consecutive marker is a grammatical replication of the Teso-Turkana consecutive marker. However, it is not clear from which Teso-Turkana language the consecutive pattern was copied. Schrock (2014: 24) points out that the cultural dominance exerted by the Teso-Turkana peoples has strongly influenced the Ik language. As many Ik children enter their teen-age years, they begin learning a Teso-Turkana language during trips outside Ikland, stints at non-Ik

schools, or periods when a non-Ik guest stays at their home. Thus, many Ik adults have a functional command of one or more Teso-Turkana languages. Ik young people face a pressure to learn a Teso-Turkana language as a language of wider communication. It is especially useful in trade, travel, and simple physical survival (Schrock 2014: 25).

As for the other Kuliak languages, the Nyang'i language was formerly spoken throughout the Nyangea Mountains, a small range near the border between Acholiland and Karamoja. Varieties of Karamojong (Teso-Turkana), including Napore and Dodoth, are dominant east of the Nyangea Mountains. Acholi (Western Nilotic) varieties such as Okuti may both be found west of the Nyangea Mountains, along with the Napore variety of Karamojong (Beer 2017: 5). Accordingly, it is very likely that Nyang'i copied the consecutive pattern from a Teso-Turkana language (e.g. Karamojong). Recall that Acholi does not seem to use a consecutive pattern for expressing temporal subsequence. Another hypothesis is that Nyang'i developed the consecutive pattern due to Ik influence given the close contact between speakers of these languages. With respect to So, they live on three mountains (i.e. Moroto, Napak, and Kadam). Note that the So are surrounded on the plains by the semi-nomadic Karamojong, Turkana, and Suk peoples. Of these, it is likely that So copied the consecutive pattern from Karamojong or Turkana. However, it is more likely that speakers of So copied the consecutive pattern from Karamojong given that the So have a closer relationship with the Karamojong. In this regard, the So organization of social relationships shows traditional features borrowed from their neighbors, the Karamojong (Laughlin 1972: 10). Furthermore, at the turn of the century the So began to intermarry with the surrounding pastoral groups, notably the Karamojong, giving their women in exchange for the prevailing brideprice of the respective group (Laughlin 1972: 10; Laughlin 1973: 133; Laughlin & Allgeier 1979).

As was shown earlier, the consecutive pattern is not attested in all Nilotic-languages. Furthermore, the forms of the consecutive markers are not the same (Moodie & Rosey Billington 2020: 269), which seems to indicate that they are not cognates. The question is: did speakers of various Nilotic languages copy the consecutive pattern from other languages?

Recall that various Eastern Nilotic languages (i.e. Teso-Turkana languages and Lotuxo-Maa languages) encode 'after' constructions with a consecutive pattern. One hypothesis is that this pattern was copied from Swahili or Luganda. As is illustrated in (615), Swahili indicates temporal subsequence by a consecutive construction marked by *ka-*. In a similar fashion, Luganda encodes 'after' constructions by a "narrative tense" (Kamoga & Stevick 1968: 233). Swahili and Luganda are the second languages of most Ateso speakers and they are the most prominent languages in formal education (Barasa 2017: 14). These languages are considered "prestigious" by many citizens who choose increasingly to bring up their children in these languages. While it is likely that Ateso developed the consecutive pattern due to Swahili or Luganda, it is not clear how the other Ateso-Turkana languages developed it.

Swahili (Atlantic-Congo/Bantu)

(615)	*wa-li-ondoka*	*wa-**ka**-ona*	*moto*	*mbele*.
	3PL-PST-leave	3PL-CONS-see	fire	ahead

'They left and then saw a fire ahead.' (Mohammed 2001: 160)

The Lotuxo-Maa languages with a consecutive construction are Lopit and Maa. The language with the greatest potential influence on Lopit is Otuho. Otuho is spoken by more people than Lopit. Furthermore, it is the language with more political and social influence and

the language that has been established as the language of instruction in a number of schools (Moodie & Rosey Billington 2020: 5). However, it is not likely that the consecutive pattern was copied from Otuho given that, as was shown earlier, Otuho 'after' constructions are formed with the sequential coordinating device *et:e* 'and then'. Therefore, it is not clear how the consecutive pattern developed in Lopit. The other Lotuxo-Maa language with a similar pattern is Maa. One hypothesis is that the Maa *n-* pattern developed due to Kikuyu influence. Note that Kikuyu is a Bantu language that is mainly spoken in Kenya. The language indicates temporal subsequence with the consecutive marker *-rĩ* (Englebretson & Wa-Ngatho 2015: 163). Englebretson & Wa-Ngatho (2015: 60) mention that this verbal form appears frequently in story elicitation (e.g. the Pear Story, the Frog Story) and in other descriptions of past events. They mention that their consultant considers the *kĩ-* verbal form to mean 'and then.'

Speakers of Maa and Kikuyu have probably been in steady contact for at least 200 years (Lawren 1968: 572). Relations between the Kikuyu and the Maa were apparently both belligerent and friendly during this early period. However, belligerence must have been the dominant theme (Lawren 1968: 574). It is worth noting that intermarriage between the two tribes was characteristic of their initial relationship. A peaceful interchange was going on at the same time that the two tribes were warring against one another. The endogamous restrictions of the Kikuyu clan system facilitated marriage outside the tribe (Lawren 1968: 577). Doris Payne (personal communication) informs me that she doubts that the *n-* pattern is due to Bantu influence. Accordingly, this hypothesis is very tentative in the absence of more historical evidence. Another hypothesis is that Maa copied the *n-* pattern from Iraqw. These two languages are neighbors. Iraqw is a South Cushitic language spoken in the Arusha region in Tanzania, on the high plateau between Lake Manyara and Lake Eyasi. Consecutive

constructions in Iraqw are encoded by the verbal form *-ri*, as in (616), or the verbal form *-ay*, as in (617). Mous (1992: 146) points out that *-ri* and *-ay* are never used in the first clause, but are always used for continuing stories when the time has been set in the first clause. There is no direct contact between the Iraqw and the Maa nowadays, partly because traditionally the Maa are considered enemies of the Iraqw (Mous 1992: 2). The historical analysis of the Maa *n-* pattern awaits further study (Doris Payne, personal communication).

Iraqw (Afro-Asiatic/Southern Cushitic)

(616)	*tlaano*	*u-na*	*ta-táahh,*	*ngu-**ri***	*dayshimo-r*	*tsaxáar…*
	stone	M-PST	HAB-1SG.take	1SG-CONS	snake-INSTR	1SG.hit

'I took a stone, and then hit the snake…' (Mous 1992: 146)

Iraqw (Afro-Asiatic/Southern Cushitic)

(617)	*ta-na*	*harddáh,*	*ta-**ay***	*dí-r*	*af-kú*	*tlawi.*
	SBJ-PST	arrive	DEP.be-CONS	place-F	mouth-M	lake

'They arrived, and then they reached the edge of the lake.' (Mous 1992: 124)

As was discussed in §10.2.3.1.2, various Southern Nilotic languages also have consecutive constructions. In particular, Datooga has a consecutive pattern signaling temporal subsequence. One hypothesis is that Datooga developed the consecutive pattern under Swahili influence. Note that the Swahili consecutive marker *ka-* has been reconstructed for Proto-Bantu ∗*ka-* (Nurse 2008: 123). Asimjeeg Datooga, and other Datooga language varieties, are threatened by the increasing use of Swahili as a lingua franca (Griscom 2019: 2). After independence, institutional forces in Tanzania have promoted Swahili as the national language

(Legère 2010:51). As a result, use of the more than 120 vernacular languages of Tanzania has been discouraged (Muzale & Rugemalira 2008:69; Ström 2009:229). The fact that in most language contact situations in Tanzania, Swahili is considered the language of "power/status/prestige", has led speakers of many vernacular languages of Tanzania to copy linguistic traits from Swahili, a process known as "Swahilization" (Yoneda 2010).

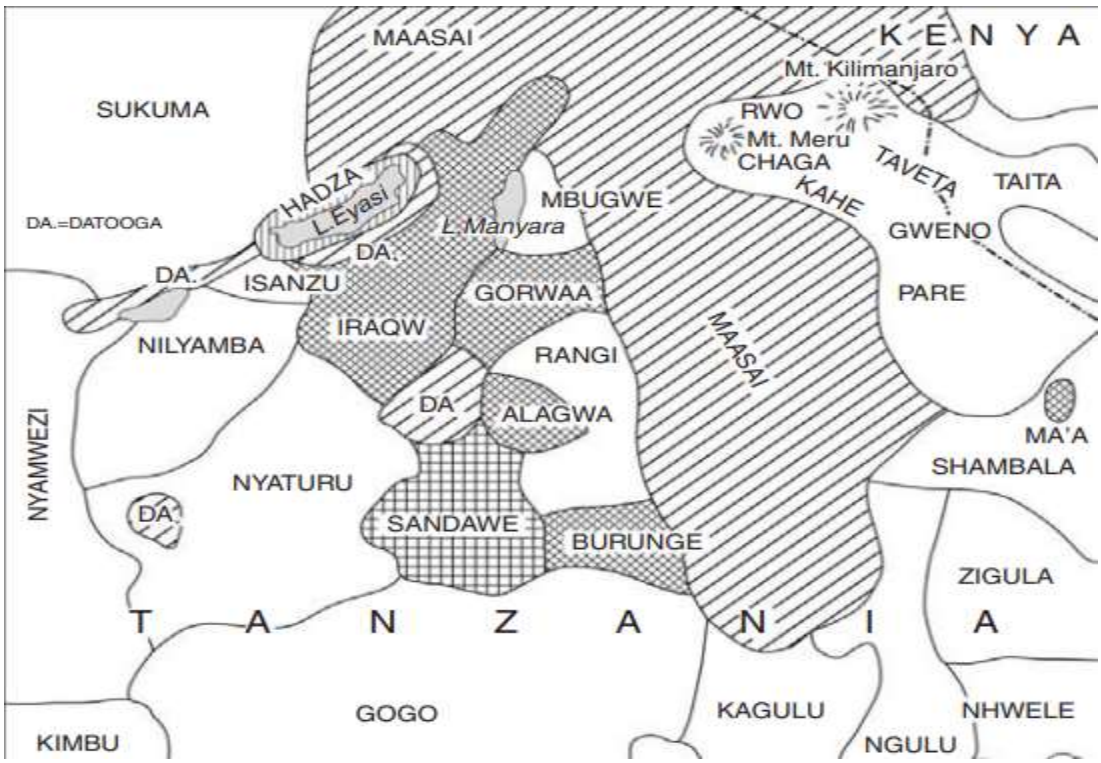
Another hypothesis is that the Datooga consecutive pattern developed due to Iraqw influence. Many Datooga speakers can also speak some Iraqw due to intermarriage and general language contact (Griscom 2019: 16). The Datooga are predominantly cattle breeders. They cover large distances in order to find grazing land for their large herds of cattle. The Iraqw are farmers, engaged in mixed farming (Mous & Rottland 2001: 377). There is quite a lot of intermarriage and cultural assimilation between the Iraqw and the Datooga, since the Iraqw are still spreading southwards. There have been influences in both directions regarding the language structures used in animal husbandry practices (e.g. breeding taxonomy, cattle-naming (Mous & Rottland 2001: 377). Contact between the two groups has also come about because the Iraqw sell maize to the Datooga, from whom they buy various iron instruments (Mous 1992: 2). Recall that Iraqw is a Southern Cushitic language. Southern Cushitic belongs to the Afro-Asiatic language family and it comprises eight languages spoken in Tanzania and Kenya. The most important one is Iraqw with roughly half a million speakers, followed by Gorwaa (100.000), Burunge (30.000), Alagwa (30.000), Mbugu (30.000), Dahalo (400), Asax and Qwadza (extinct) (Kießling 2000). While Gorwaa, Iraqw, Alagwa, and Burunge are classified as West-Rift languages of Southern Cushitic, Asax and Qwadza are classified as East-Rift languages of Southern Cushitic. The classification of Mbugu as Southern Cushitic is disputed for theoretical reasons, namely because Mbugu is a mixed language with Bantu morphology

and Cushitic roots. Likewise, the inclusion of Dahalo in Southern Cushitic is disputed (Mous 1992: 4). Of the Southern Cushitic languages mentioned before, West-Rift languages of Southern Cushitic have consecutive constructions. Besides Iraqw, Gorwaa encodes consecutive construction by *-re* (Harvey 2018: 156). Kießling (2000: 85) points out that another Southern Cushitic language with a consecutive pattern is Burunge. This language indicates temporal subsequence by the consecutive marker *-gi*.[92]

Datooga and the West-Rift languages of Southern Cushitic mentioned before (i.e. Iraqw, Gorwaa, and Burunge) are spoken in the Rift valley area of central and northern Tanzania. This is a linguistic area in which various genetically unrelated families have been in contact for a long period of time (see Map 30). The modern languages that have taken part in this linguistic contact are several West-Rift languages of Southern Cushitic (i.e. Iraqw, Gorwaa, and Burunge), the Datooga languages of Southern Nilotic, some Bantu languages of the F zone (Nyaturu, Rangi, Mbugwe), Sandawe, and Hadza (Kießling et al. 2008: 186).

[92] Roland Kießling (personal communication) informs me that the consecutive marker in West-Rift languages of Southern Cushitic cannot be reconstructed to Proto-West-Rift.

Map 30. The Tanzanian Rift Valley area (Kießling et al. 2008: 187)



A third hypothesis is that Datooga and West-Rift languages of Southern Cushitic (i.e. Iraqw, Gorwaa, and Burunge) copied the consecutive from a Bantu language. Mbugwe, a Bantu language spoken in the Rift valley area, has a consecutive construction marked by *ká-*. Recall that this verbal form has been reconstructed as **ka-* in Proto-Bantu. The consecutive in Mbugwe is considered to be a relative tense, with no inherent temporal frame. The time reference of the consecutive verb depends on the previous verb in the narrative (Wilhelmsen 2019: 177). Rangi, another Bantu language spoken in this area, also encodes consecutive constructions by the verb form *ka-* (Dunham 2001: 216).[93]

[93] Nyaturu, a Bantu language spoken in the Rift valley area, shows an interesting scenario in that it also encodes consecutive constructions by *=qàá*. However, this deviates from the prototype Bantu consecutive construction in that *=qàá* is not a verbal affix. Instead, *=qàá* is a clitic in preverbal position. Kießling et al. (2008: 199) propose that Nyaturu seems to have extracted the original Bantu consecutive marker from the verb into a preverbal clitic position. Note that it is common in various Southern Cushitic subordinating devices appear in preverbal clitic

Other languages spoken in the Rift valley area do not encode 'after' constructions by a consecutive marker. Sandawe has a paradigm of "narrative conjunctions" that indicate 'and then' (Steeman 2012: 209). In Hadza, temporal subsequence is signaled by the adverbial subordinator prefix *kwa-* (Kirk Miller, personal communication).

I have proposed in this section that the consecutive pattern spread from Nilotic languages to Kuliak languages (i.e. Ik, Nyang'i, and So). In particular, Teso-Turkana languages (Eastern Nilotic) seem to have played an important role here. As for Nyang'i and So, it is very likely that they copied the consecutive pattern from Karamojong, a Teso-Turkana language. With respect to Ik, it is not clear the Teso-Turkana language that served as the model language of the consecutive pattern. I have also shown that Teso-Turkana languages may have developed the consecutive pattern due to Bantu influence (i.e. Swahili or Luganda influence). Lotuxo-Maa languages (Eastern Nilotic) may have developed the consecutive pattern due to Bantu influence (e.g. Kikuyu) or Southern Cushitic influence (e.g. Iraqw). Southern Nilotic languages (i.e. Datooga languages) show an interesting picture in that Bantu languages (i.e. Swahili, Mbugwe, Rangi) or Iraqw may have served as the model languages for the consecutive pattern.

10.2.4 'And then' devices: Australia

As was discussed in §5.2.3, there are languages that contain 'and then' devices formed by a demonstrative and an ablative marker. This type of 'and then' device seems to be common in many Australian languages not genetically related, as can be observed in the Gooniyandi

position. Kießling et al. (2008: 199) explicitly mention "it looks as if Bantu material has been used to build a system of preverbal clitics, encoding Bantu categories in a Southern Cushitic frame." What this indicates is that consecutive patterns in Bantu languages spoken in the Tanzanian Rift Valley area have also been shaped by Southern Cushitic clause-linkage influence.

example in (618), the Wardaman example in (619), the Waray example in (620), and the Limilngan example in (621).

Gooniyandi (Bunuban)

(618) *yoowooloo* *garndiwangooddoo-ngga* *gardboowooddarni*,
men many-ERG they.fought.together
'Many men fought together,

niyi-nhingi *nardawooddarni* *thiddi-nhingi-ngga*.
that-ABL they.cried.together fight-ABL-ERG
and then they cried together afterwards.' (McGregor 1990: 428)

Wardaman (Yangmanic)

(619) *wurr-ngu-ndi-wiya* *girdibun* ***nan-ba-****wan* *wurr-bu-yi-rri-wuya*.
3-eat-PST-DU finish that-ABL-DEF 3-hit-REFL-PST-DU
'The two of them ate it all up and then they fought.' (Merlan 1994: 190)

Waray (Gunwinyguan)

(620) *tjim* *Beatrice* *litawi-lik* *tjul-tj-ang*,
come Beatrice hill-LOC go.down-AUX-REAL
'She came to Beatrice Hill and went down,

kati-yang *tiri-tjim* *punji* *angilak.*

that-ABL crawl-come banyon over.here

and then she came crawling to this Banyon tree over here.' (Harvey 1986: 267)

Limilngan (Darwin Region/Limilngan)

(621) *ngaykgi* *bangi* *lakgarni* *m-adlingi*,

1SG tree LOC III-small.of.back

'I sat at the roots of the tree,

*da-ya-**k-ulang*** *daklambangi* *ng-ayung*.

DEF-IV-DEM-ABL town I-go.PST.REAL.PFV

and then I went to town.' (Harvey 2001: 115)

As illustrated above, this pattern is attested in Bunuban languages, Yangmanic languages, Gunwinyguan languages, and Darwin Region languages. However, it is worth noting that 'and then' devices consisting of a demonstrative and an ablative marker are also found in other Australian languages from different families, as can be seen in Table 50. This pattern has been documented for Pama-Nyungan languages, Mara-Alawic languages, Nyulnyulan languages, and Mangrida languages. The question is: is it possible to determine the source of diffusion of this pattern? In what follows, I conduct an intra-genetic analysis for each of the language families that have this type of 'and then' device. Some hypotheses are offered regarding the directionality of spread.

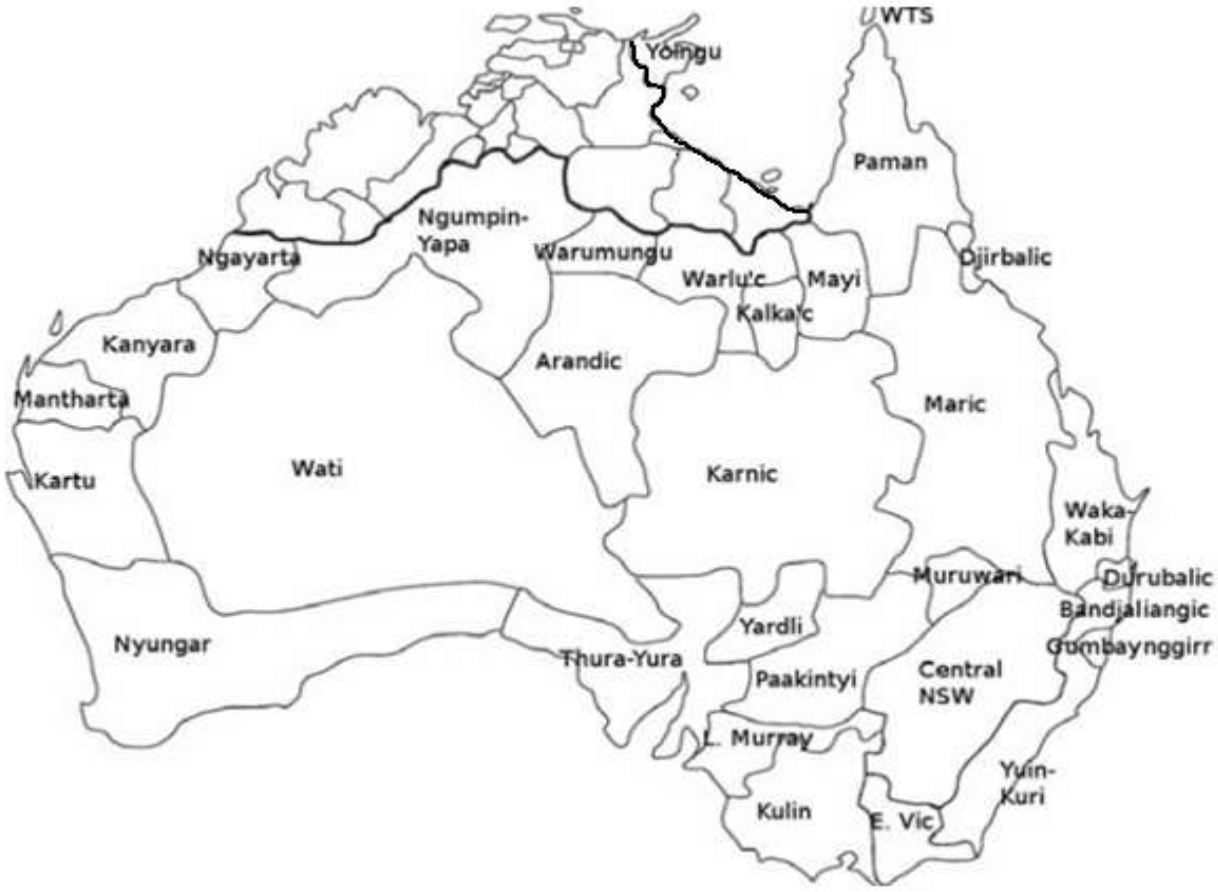
Table 50. ‘And then’ devices consisting of a demonstrative and an ablative marker

Language	Family	Form
Gooniyandi	Bunuban	*niyi-nhingi* ‘DEM-ABL’ (McGregor 1990: 428)
Wardaman	Yangmanic	*nan-ba-wan* ‘DEM-ABL-DEF’ (Merlan 1994: 190)
Waray	Gunwinyguan	*kati-yang* ‘DEM-ABL’ (Harvey 1986: 267)
Limilngan	Darwin Region	*da-ya-k-ulang* ‘DEF-IV-DEM-ABL’ (Harvey 2001: 115)
Warrongo	Pama-Nyungan	*ngona-ngomay* ‘DEM-ABL’ (Tsunoda 2011: 173)
Kurrama	Pama-Nyungan	*ngunhangaata-ngu* ‘DEM-ABL’ (Hill 2011: 72)
Mara	Mara-Alawic	*ni-ŋga-yani* ‘OBL-DEM-ABL’ (Heath 1981: 298)
Nyigina	Nyulnyulan	*giny-abu* ‘DEM-ABL’ (Stokes 1982: 98)
Gurr-Goni	Mangrida	*gu-garrapu-kuwa* ‘IV-DEM-ABL’ (Green 1995: 324)

10.2.4.1 ‘And then’ in Pama-Nyungan

Bowern & Atkinson (2012: 817) mention that “Pama-Nyungan languages cover just under 90% of the Australian mainland; they stretch from the islands of the Torres Strait in the northeast to the far southwest of Western Australia.” As can be seen in Map 31, the Pama-Nungan language family is composed of many subgroups, such as Maric (e.g. Warrongo), Ngayarta (e.g. Martuthunira), Ngumpin-Yapa (e.g. Bilinarra), Wati (e.g. Wangkajunga), and Yolngu (e.g. Ritharngu), among others. Most of these subgroups are well supported through established methods of historical reconstruction (i.e. the comparative method applied to lexicon and morphology and the identification of sound changes; Bowern & Atkinson 2012: 817).

Map 31. Subgroups of the Pama-Nyungan language family (Bowern & Atkinson 2012)



Pama-Nyungan languages of different subgroups use 'and then' devices formed by a demonstrative and an ablative marker for expressing temporal subsequence (see Table 51). In Warrongo, *ngona-ngomay* is a device consisting of the demonstrative *ngona-* and the ablative marker *-ngomay* (Tsunoda 2011: 355). This device occurs in texts very frequently, and indicates temporal subsequence and a change in the topic, scene or the like (Tsunoda 2011: 250). Another Pama-Nyungan language with a similar pattern is Bilinarra. In this language 'and then' is indicated by a device with the form *yala-nginyi* 'DEM-ABL'. Meakins & Nordlinger (2014: 181) mention that this device is used for connecting two situations in a narrative in a manner similar to 'then' or 'after that' in English. 'And then' constructions are marked by *yala-ngurlu* 'DEM-ABL' in Mudburra (Green et al. 2019: 286). Martuthunira encodes

'after' constructions by a device showing the form *ngurnu-nguru* 'DEM-ABL' (Dench 1995: 79). 'After' constructions in Ngarla are encoded by a sequential coordinating device that shows a similar form to the devices discussed before. 'And then' meanings are signaled by a device with the form *pala-ngka-nguru* 'DEM-LOC-ABL' (Westerlund 2015: 19). A similar 'and then' device has also been documented for Djinang. In this language, 'after' is signaled by a clause-linking device with the form *ngun-ngiri* 'DEM-ABL' (Waters 1989: 51). Other Pama-Nyungan languages with a similar 'and then' pattern are Ritharngu *ŋuki-r-ŋuru* 'DEM-?-ABL' (Heath 1980a: 53), Kurrama *ngunhangaata-ngu* 'DEM-ABL' (Hill 2011: 107), Gurindji *yala-ngulu* 'DEM-ABL' (Senge 2015: 188), Yanyuwa *baj-ingu* 'DEM-ABL' (Kirton & Charlie 1996: 47), and Wangkajunga *pala-nya-janu* 'DEM-?-ABL' (Jones 2011: 245).

Two remarks are in order here. First, some Pama-Nyungan languages show a further development in that the 'and then' device may not only consist of a demonstrative and an ablative marker, but also of another morphological element (e.g. the Ngarla *pala-ngka-nguru* 'DEM-LOC-ABL' device is formed by a demonstrative, a locative marker, and an ablative marker). Second, the forms of the 'and then' devices are very similar, as can be seen in Table 51. Note that Warrongo, Kurrama, Martuthunira, Djinang, and Ritharngu have a pattern that differs slightly from the pattern of Bilinarra, Gurindji, Ngarla, and Wangkajunga in that the form of the demonstrative is not the same. While *yala-* and *pala-* are third person singular markers that may function as demonstratives in many Pama-Nyungan languages, *ngun-*, *ngurnu-*, and *ŋuki-* can only function as demonstratives. With respect to the ablative markers found in Pama-Nyungan 'and then' markers, it has been proposed that they can be reconstructed to Proto-Pama-Nyungan **-ngu* (Dunn 1982: 46). It is likely that 'and then' devices can be reconstructed to Proto-Pama-Nyungan. However, care should be taken here

given that it has not been possible to determine whether the demonstratives occurring in the ‘and then’ device can be reconstructed.

Table 51. Forms of ‘and then’ devices in Pama-Nyungan languages

Language	Subgroup	Form
Warrongo	Maric	*ngona-ngomay* ‘DEM-ABL’
Bilinarra	Ngumpin-Yapa	*yala-ngurlu* ‘DEM-ABL’
Gurindji	Ngumpin-Yapa	*yala-ngulu* ‘DEM-ABL’
Mudburra	Ngumpin-Yapa	*yala-ngurlu* ‘DEM-ABL’
Kurrama	Ngayarta	*ngun-hangaata-ngu* ‘DEM-?-ABL’
Martuthunira	Ngayarta	*ngurnu-nguru* ‘DEM-ABL’
Ngarla	Ngayarta	*pala-ngka-nguru* ‘DEM-LOC-ABL’
Wangkajunga	Wati	*pala-nya-janu* ‘DEM-LOC-ABL’
Djinang	Yolngu	*ngun-ngiri* ‘DEM-ABL’
Ritharngu	Yolngu	*ŋuki-r-ŋuru* ‘DEM-?-ABL’

As is shown in the following subsections, it is possible that non-Pama-Nyungan languages copied ‘and then’ devices from Pama-Nyungan languages. This stems from the fact that (1) it is likely that ‘and then’ devices can be reconstructed to Proto-Pama-Nyungan, as has been pointed out above, (2) the Pama-Nyungan language family has a deeper time depth than other non-Pama-Nyungan language families (i.e. the time depth of Pama-Nyungan ranges from 4 thousand years ago to more than 40 thousand years ago; Bouckaert et al. 2018: 741), and (3)

various Pama-Nyungan languages are the prestige languages in several language contact situations.[94]

10.2.4.2 'And then' in Bunuban

The Bunuban language family is a small family consisting of just two languages: Gooniyandi and Bunuba (O'Grady et al. 1966: 28). To date, genetic relationships have not been definitely established with any other language family in Australia (or elsewhere) (McGregor 1990: 1).

Map 32. Gooniyandi territory (McGregor 1990: 5)

Speakers of Gooniyandi indicate 'and then' by means of a restricted device that has the following form: *niyi-nhingi* 'DEM-ABL'. Bunuba, the other member of the Bunuban language

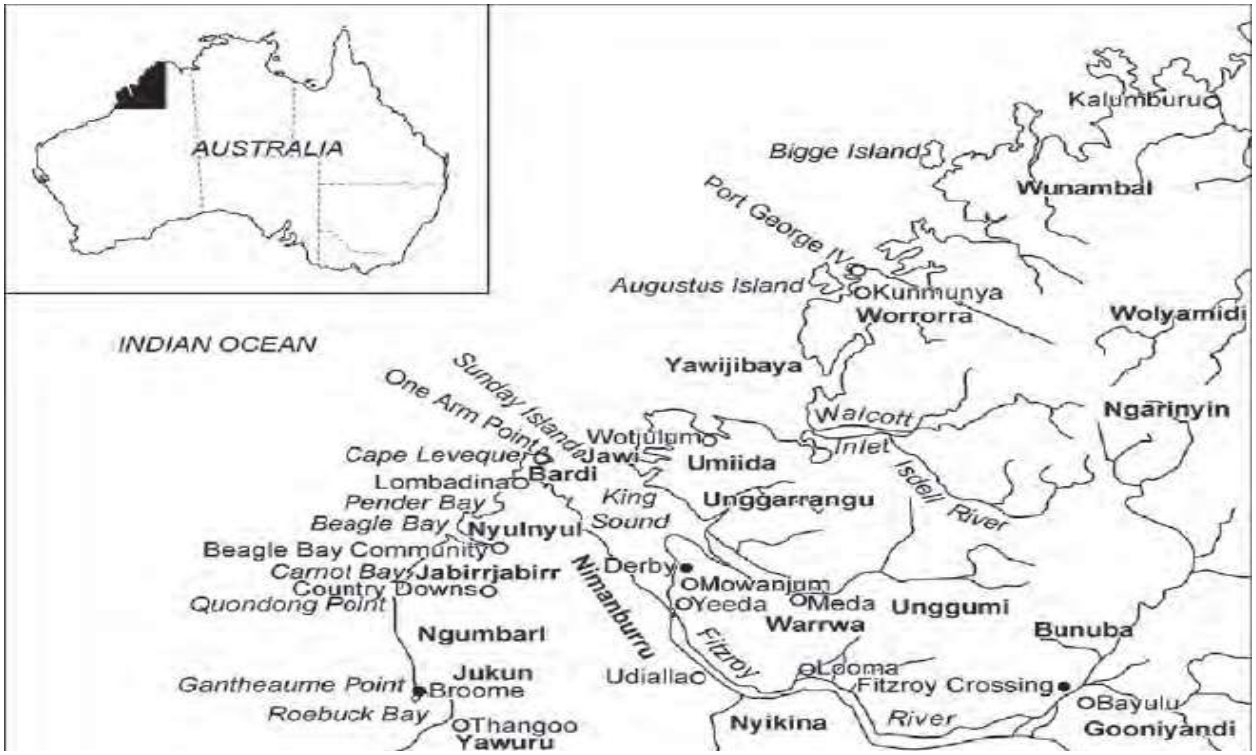
[94] Some of the Pama-Nyungan languages with the 'and then' pattern (e.g. Warrongo) are spoken far away from non-Pama-Nyungan languages.

family, signals temporal subsequence by the sequential coordinating device *nyirra-nhingi* ‘and then’ (Rumsey 2000: 58). This device also consists of a demonstrative (i.e. *nyirra* ‘that’) and an ablative marker (i.e. *-nhingi*). McGregor (1990: 24) mentions that Gooniyandi has been in contact with various Pama-Nyungan languages of the Ngumpin-Yapa subgroup (e.g. Gurindji, Walmajarri) and Jarrakan languages (e.g. Kija, Miriwung). The Jarrakan language family is a family that consists of Miriwung, Kija, and Gajirrabeng (Gajirrawoong). Of these languages, recall that Ngumpin-Yapa languages have ‘and then’ devices formed by a demonstrative and an ablative marker (e.g. Gurindji *yala-ngulu* ‘DEM-ABL’; Senge 2015: 284). Jarrakan languages do not use ‘and then’ devices formed by a demonstrative and an ablative marker for expressing temporal subsequence. For instance, ‘after’ constructions in Miriwung are encoded by *waranj* ‘and then’ (Kofod 1978: 79). With this in mind, one possible hypothesis is that Gooniyandi copied the ‘and then’ pattern from Ngumpin-Yapa languages. It is not clear whether Bunuba copied the ‘and then’ pattern from Gooniyandi or from one of the Ngumpin-Yapa languages mentioned before.

10.2.4.3 ‘And then’ in Nyulnyulan

The Nyulnyulan family is a small family consisting of about ten named language varieties (McGregor 1998), all of which are spoken on the Dampier Land peninsula and contiguous parts of the western Kimberley region, as can be seen in Map 33. Whether or not the Nyulnyulan family is genetically related with any other family in Australia (or elsewhere) is uncertain (McGregor 2011: 2).

Map 33. Nyulnyulan family and neighboring languages (McGregor 2011: 2)

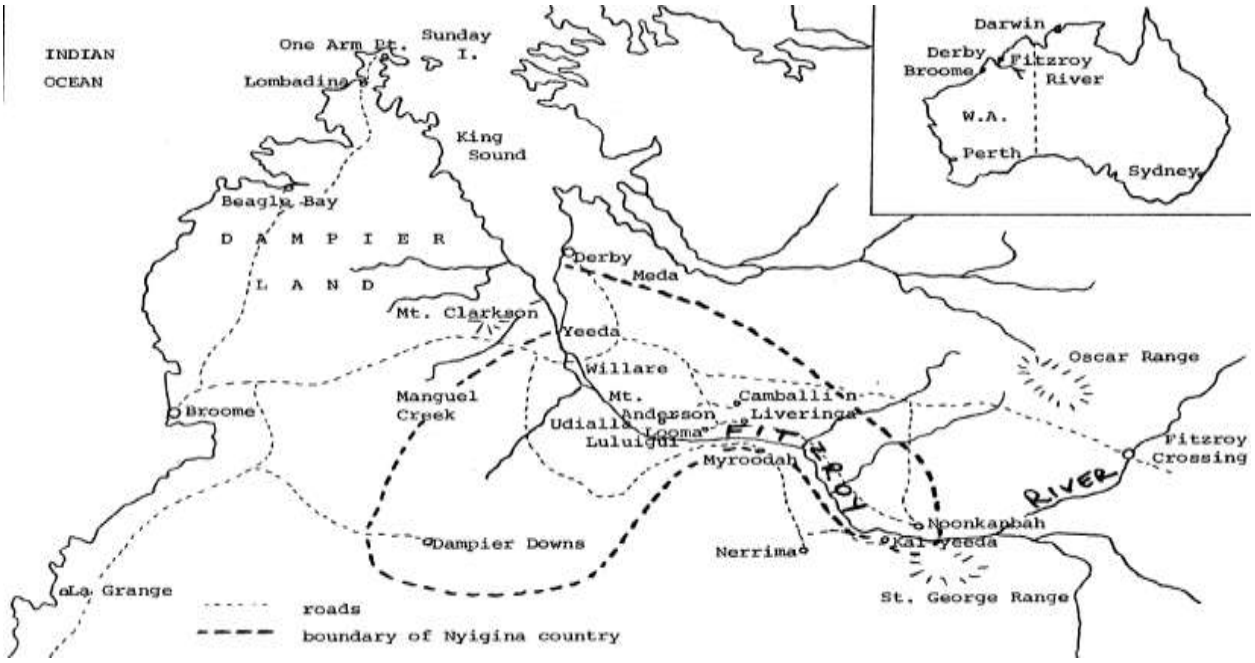


Nyigina has an 'and then' device formed by a demonstrative and an ablative marker: *giny-abu* 'DEM-ABL' (Stokes 1982: 98). Other Nyulnyulan languages with a similar pattern are Nyulnyul (*kinyingk-kun* 'DEM-ABL'; McGregor 2011: 616) and Bardi (*bijorr-o* 'DEM-ABL'; Bowern 2012: 679). As is shown in Map 34, to the south, the major neighbors of Nyigina are two Pama-Nyungan languages of the Marrngu subgroup: Mangala and Garadyari. The Worrorran languages Ungarinjin and Worrorra are adjacent to the north.[95] To the east, Walmatjari (Pama-Nyungan language of the Ngumpin-Yapa subgroup) is the major neighbor. The influence of Walmatjari is probably the most significant Aboriginal threat to the language

[95] Worrorran is a family consisting of over twenty named languages spoken throughout the Northern Kimberley region. This family is divided into three main subgroups: (1) Western Worrorran (e.g. Worrorra, Umiida, Unggarangu, and Unggumi), (2) Eastern Worrorran (e.g. Ungarinjin and Wurla), and (3) Northern Worrorran (e.g. Wunambal, Gambera, and Kwini) (McGregor & Rumsey 2009: 7).

and culture of Nyigina and Nyulnyul people (Stokes 1982: 4). Many Nyigina people use Walmatjari as their everyday language. With respect to Bardi, Bowern (2012: 9) mentions that there have been periods of extensive contact between Bardi and various Pama-Nyungan languages (i.e. Garadyari in the south and Walmajarri in the east) and between Bardi and Worrorran languages (i.e. Yawijibaya in the north). These languages not only belong to different families, but are also rather different typologically.

Map 34. Nyigina language and its neighbors (Stokes 1982: 3)



Claire Bowern (personal communication) informs me that 'and then' devices consisting of a demonstrative and an ablative marker can be reconstructed to Proto-Nyulnyulan. Given that the time depth of Nyulnyulan languages (i.e. about 2 thousand years; Claire Bowern, personal communication) is shallower than the time of Pama-Nyungan (i.e. the time depth of Pama-Nyungan ranges from 4 thousand years ago to more than 40 thousand years; Bouckaert

et al. 2018: 741), it is likely that Nyulnyulan languages copied the 'and then' pattern from Pama-Nyungan languages.

10.2.4.4 'And then' in Wardaman

Wardaman indicates 'and then' with the sequence: *nan-ba-wan* 'DEM-ABL-DEF'. Wardaman is a non-Pama-Nyungan language of the upper inland Northern Territory of Australia, as can be seen in Map 35.

Map 35. Wardaman area and neighboring languages (Merlan 1994: 1)

Wardaman is now one of the most widely spoken Aboriginal languages of Katherine, a rapidly-growing town of about 8000 people located on the Stuart Highway in the upper third of the Northern Territory (Merlan 1994: 1). Wardaman is genetically related to Yangman and Dagoman. They form the Yangmanic language family. Merlan (1994: 2) shows that the three may be considered dialects of a single language. They were of such a degree of structural and lexical similarity as to be mutually intelligible. Yangman is no longer actively used and Dagoman is extinct. With this in mind, there are no available sources that allow me to analyze whether Yangman and Dagoman also employ a similar 'and then' device for signaling temporal subsequence.

Franscesca Merlan (personal communication) informs me that, when she first got to know the Wardaman speech community, Wardaman speakers also spoke various Mirndi languages (e.g. Nungali, Jaminjung, and Ngaliwurru).[96] A few spoke some dialect of Mudburra, a Pama-Nyungan language of the Ngumpin-Yapa subgroup. Furthermore, intermarriage between Wardaman and Mudburra peoples seems not uncommon (Merlan 1994: 8). As for Mirndi languages, a closer look reveals that Jaminjung indicates temporal subsequence by *jamang* 'after that' (Schultze-Berndt 2000: 103)[97]. As for Nungali, after I consulted Bolt et al. (1971), it was not possible to determine the way in which temporal subsequence is expressed.

Given that 'and then' devices formed by a demonstrative and an ablative marker are common in Pama-Nyungan, it seems likely that Mudburra served as the model language.

[96] The Mirndi language family is one of the few geographically discontinuous families that has been proposed in Australia. This language family consists of Jaminjung, Ngaliwurru, Nungali, Jingulu, Ngarnka, Wambaya, Gudanji, and Binbinka (Harvey 2008: 1).

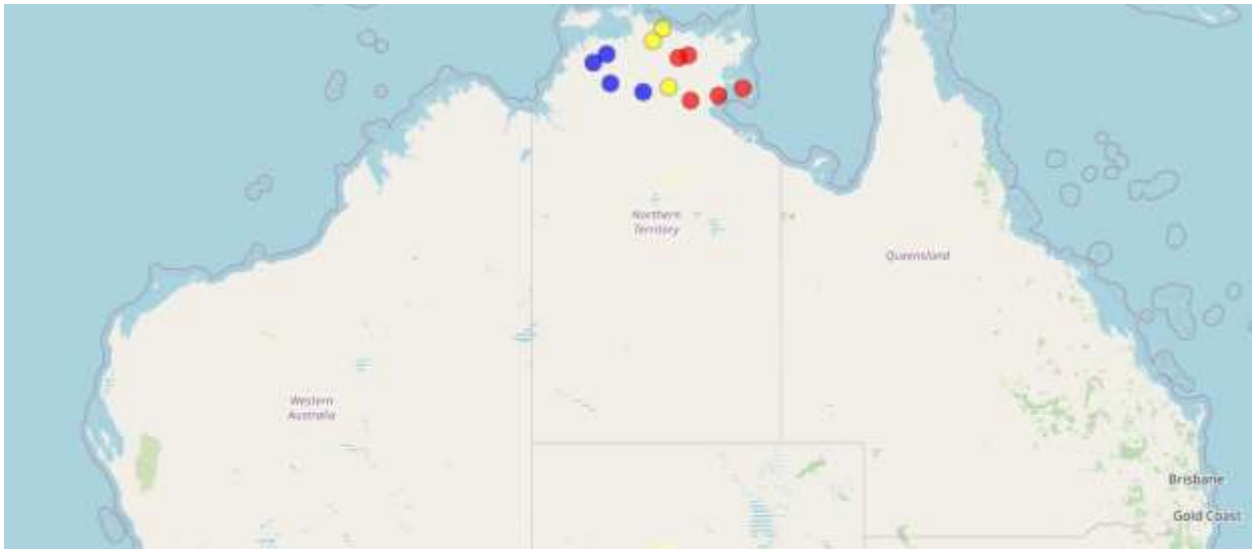
[97] The internal morphological structure of *jamang* 'and then' consists of *ja-* and the subordinating marker *-mang* (Schultze-Berndt 2000: 110). It was not possible to determine the meaning of *ja-*.

Recall that ‘and then’ constructions are marked by *yala-ngurlu* ‘DEM-ABL’ in Mudburra (see §10.2.4.1).

10.2.4.5 ‘And then’ in Gunwinyguan

Evans (2003: 32) mentions that the Gunwinyguan language family is “the most numerous family and widespread group of non-Pama-Nyungan languages, spreading like an octopus across Arnhem Land, centered on the Arnhem Land escarpment, but with tentacles extending to the north, east, west and south.” Map 36 provides an idea of the distribution of the languages of the Gunwinyguan language family. Note that this language family is divided into (1) Gunwinyguan Bak languages (i.e. Anindilyakwa, Ngalakan, Ngandi, Nunggubuyu, Rembarnga; indicated by red dots in Map 36), (2) Marne languages (i.e. Bininj Gun-Wok, Dalabon, and Kunbarlang; indicated by yellow dots in Map 36), and Western Gunwinyguan languages (e.g. Jawoyn, Uwinymil, Waray, and Wulwulam; indicated by blue dots in Map 36).

Map 36. The Gunwinyguan language family



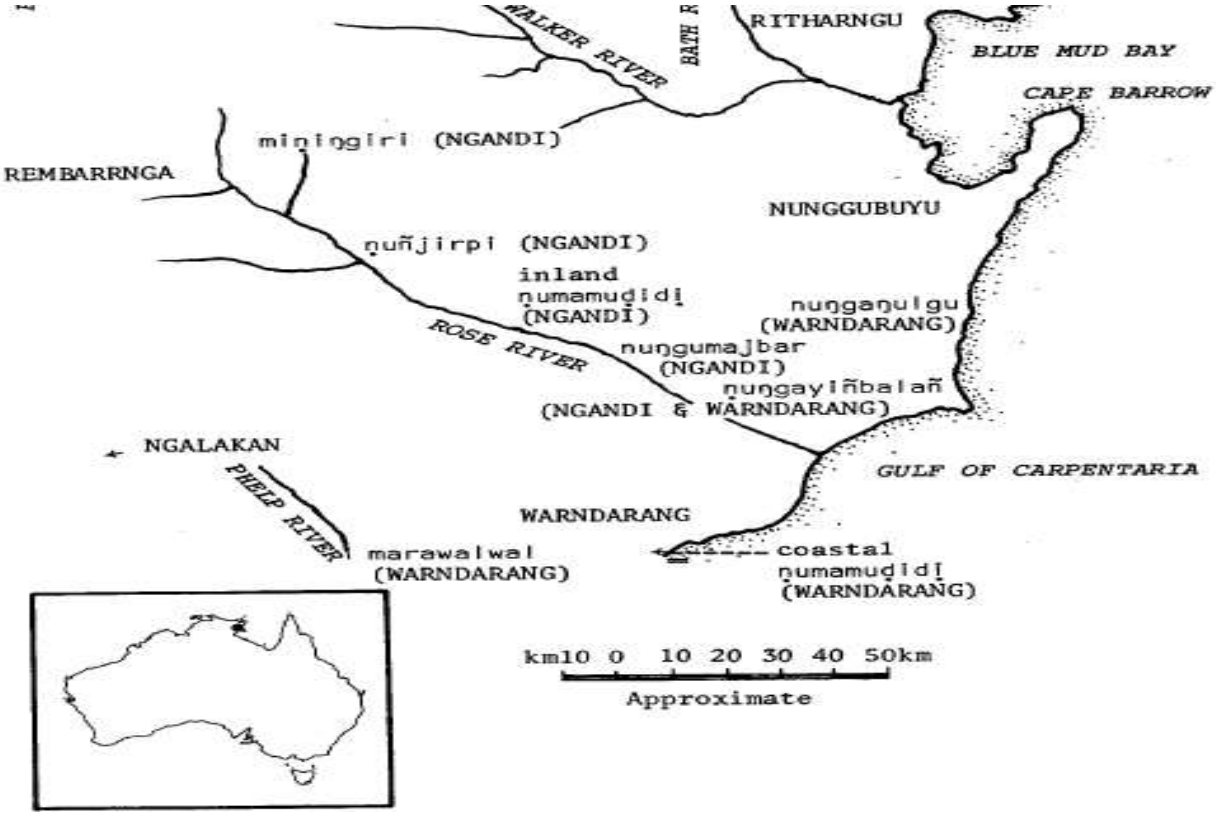
As was discussed in §10.2.4, Waray indicates ‘and then’ by the following clause-linking device: *kati-yang* ‘DEM-ABL’ (Harvey 1986: 267). A closer look reveals that other Gunwinyguan languages also have ‘and then’ devices consisting of a demonstrative and an ablative marker. In this regard, various Gunwinyguan Bak languages (i.e. Ngandi, Nunggubuyu, and Ngalakan) express ‘and then’ by means of a similar pattern to the one attested in Waray. Ngandi indicates ‘and then’ by *ni-ču-wili-ñ* ‘DEM-?-ABL-?’ (Heath 1978a: 64). Nunggubuyu conveys ‘and then’ by *ala-wala* ‘DEM-ABL’ (Heath 1984: 294). Ngalakan signals ‘and then’ by *go?je-wala* ‘DEM-ABL’ (Merlan 1983: 75). Heath (1978a: 64) shows that this type of ‘and then’ device is common in Gunwinyguan Bak languages.

This pattern is not attested in the Marne languages. Evans (2003: 654) mentions that temporal subsequence in Bininj Gun-Wok may be conveyed explicitly (i.e. by means of various types of devices, *wanjh* ‘and then’, *kaluk* ‘and then’, *weleng-* ‘and then’, *yerre* ‘and then’) or by an asyndetic construction. Dalabon, another Marne language, encodes ‘after’ constructions by the sequential coordinator *bah* ‘and then’ or by the consecutive marker *lng-* (Cutfield 2011: 34). As for Western Gunwinyguan languages, this pattern has only been documented for Waray: *kati-yang* ‘DEM-ABL’. For Jawoyn, Uwinymil, and Wulwulam, it was not possible to identify any sources describing temporal adverbial clauses. The question is: did Gunwinyguan Bak languages and Waray copy ‘and then’ devices from other languages?

Most people who speak Ngandi, Nunggubuyu, and Ngalakan also speak one or more other neighboring Aboriginal languages, such as Ritharngu (Heath 1978a: 1). Heath (1978b: 15) points out that besides the abundant evidence that these languages have undergone mutual diffusion of linguistic features, there is ethnographic evidence of the close relationship between Gunwinyguan Bak languages and Ritharngu. He mentions that in a text of Aboriginal

ceremonial activity in the area, speakers of Ngandi refer constantly to associations between the groups. In particular, it is specified in many texts how various Ritharngu-speaking clans used to come together with Ngandi clans to hold ceremonies. Recall that Ritharngu is a Pama-Nyungan language of the Yolngu subgroup that forms 'and then' constructions by a device comprising a demonstrative and an ablative marker*: ŋuki-r-ŋuru* 'DEM-?-ABL' (Heath 1980a: 53). Therefore, it is likely that Gunwinyguan Bak languages copied the pattern from Ritharngu.

Map 37. Gunwinyguan Bak languages and neighboring languages (Heath 1978b: 1)



The relationship between various Gunwinyguan Bak peoples and Ritharngu peoples was generally friendly and close (e.g. the relation between Ngandi and Ritharngu). However, the Ritharngu peoples were traditional enemies of various Gunwinyguan Bak peoples (e.g. the

relation between Nunggubuyu and Ritharngu; Heath 1978b: 16). As for the latter relationship, there was some intermarriage, some joint participation in ceremonies, and some trading between the Nunggubuyu and Ritharngu (e.g. stone spears were manufactured by the Ritharngu and traded to the south, in exchange for items such as hook spears made by the Nunggubuyu; Heath 1978b: 16).

For Waray, it is not clear from which language it copied the 'and then' pattern. The neighbors of Waray are Malakmalak and Kungarakany (Harvey 1986: 12). However, it has not been possible to establish whether Waray speakers have been in contact with these languages. As is shown in §10.2.8.7, Limilngan indicates 'and then' by a device formed by a demonstrative and an ablative maker. Accordingly, one possible hypothesis is that Waray speakers copied this pattern from Limilngan. However, this hypothesis is very weak in the absence of socio-cultural information.

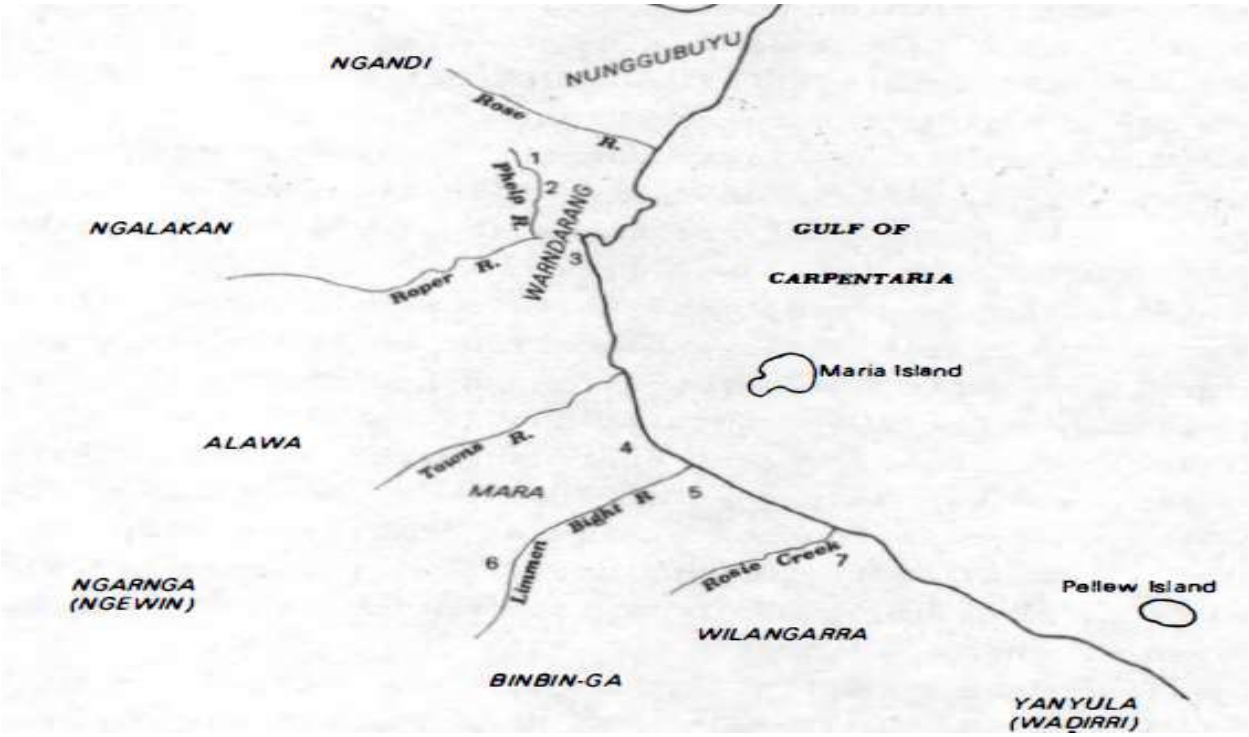
Another hypothesis is that Waray speakers copied the 'and then' pattern from Watjikinj, a Pama-Nyungan language. Culturally, there is one system that links the Waray to the Watjikinj peoples, and other peoples from the Daly River tribes (i.e. the Kungarakanj and Malakmalak). This system is called the *ngirwat* system (Harvey 1986: 20). Stanner (1937) and Elkin (1950) mention that a child receives its other name by the *ngirwat* system, which was practiced by the Waray, the Watjikinj, the Kungarakany, and the Malakmalak. In this system, an old person gives their name to a child and they then become *ngirwar* to another. It has not been possible to determine the way by which speakers of Watjikinj express 'and then'. However, recall that Pama-Nyungan languages tend to have 'and then' devices formed by a demonstrative and an ablative marker.

With this in mind, it is reasonable to assume that this language contact situation played a role in the diffusion of the ‘and then’ pattern. However, this hypothesis is also very weak in the absence of linguistic information about the temporal adverbial clause system of Watjikinj.

10.2.4.6 ‘And then’ in Mara

Mara is a language that was spoken in the Northern Territory of Australia. Heath (1981: 2-3) mentions that Mara is genetically related to Warndarang and Alawa. They constitute the Mara-Alawic family. As is shown in Map 38, this family occupied a continuous area ranging from the Gulf of Carpentaria coast just north of the Rose River to a point between the mouth of the Limmen Bright River and Borroloola, and stretching inland to include the areas around Ngukurr (Ropper River settlement) and Hodgson Downs (Heath 1980b: 1).

Map 38. Mara-Alawic family and neighboring languages



Mara indicates ‘and then’ by the following form: *ni-ŋga-yani* ‘OBL-DEM-ABL’ (Heath 1981: 298). Other languages of this family with the same pattern are Warndarang and Alawa. In Warndarang, ‘after’ constructions are encoded by means of the pattern: *wu-nñaya-wala* ‘?-DEM-ABL’ (Heath 1980b: 100). Alawa, the other language genetically related to Mara and Warndarang, also has an ‘and then’ device formed by a demonstrative and an ablative marker: *adapurʔki-yunu* ‘DEM-ABL’ (Sharpe 1972: 156).

As can be observed in Map 38, Mara was spoken in the same area as Gunwinyguan Bak languages (i.e. Ngandi, Nunggubuyu, and Ngalakan). Recall that Gunwinyguan Bak languages express ‘and then’ by a device consisting of a demonstrative and an ablative marker (see §10.2.4.5). It is worth noting that not all Mara-Alawic languages were in contact with Gunwinyguan Bak languages, but only Warndarang (i.e. Warndarang was in contact with Nunggubuyu; Heath 1978b: 15).

One hypothesis regarding the development of the ‘and then’ pattern in Mara-Alawic languages is the following. The ceremonial life of the Warndarang was highly influenced by the Nunggubuyu (Heath 1978b: 15). This suggests that it is very likely that in this language contact situation, Warndarang speakers copied the ‘and then’ pattern from Nunggubuyu. Recall that Nunggubuyu also has a similar pattern for expressing ‘and then’ (§10.2.4.5). The evidence indicates that the ‘and then’ pattern may have spread to other Mara-Alawic languages (i.e. Mara and Alawa) via Warndarang. It has been noted that Mara and Alawa copied other linguistic traits from Warndarang (Heath 1981: 2).

Another language that seems to be genetically related to the Mara-Alawic languages is Mangarrayi. Interestingly, Mangarrayi has a similar pattern for signaling ‘and then’: *na-naŋ-gana-wa* ‘?-DEM-ABL-?’ (Merlan 1982: xii). One possible hypothesis is that Mangarrayi copied

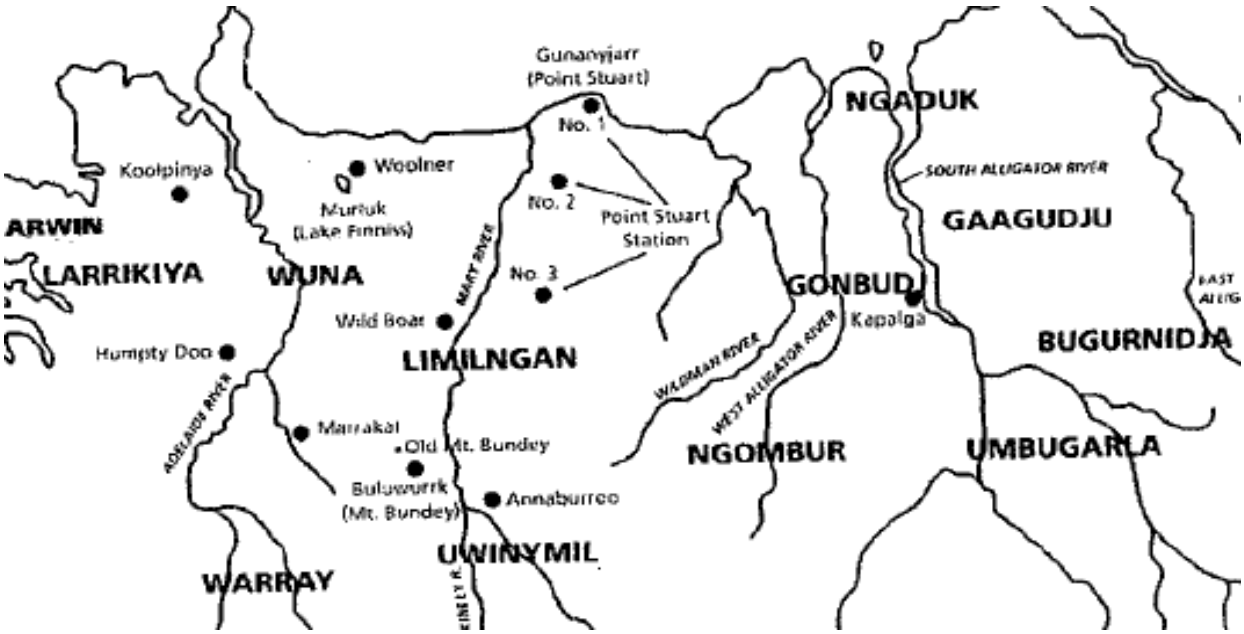
the ‘and then’ device from Mara-Alawic languages. However, for this scenario, I have not identified any sources providing socio-cultural information about the relationship between Mangarrayi and Mara-Alawic languages. Merlan (1982: xii) explicitly mentions that “all of the elderly people could speak at least one other Aboriginal language besides Mangarrayi.” However, she does not provide the names of these languages.

10.2.4.7 ‘And then’ in Limilngan

Limilngan indicates temporal subsequence by an ‘and then’ device formed by a demonstrative and an ablative marker: *da-ya-k-ulang* ‘DEF-IV-DEM-ABL’. This pattern also occurs with the definite marker *da-* and the noun class marker *ya-*.

Limilngan is a non-Pama-Nyunan language of the Darwin hinterland (see Map 39). It has been claimed that Limilngan along with Larrikiya and Wuna constitute a classic example of a linguistic area in that various features seem to have diffused through language contact (Harvey 2001: 8). This linguistic area appears to have extended further east along the Van Diemen coast in that Gonbud Ngaduk, and Gaagudju seem to have traits similar to those attested in Limilngan, Larrikiya, and Wuna.

Map 39. Limilngan and neighboring languages



It has not been possible to analyze temporal clauses in Wuna, Gonbud, and Ngaduk given that the sources do not provide information about this type of complex sentence construction. The only source for which there is information on temporal adverbial clauses is Gaagudju. In this language, temporal subsequence is signaled by means of *baleeru* ‘and then’, as in (622). Note that *mananggaarr* can also be used for indicating temporal subsequence, as in (622). This is a class IV demonstrative form. It belongs to the paradigm of *manaarr* ‘that’. Therefore, it is not clear whether the Limilngan ‘and then’ device was copied from another language.

Gaagudju (Isolate)

(622) …***baleeru*** *ma-rraama djaamu. Ma-nee-nda mananggaarr nji-n-baloolburrbu.*
and.then 1SG-get.FUT tucker 2SG-FUT-eat that 2SG-FUT-full.up
'…And then I will get some tucker. You can eat it, and then you will be full up.'
(Harvey 2002: 377)

10.2.4.8 'And then' in Maningrida

The Maningrida languages is a small language family spoken in Arnhem Land in the Northern Territory, as is illustrated in Map 40.

Map 40. Maningrida languages and their neighbors (Green 1995: 1)

It consists of Burarra, Gurr-Goni, Nakkara, and Ndjébbana (Green 1995: 1). It was originally proposed that these languages were separate language families as suggested by O'Grady et al. (1966) on the basis of lexicostatistical information. However, Green (1989) shows based on sound correspondences that these languages form a single family.

Gurr-goni indicates 'and then' by the following device: *gu-garrapu-kuwa* 'IV-DEM-ABL' (Green 1995: 324). Other Maningrida languages with a similar pattern are Nakkara (i.e. *na-kkarda-bba-kkawa* 'DERIV-that-DERIV-ABL'; Eather 1990: 147) and Ndjébbana (i.e. *nganéyabba-kkawa* 'DEM-ABL'; McKay 2000: 264). Burrara encodes 'after' constructions by a different pattern (i.e. *lika'* and then'; Green 1987: 87).

Gurr-goni along with Burarra, Nakkara, and Ndjébbana shares some features with some Yolngu languages, a subgroup of the Pama-Nyungan languages to the east (Green 1995: 1; see Map 41 for a better idea of the geographical distribution of these languages). This seems to indicate that language contact may have played a role in the diffusion of various linguistic features (e.g. serial verbs with aspectual and/or associated motion functions; Green 1995: 277). In particular, Maningrida languages may have copied various features from the most westerly Yolngu language, Djinang. Recall that Djinang indicates 'and then' by *ngun-ngiri* 'DEM-ABL' (Waters 1989: 262). Accordingly, it seems reasonable to propose that 'and then' devices formed by a demonstrative and an ablative marker spread to Maningrida languages via Djinang.

Map 41. Maningrida languages and Yolngu languages

Another hypothesis is the following. It is likely that one Maningrida language copied the pattern from Djinang and then the 'and then' pattern spread to other Maningrida languages. Eather 1990: 5-6) mentions that intermarriage between Gurr-Goni, Nakkara, and Ndjébbana has been extensive. Furthermore, they have participated in a range of ceremonies that occur throughout Arnhem Land. For instance, the painting used in ceremonies is very similar among Gurr-Goni, Nakkara, and Ndjébbana. This is characterized by use of black in the foundation layer, which denotes the figure outlines or dreaming tracks. Then cross-hatching in several colours, often white, red-brown and yellow, fills in most of the painting.

10.2.4.9 Discussion

I have shown that 'and then' devices formed by a demonstrative and an ablative marker seem to have spread from Pama-Nyungan languages to other, non-Pama-Nyungan languages. I have

proposed that only several languages of two Pama-Nyungan subgroups were involved in the diffusion of ‘and then’ devices: Ngumpin-Yapa languages and Yolngu languages. As for Ngumpin-Yapa languages, it is likely that Gurindji and Walmajarri served as the model languages of the Bunuban ‘and then’ pattern (e.g. Gooniyandi), Walmatjari may have served as the model language of the Nyulnylan ‘and then’ pattern (e.g. Nyigina and Nyulnyul), and Mudburra may have served as the model language of the Wardaman ‘and then’ pattern. With respect to Yolngu languages, Ritharngu and Djinang seem to have played an important role in the diffusion of ‘and then’ devices formed by a demonstrative and an ablative marker. For instance, Gunwinyguan Bak languages seem to have copied the ‘and then’ pattern from Ritharngu, and Maningrida languages seem to have copied the pattern from Djinang.

As for the ‘and then’ pattern in Mara-Alawic languages, the picture is interesting in that it seems to have involved a chain of contacts, that is, it is likely that Warndarang copied the ‘and then’ pattern from a Gunwinyguan Bak language (i.e. Nunggubuyu) and then the pattern spread to other Mara-Alawic languages (i.e. Mara and Alawa) via Warndarang.

The situation of Limilngan and Waray is interesting in that it has been proposed that Waray may have copied the ‘and then’ pattern from Limilngan. However, this hypothesis is very weak in the absence of socio-cultural information. Furthermore, it is not clear how Limilngan developed the ‘and then’ pattern.

10.2.5 Consecutive constructions: Australia

As was discussed in Chapter 5, various Australian languages of the sample indicate temporal subsequence by a consecutive construction. In Garrwa, ‘after’ constructions are formed by the consecutive marker *-jiwa*, as in (623). The initial clause in a narrative sets the TAM stage by

the present tense clitic =*ngka*. After that, the narration is carried forward by a clause that appears with the consecutive marker -*jiwa* (Mushin 2012: 193).

Garrwa (Garrwan)

(623) *…walajba=**ngka*** *ja-**jiwa*** *wada*.
get.up=PRS eat-SEQ food
'…(he) gets up and then eats food.' (Mushin 2012: 193)

Table 52 shows the Australian languages of the sample that use consecutive constructions for expressing temporal subsequence.

Table 52. Australian languages of the sample with consecutive constructions

Language	Family	Form
Kalkatungu	Pama-Nyungan	-*(m)pa* (Blake 1979: 58)
Wangkajunga	Pama-Nyungan	-*(l)ta* (Jones 2011: 270)
Muruwari	Pama-Nyungan	-*ra* (Oates 1988: 187)
Garrwa	Garrwan	-*jiwa* (Mushin 2012: 193
Gooniyandi	Bunuban	-*rni* (McGregor 1990: 428)
Bininj Gun-Work	Gunwinyguan	*weleng*- (Evans 2003: 526)
Miriwung	Jarrakan	-*ra* (Kofod 1978: 68)
Wagiman	Isolate	-*ny* (Cook 1987: 182)
Marrithiyel	Western Daly	-*njsjan* (Green 1989: 185)

This pattern is attested in Pama-Nyungan languages, Garrwan languages, Bunuban languages, Gunwinyguan languages, Jarrakan languages, an isolate language (i.e. Wagiman), and Western Daly languages. The following step is to analyze whether it is possible to determine how the consecutive pattern spread to various Australian languages.

10.2.5.1 Consecutive constructions in Pama-Nyungan

Various Pama-Nyungan languages of several subgroups have consecutive constructions that signal temporal subsequence. This is attested in Kalkatungic languages, New South Wales Pama-Nyungan languages, Ngarna languages, Ngumpin-Yapa languages, Wati languages, Yalandyic languages, and Yolngu languages (see Table 53). The Wangkajunga example in (624) shows a consecutive construction. The first clause shows the formal characteristics of an independent clause while the second clause is characterized by the use of the consecutive marker -*lta*.

Wangkajunga (Pama-Nyungan)

(624) *yu-ngun-pa-jananya* *kartiya-lu,* *mintim-ma-nun-pa-**lta**-ya*.
give-PST-?-3PL.OBJ European-ERG sew-CAUS-PST-?-SEQ-3PL.SBJ
'After the European gave it to them, they sewed it.' (Jones 2011: 270)

Djinang shows a similar pattern to the one discussed before in that temporal subsequence is signaled by a consecutive pattern (i.e. the consecutive marker -*ban*), as in (625). In this construction, the temporal frame of the discourse is initially anchored by the remote past tense marker -*na*, and the second clause appears with the consecutive marker -*ban*. Other

Pama-Nyungan languages with a consecutive pattern are Kuku Yalanji (e.g. the consecutive marker *-da*; Patz 2002: 114), Muruwari (e.g. the consecutive marker *-ra*; Oates 1988: 188), Yalarnnga (e.g. the consecutive marker *-ya*; Breen & Blake 2007: 69), Yanyuwa (e.g. the consecutive marker *-nha*; Kirton & Charlie 1996: 206), and Kalkatungu (e.g. the consecutive marker *-mpa*; Blake 1979: 58).

Djinang (Pama-Nyungan)

(625) *nginiba* *nginiba* *walmi-na,* *larr-**ban***.
1PL.EXCL.DUR 1PL.EXCL go.up-REM.PST set.off-CONS
'We repeatedly went up (the river bank), then we set off.' (Waters 1989: 134)

The forms of the consecutive markers in Pama-Nyungan languages are the following: *-lta, -mpa, -ban, -da, -ra, -nha, -la,* and *-ya* (see Table 53). Given that the forms of the consecutive markers are very similar, it is possible that they can be reconstructed to Proto-Pama-Nyungan (Claire Bowern, personal communication). As is shown in the following subsections, various non-Pama-Nyungan languages use consecutive constructions for indicating temporal subsequence. Therefore, it is very likely that they copied the pattern from Pama-Nyungan languages. This hypothesis is based on the fact that: (1) the consecutive markers can be reconstructed to Proto-Pama-Nyungan and (2) the Pama-Nyungan language family has a deeper time depth than other, non-Pama-Nyungan language families.

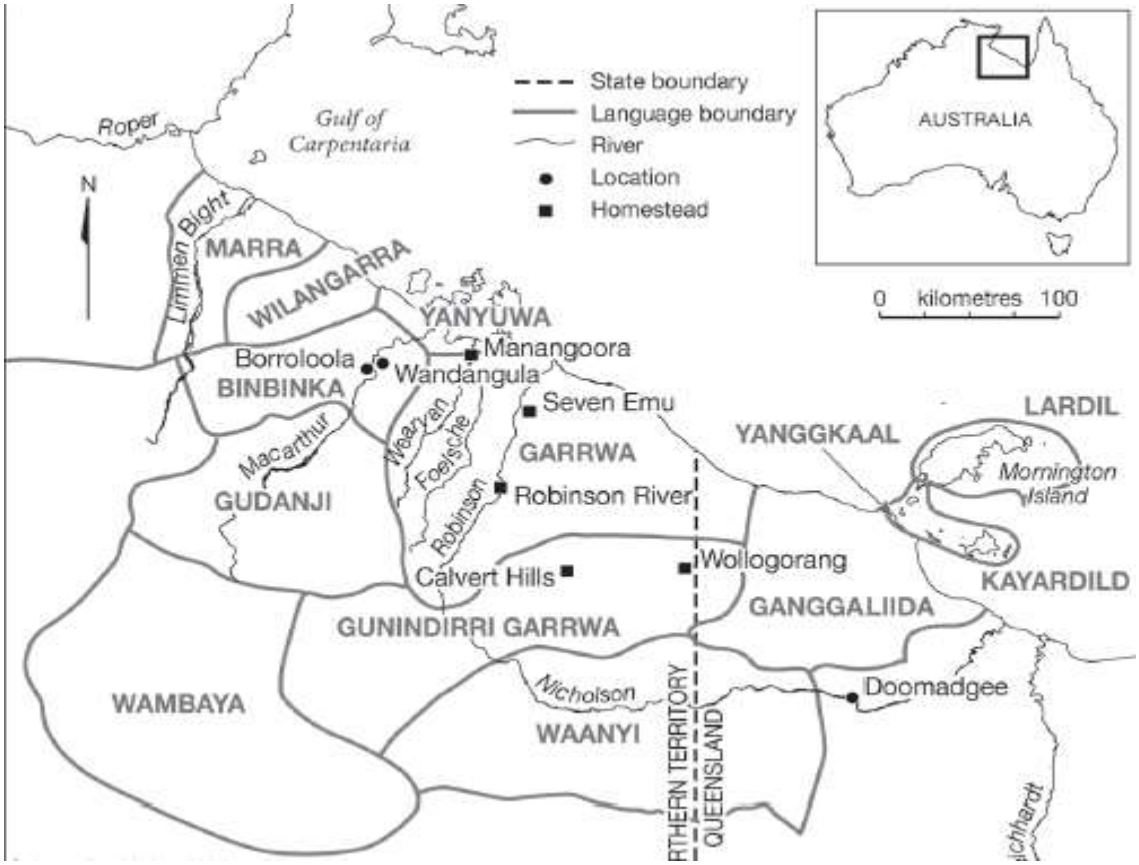
Table 53. Consecutive markers in Pama-Nyungan languages

Language	Family	Subgroup	Form of the consecutive marker
Kalkatungu	Pama-Nyungan	Kalkatungic	*-(m)pa* (Blake 1979: 58)
Yalarnnga	Pama-Nyungan	Kalkatungic	*-ya* (Breen & Blake 2007: 69)
Muruwari	Pama-Nyungan	New South Wales Pama-Nyungan	*-ra* (Oates 1988: 187)
Yanyuwa	Pama-Nyungan	Ngarna	*-nha* (Kirton & Charlie 1996: 206)
Gurindji	Pama-Nyungan	Ngumpin-Yapa	*-la* (Senge 2015: 522).
Wangkajunga	Pama-Nyungan	Wati	*-(l)ta* (Jones 2011: 270)
Kuku Yalanji	Pama-Nyungan	Yalandyic	*-da* (Patz 2002: 114)
Djinang	Pama-Nyungan	Yolngu	*-ban* (Waters 1989: 134)

10.2.5.2 Consecutive constructions in Garrwa

The Garrwa people mostly live in the southwestern Gulf of Carpentaria region of Northern Australia, from the towns of Borroloola to Doomagee (see Map 42). Garrwa, along with neighboring Waanyi, belong to the Garrwan language family. Garrwa itself consists of at least two varieties: Gunindirri/Kunindirri and Western Garrwa (Mushin 2012: 5). Most Garrwa speakers agree that Gunindirri/Kunindirri is a variety of Garrwa and that Waanyi is a different language. Furthermore, they also recognize the closer relationship between Garrwa and Waanyi, which are clearly genetically related (Mushin 2012: 5).

Map 42. Garrwa and surrounding languages (Mushin 2012: xviii)



Garrgwa indicates temporal subsequence by a consecutive construction (i.e. the consecutive marker *-jiwa*). Note that for Waanyi, it was not possible to analyze how temporal adverbial clauses are encoded in this language given that there are no sources providing a description of this type of complex sentence construction. As can be seen in Map 42, the surrounding languages of Garrwa include Yanyuwa (a Pama-Nyungan language of the Ngarna subgroup), Waanyi (to the south), Gudanji, a Mirndi language (also to the south), and Ganggalida, a Tangkic language (to the east) (Mushin 2012: 1).

Of the languages mentioned above, Garrwa speakers have been in contact with Yanyuwa speakers for a long period of time. There are small populations who are of mostly

mixed Garrwa and Yanyuwa heritage (e.g. Wandangula is a community of mixed Garrwa and Yanyuwa heritage; Mushin 2012: 3). This language contact situation has played a role in the diffusion of various linguistic traits. In particular, Garrwa has copied many discourse level features from Yanyuwa. This has resulted in a conflation of pragmatic conventions, discourse organization, and rhetorical style in Garrwa that has been influenced by Yanyuwa discourse (Mushin 2012: 300). The transfer of discourse patterns through contact is not uncommon (Matras 1998: 285; Mithun 2008b: 208). Discourse preferences are particularly prone to diffuse much more quickly and easily than grammatical features (Schokkin 2014: 17; Beier et al. 2002: 123).

Yanyuwa speakers use various forms for providing discourse cohesion, that is, they are involved in linking units or in maintaining the continuity of thematic or participant reference. Furthermore, some of these forms may be used for marking focus on the crisis of a narrative discourse or on the successful conclusion of a procedural discourse. There are other discourse forms that are used for signaling temporal subsequence and for marking a discourse climax. In Yanyuwa, the verbal suffix *-nha* is used for indicating temporal subsequence and for marking one or two verbs associated with the climax of a narrative discourse or a dramatic discourse which has narrative-related content (Kirton & Charlie 1996: 206). In (626), a man describes the experience of accompanying a New South Wales group going back from Brisbane to visit their home community at Woodenbong. On the way they came within sight of Mount Lindsay, and for the narrator, this was the climax of the journey. Note that the construction in (626) has the formal properties of a consecutive construction.

Yanyuwaa (Pama-Nyungan)

(626) *ngamal-iya* *kanu-wuluma,* *ka-wuluma-**nha*** *mudika* *kulu* *ngamala*
south-wards 1PL.EXCL-run it-run-SEQ car and south

baji *barra* *akarra-kari* *ankangu* *ja-alarri-nji* *nya-mangali*
there.DEF now east-DEF above it-stand-PRS M-that.DEF

jayngka.
mountain
'We ran on southwards, and then the vehicle ran on, and there in the south now, up on the east side, that mountain is standing.' (Kirton & Charlie 1996: 206)

Given that Garrwa discourse has been influenced by Yanyuwa discourse, one hypothesis is that Garrwa speakers copied the consecutive pattern from Yanyuwa. Note, however, that the replication of the Yanyuwa consecutive construction has only been partial in that the Garrwa consecutive construction seems to be only used for indicating temporal subsequence across clauses and not for marking a discourse climax.

10.2.5.3 Consecutive constructions in Bunuban

One primary strategy for indicating temporal subsequence in Gooniyandi is the consecutive marker *-rni,* as in (627). Recall that Gooniyandi belongs to the Bunuban language family. Note that Bunuban does not express temporal subsequence by a consecutive pattern. Instead, this language encodes *after*-constructions by the sequential coordinating device *nyirra-nhingi*

'DEM-ABL'. As was discussed in §10.2.4.2, Gooniyandi has been in contact with various Pama-Nyungan languages of the Ngumpin-Yapa subgroup (e.g. Gurindji, Walmajarri). Therefore, it is likely that Gooniyandi copied the consecutive pattern from a Pama-Nyungan language. For Walmajarri, it was not possible to determine whether it has a consecutive construction. However, Gurindji seems to have a consecutive construction encoded by *-la* (Senge 2015: 522). Senge mentions that "when the time sequential marker attaches to inflecting verbs, they are always non-finite forms and no example of finite verbs taking *-la* is found."

Gooniyandi (Bunuban)

(627) *billycan* *jidiblimi* *babaabiddi-**rni*** *milala*.
billycan 1SG.SBJ.lifted.3SG.OBJ inside-SEQ
1SG.SBJ.saw.3SG.OBJ
'I lifted the billycan lid and then looked inside.' (McGregor 1990: 428)

10.2.5.4 Consecutive constructions in Gunwinyguan

Bininj Gun-Wok, a language belonging to the Gunwinyguan language family, indicates temporal subsequence by a consecutive pattern (i.e. the consecutive marker *weleng-*), as can be seen in (628). Evans (2003: 526) mentions that formally and semantically similar forms occur in Rembarrnga (i.e. *walang-*; McKay 2011: 188) and Dalabon (i.e. *yelvng-*). After I looked at many sources on Gunwinyguan languages, I was not able to identify any other language that also expresses temporal subsequence by a consecutive pattern.

Bininj Gun-Wok (Gunwinyguan)

(628)	*nungga*	*an-ga-ng*	*gure*	*bininj*	*gabarri-mirnde-rri-Ø,*
	3SG	3SG-take-PST.PFV	LOC	person	3SG-many-be-NON.PST

‘He took me to a group of people,

*arri-**weleng**-wokdanj*.

1SG-CONS-talk.PST.PFV

and then we started talking.’ (Evans 2003: 526)

One hypothesis is that Rembarrnga and Dalabon copied the consecutive pattern from Bininj Gun-Wok. Evans (2003: 7) points out that it is likely that Bininj Gun-Wok was used as a lingua franca for at least a century in the whole western half of the Arnhem Land. This means that many languages spoken in the area copied linguistic traits from Bininj Gun-Wok (including Rembarrnga and Dalabon). However, the question is: did Bininj Gun-Wok copy the consecutive pattern from another language?

It is worth noting that Bininj Gun-Wok also copied features from other neighboring languages. For instance, speakers of Bininj Gun-Wok and speakers of languages from the Iwaidjan family have been in contact for a long period of time (e.g. Maung). There have been large number of loans in both directions, including, animal, plant, and meteorological terms (Evans 2003: 36). Another example comes from Maningrida languages, for which it has been possible to determine that there has been substantial lexical and grammatical borrowing in both directions (Evans 2003: 36). Bininj Gun-Wok has also been in contact with Yolngu languages (e.g. Djinang, Djapu, and Ritharngu), a group of Pama-Nyungan languages to the east. There

has been long-standing mutual influence between Bininj Gun-Wok and Yolngu languages to the extent that they show similarities in their phonologies and grammars. Of the languages mentioned before, it is likely that Bininj Gun-Wok copied the consecutive pattern from a Yolngu language. As was shown in §10.2.5.1, Djinang has a consecutive construction encoded by *-ban*. Furthermore, this is the language in closer proximity to Bininj Gun-Wok than the other Yolngu languages. Therefore, Djinang may have served as the model language in this language contact situation.

10.2.5.5 Consecutive constructions in Jarrakan

The Jarrakan language family is a family that consists of Miriwung, Kita, and Gajirrabeng (Gajirrawoong), a closely related language now nearly extinct (see Map 43)

Map 43. Jarrakan language family

Of the Jarrakan languages mentioned before, only Miriwung seems to have a consecutive construction indicating temporal subsequence, as is shown in (629), where the temporal subsequence relation is signaled by *-ra*. The heart of Miriwung country is the wider Kununurra area in the east Kimberley region of Western Australia that stretches up to about 100 kilometers eastward across the border into the Northern Territory (Olawsky 2010: 146).

Miriwung (Jarrakan)

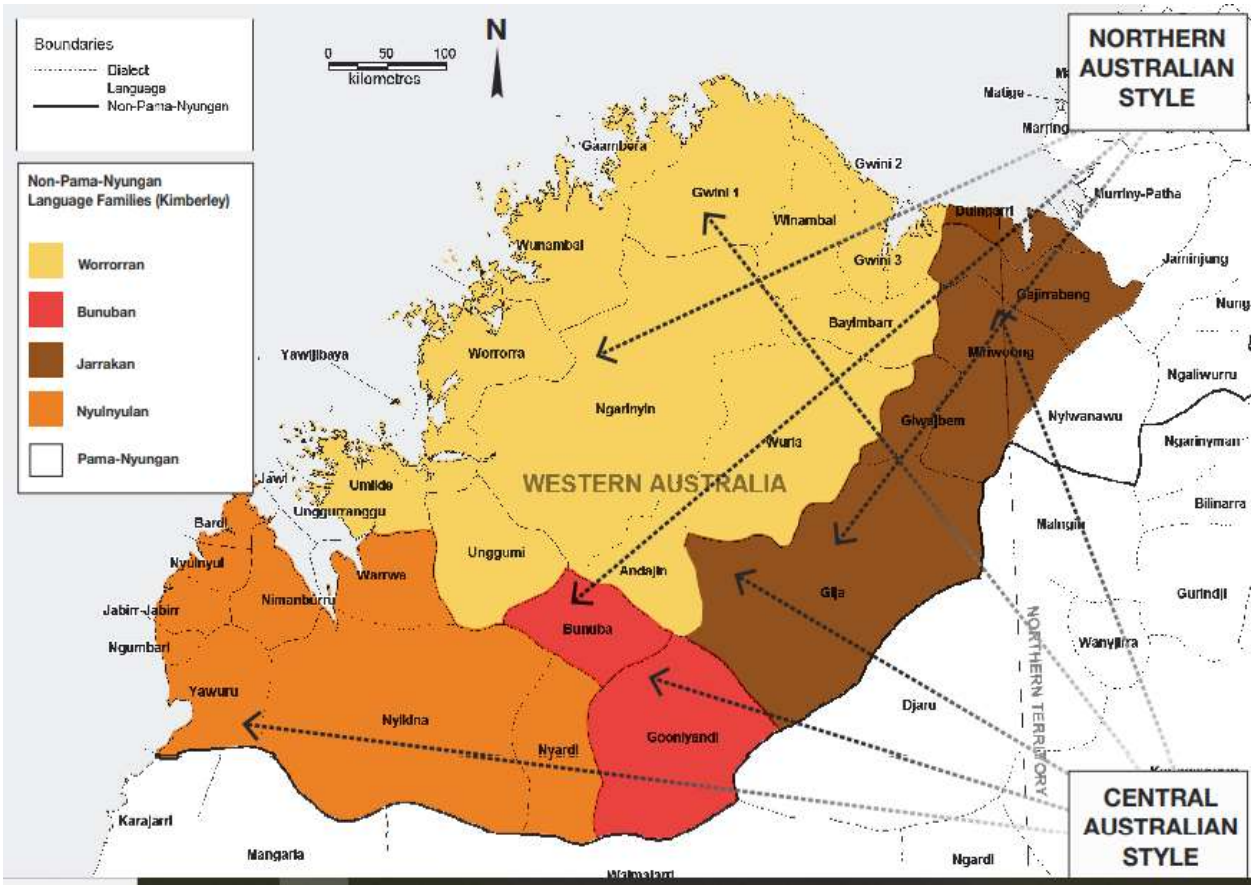
(629) *djendunga* *nengg* *beniya-a,* *geluwirrgu* *du* *berriya-**ra***.
string break 3PL.sit.PST-3SG.OBJ up.there go.away 3PL.go.PST-CONS
'They broke his string and then went away up there (into the sky).' (Kofod 1978: 68)

Other Jarrakan languages do not express temporal subsequence with a consecutive pattern. Accordingly, it is very likely that the Miriwung consecutive pattern was copied from another language. One hypothesis is that the pattern developed under the influence of Pama-Nyungan languages. However, I have not been able to identify any sources proving information about bilingualism, intermarriage, or religion. The only evidence that seems to suggest that Miriwung, and other Jarrakan speakers were at some point in contact with Pama-Nyungan languages comes from ethnomusicological research of Australian Aboriginal music.

Many Pama-Nyungan languages have song genres with the following features: (1) relatively short duration of song items (approximately one minute), (2) cyclical melodic patterns, and (3) regular beating accompaniments that are uniform within song items, etc. (Treloyn 2017: 150). This is known as the 'Central Australian musical style'. In this musical

style, a relatively short text, referred to as a 'text cycle', is employed as the core lyrical content of each song performance. Other Pama-Nyungan languages have song genres with the following features: (1) use of the didjeridu, (2) relatively long duration of song items, (3) relatively long song texts that are sectional and stanza-like (not strictly cyclical), and (4) strophic, coterminous relationship between text/rhythm and melody, etc. This is known as the 'Northern Australian musical style' (Treloyn 2017: 150).

Map 44. Musical styles in the Kimberley region (Treloyn 2017: 150).



Interestingly, it has been proposed that these musical styles extended beyond the Pama-Nyungan line into all four non-Pama-Nyungan language families of the Kimberley: (1) *ilma*

composed and performed by Bardi, and *nurlu* composed and performed by Nyikina (Nyulnyulan language family), *junba* composed and performed by Bunuba and Gooniyandi (Bunuban language family), *junba*/*balga* and subgenres *jadmi* and *jerregorl*/*galinda* composed and performed by Ngarinyin, Wunambal, and Worrorra (Worrorran language family), and *junba*/*balga* composed and performed by Miriwung and Kija (Jarrakan language family). What this seems to suggest is that Jarrakan speakers were in contact with speakers of various Pama-Nyungan languages.

10.2.5.6 Consecutive constructions in Wagiman

Wagiman, a language isolate spoken in the Northern Territory, encodes *after*-clauses by a consecutive construction, as in (630). In this example, the consecutive construction begins with a clause that gives full tense specification and subject marking. The second clause is not marked for tense and subject and only appears with the consecutive marker *-wi*.

Wagiman (Isolate)

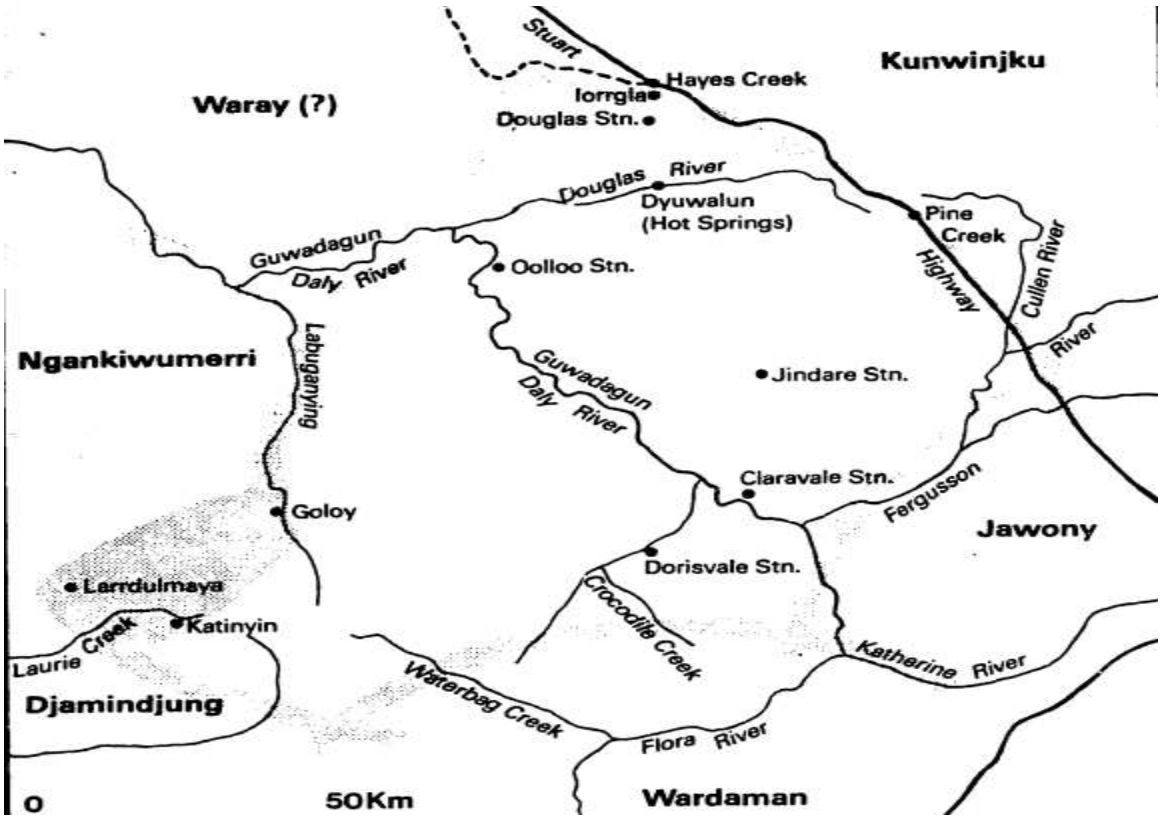
(630)	*munybaban*	*ŋa-di-nya*	*borabora*,	*bew* **'*-wi*.**
	other.side	1SG.SBJ-come-PST	river	cross-SEQ

'I came along the river on the other side and then I crossed over.' (Cook 1987: 259)

For this language, it was not possible to find any source providing information about bilingualism, intermarriage, or any other sort of socio-cultural or anthropological information. However, Cook (1987: 3) mentions that "the Wagiman people would originally have had contact with their neighbors in surrounding areas, although it is difficult to reconstruct what

sort of relationships would have held between them." As is illustrated in Map 45, to the north were the Waray people, while to the north-east were the Kunwinjku people (one dialect of Bininj Gun-Wok). To the south, south-east, and east were the Wardaman. To the south-west were the Djamingjung people. Of these languages, Bininj Gun-Wok has a consecutive construction encoded by *weleng-* (see §10.2.5.4). One hypothesis is that Wagiman copied the consecutive pattern from Bininj Gun-Wok. Recall that Bininj Gun-Wok was used as a lingua franca for at least a century in this area. However, in the absence of socio-cultural evidence, this hypothesis is not very well-founded.

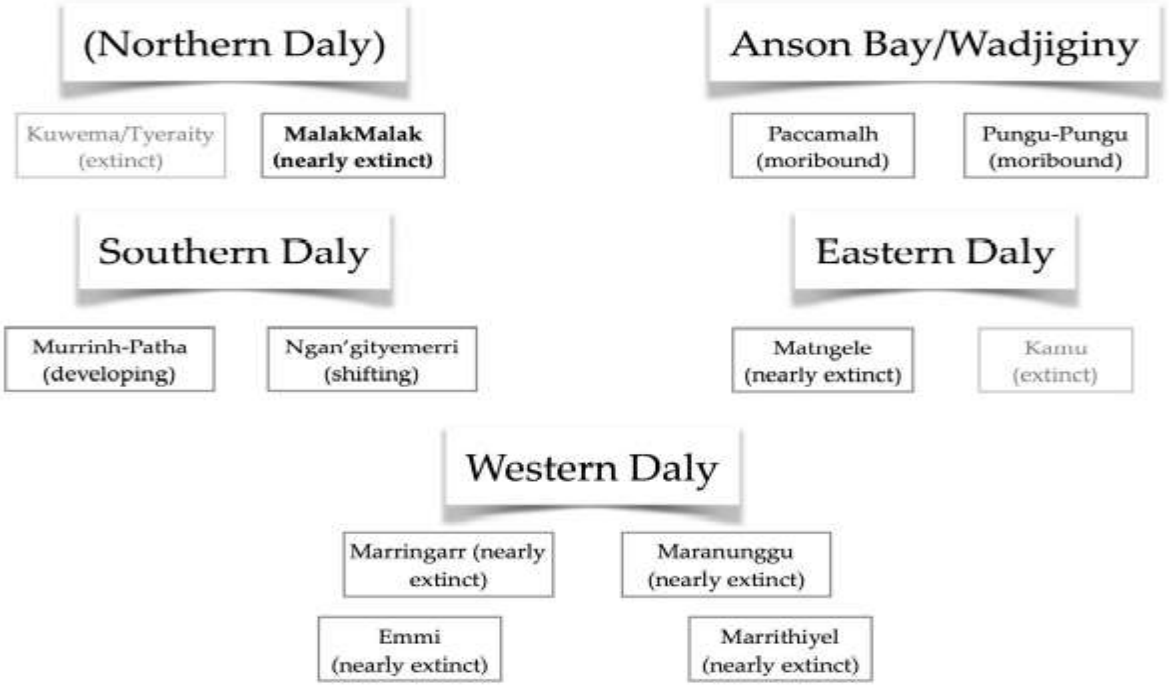
Map 45. Wagiman traditional land and neighboring languages (Cook 1987: 1)



10.2.5.7 Consecutive constructions in Daly languages

The Daly languages do not form a genetic family, but a *Sprachbund* that has led to strong convergence between the languages (Evans 2003: 13). The Western, Eastern, and Southern Daly languages are established language families (Ford 2011; Evans 2003). On the other hand, the Northern Daly family is the least accepted given that very little is known about Kuwema (Evans 2003: 13).

Figure 28. Daly languages (Yungguny Lindsay et al. 2016: vii)



Marrithiyel is a nearly extinct Western Daly language that encodes 'after' constructions by means of the consecutive marker *-njsjanis*, as in (631).

Marrithiyel (Western Daly)

(631) *gambu-wurrkama-Ø-na-ya, gambu-gudak-Ø-**njsjan**-a.*

1INCL-work-DU-first-PST 1INCL-drink-DU-CONS-PST

'We worked, and then we drank.' (Green 1989: 185)

This marker has two temporal interpretations: it can be understood as having a relative temporal reference, in which case it indicates 'and then', or it can be understood as having absolute temporal reference, i.e. referring to the time of speaking, in which case it indicates 'now'. Green (1989: 186) mentions that *-njsjanis* "as a relative temporal, it acts to sequence and segment the discourse, marking the verb, or whatever other constituent it may attach to, as belonging to a time frame subsequent to that of the preceding discourse." Note that *-njsjanis* is one of the most commonly occurring clause-linking devices in the day-to-day conversational form of Marrithiyel. Other Western Daly languages do not express temporal subsequence with a consecutive pattern. For instance, Emmi indicates temporal subsequence with the sequential coordinating device *ngunu* 'and then' (Ford 2011: 332).

A closer look reveals that MalakMalak, a nearly extinct Northern Daly language spoken in the Daly River region of northern Australia, seems to have a consecutive pattern indicating temporal subsequence. The language has a paradigm of consecutive markers that simultaneously index the subject and express temporal subsequence, as can be seen in Table 54. These may be free forms or verbal forms. For Tyaraity, the other language genetically related to MalakMalak, it was not possible to determine whether it has a consecutive pattern or not.

Table 54. Paradigm of consecutive markers in MalakMalak (Birk 1974: 50)

Person	Free forms	Verbal forms
First person singular	*awöntön*	*a-*
Second person singular	*nöwöntön*	*nö-*
Third person singular masculine	*wöwöntön*	*wö-*
Third person singular feminine	*wöwöntön*	*wö-*
Third person singular vegetative	*möwöntön*	*mö-*
First person dual	*aŋköntön*	*aŋk-*
First person inclusive	*arˇköntön*	*arˇk-*
First person exclusive	*arˇöntön*	*arˇ-*
Second person plural	*nönŋkörˇöntön*	*nönkörˇ-*
Third person plural	*wirˇmin*	*wörˇ-*

Given that the consecutive pattern seems to be attested only in Marrithiyel and MalakMalak, language contact may have taken place. Green (1989: 8) mentions that MalakMalak and Marrithiyel are typologically similar, which suggests that language contact may have played a role here. With this in mind, one hypothesis is that Marrithiyel copied the pattern from MalakMalak. This stems from the fact that the MalakMalak consecutive pattern has developed more functions than in Marrithiyel, that is, MalakMalak has a paradigm of consecutive markers that simultaneously index the subject and express temporal subsequence. It has been claimed that more time is required for a form to develop a range of functions (Campbell 1985: 31). However, as is argued in §10.1, if a pattern develops more functions in 'X' than in 'Y', this does not necessarily provide information about the antiquity and direction

of areal diffusion. In the absence of more socio-cultural information, it is not clear who passed the consecutive pattern to whom in this language contact situation.

Map 46. Marrithiyel and surrounding languages (Green 1989: xiv)

The question is: did Marrithiyel and MalakMalak copy the consecutive pattern from any Pama-Nungan language? As was discussed above, various non-Pama-Nyungan languages have copied the consecutive pattern from various Pama-Nyungan languages. Therefore, another hypothesis is that Marrithiyel and MalakMalak copied the pattern from Pama-Nyungan languages. However, it has not been possible to determine whether Marrithiyel and MalakMalak have been in contact with speakers of any Pama-Nyungan languages.[98] In the

[98] MalakMalak language and culture have been in very close contact with Matngele, a neighboring Daly language spoken by most MalakMalak speakers (Yungguny Lindsay et al. 2016: vii). There are no sources of Matngele that provide a description of complex sentence constructions, let alone temporal adverbial clauses. Zandvoort

absence of socio-cultural and anthropological information about this language contact scenario, this hypothesis is not well-founded.

10.2.5.8 Discussion

Consecutive constructions seem to have spread from Pama-Nyungan languages to other, non-Pama-Nyungan languages. I have proposed that only languages of three Pama-Nyungan subgroups were involved in the diffusion of the consecutive pattern: Ngarna languages, Ngumpin-Yapa languages, and Yolngu languages. As for Ngarna languages, it is likely that Yanyuwa served as the model language of the Garrwa consecutive pattern. With respect to Ngumpin-Yapa languages, it is likely that Gurindji served as the model language of the Gooniyandi consecutive pattern. As for Yolngu languages, Djinang may have served as the model language of the Bininj Gun-Wok consecutive pattern. It was proposed that this pattern may have spread to other Gunwinyguan languages (i.e. Rembarrnga and Dalabon) and language isolates (i.e. Wagiman) via Bininj Gun-Wok. The situation of Marrithiyel and MalakMalak is not clear in that it has not been possible to determine the directionality of spread of the consecutive pattern.

10.2.6 Adverb(ial)s meaning 'only' and 'as soon as': Mali

As was discussed in §5.4.4, various languages spoken in Mali, though from different language families, use adverb(ial)s meaning 'only' for expressing 'as soon as'. For instance, in Humburu Senni (Songhay), 'as soon as' constructions are realized by the adverb(ial) *táŋ* 'only'. In Jamsay (Dogon), 'as soon as' is indicated by the adverb(ial) *tán* 'only'. Given that this pattern

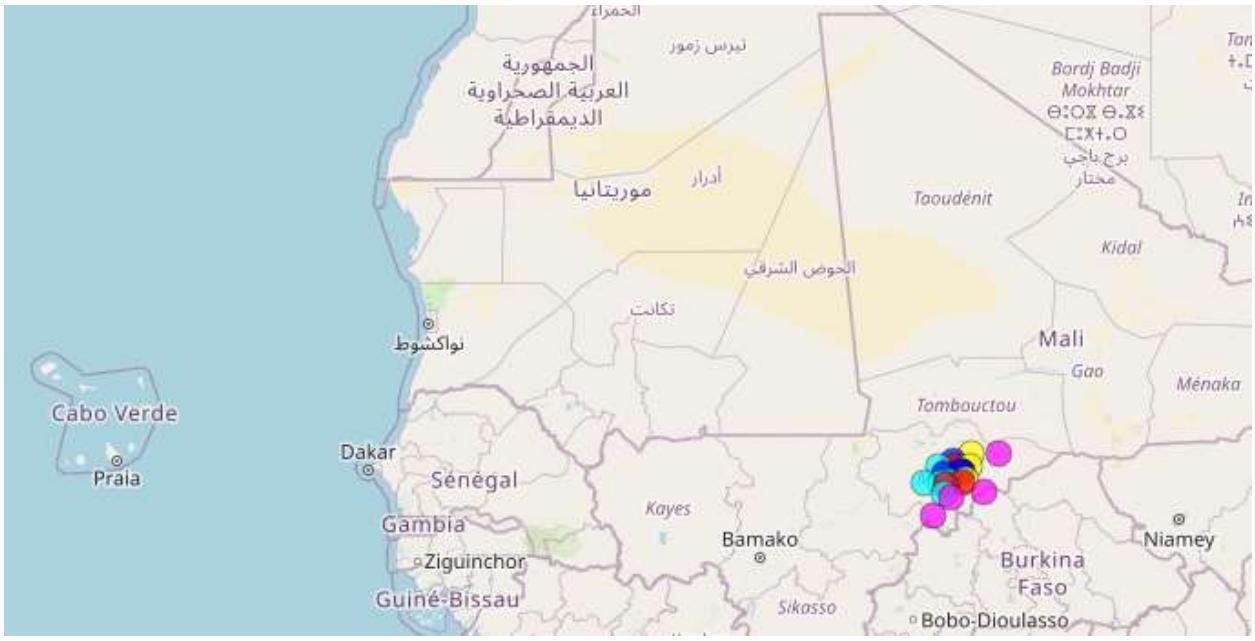
(1999: 136) briefly mentions the particle *ngunjuwa* 'afterwards' at the end of his grammar. However, he does not provide any examples.

is only attested in this area, it is likely that language contact may have taken place. In the following subsections, I analyze the range of ways by which 'as soon as' is expressed in Dogon languages and in Songhay languages, and then propose a hypothesis about the spread of the 'as soon as' pattern in Mali.

10.2.6.1 'As soon as' in Dogon

Dogon is a family of languages mainly spoken in eastern Mali, as can be seen in Map 47. The Dogon people live in the southwest part of the Central Nigerian Highlands in Mali. This area consists of a high rocky plateau in the west and a wide sandy plain called "Seno" in the east (Hochstetler et al. 2004: 12).

Map 47. Dogon languages



Dogon languages express ‘as soon as’ with various clause-linking strategies. First, there are languages that indicate ‘as soon as’ with an adverb(ial) meaning ‘only’. In most Dogon sources, this item is characterized as a focus-sensitive particle used as a clause-linking device. In the example in (632) from Ben Tey, immediate temporal subsequence is signaled by *tá*^{n} ‘only’. A look-alike construction is also found in Bunoge. In this language, ‘as soon as’ constructions are encoded by the focus-sensitive particle *tán*, as in (633). Jamsay, another Dogon language spoken in Mali, forms ‘as soon as’ constructions by the focus-sensitive particle *tán* ‘only’, as in (634). Heath (2008: 582) mentions that *tán* ‘only’ is used for signaling that the fulfillment of the ground clause situation leads immediately to that of the figure clause. He suggests that a translation like ‘as soon as’ is appropriate in most contexts.

Ben Tey (Dogon)

(632) *núwⁿɔ̀yⁿ* *yɛ̀-ẁ* ***tán***, *súːrⁿà*.
now come.PFV-2SG.SBJ only rest.IMP
‘As soon as you have come, take a rest!’ (Heath 2015a: 257)

Bunoge (Dogon)

(633) *nàmbálà* *nɔ̀-ŋ́* *tɛ̌m* *mbà* ***táⁿ***…
lion DEF-ACC devour.PFV.3SG.SBJ PFV only
‘As soon as he devoured the lion…’ (Heath 2014a: 357)

Jamsay (Dogon)

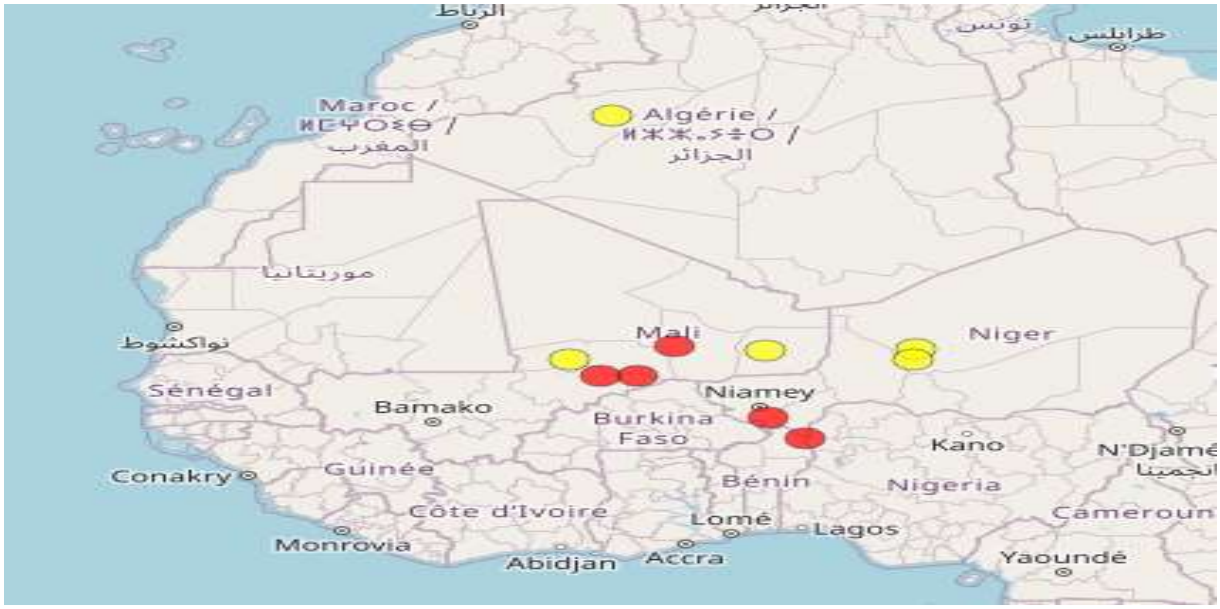
(634)	*íné-m*	*yèrɛ́*	*mɔ̌y-yɛ-bà*	***tán***…
	person-PL	come	be.together-PFV-3PL	only

‘As soon as they gather together, (they ask each other)…’ (Heath 2008: 582)

10.2.6.2 ‘As soon as’ in Songhay

Songhay is often described loosely as a “language”, but in fact it is a large complex of varieties, some of which are quite clearly distinct languages. Languages of the Songhay family are linguistically dominant in northeastern Mali along the Niger River, and others of the family occupy much of the Republic of Niger (see Map 48). Additional varieties are spoken in Bénin, and perhaps still residually in the Dori area of Burkina Faso (Heath 1999a: 1).

Map 48. Songhay languages



There are various Songhay languages that express ‘as soon as’ with an adverb(ial) meaning ‘only’. The ground clause in the Koyraboro Senni example in (635) appears with *hinne* ‘only’. This device indicates that the situation of the figure clause immediately happens after the situation expressed in the ground clause.

Koyraboro Senni (Songhay)

(635)	*...ya*	*ŋka*	*zumbu*	*lol-aa*	*ra*	***hinne***...
	1SG	ST	descend	street-DEF	LOC	only

‘…As soon as I had gotten out in the street…’ (Heath 1999b: 268)

Comparable formations can be described for Humburu Senni and Koyra Chiini. In (636), ‘as soon as’ constructions are encoded by *táŋ* ‘only’. In (636), *táŋ* ‘only’ is used for signaling that that “the completion of the firs eventuality immediately precedes the second eventuality: ‘A, (only) then B’ or ‘as soon as A, B’” (Heath 1999a: 416).

Humburi Senni (Songhay)

(636)	*ì*	*náŋ*	*tó:*	***táŋ***,	*gá*	*ì*	*káni*.
	1SG	PFV	arrive	only	REL	1SG	go.to.sleep

‘As soon as I had arrived (home), I went to sleep.’ (Heath 2014b: 356)

A closer look reveals that ‘as soon as’ constructions encoded with an adverb(ial) meaning ‘only’ are only attested in Songhay languages spoken in Mali. Other Songhay languages, not spoken in Mali, seem to express ‘as soon as’ with other types of clause-linkage

patterns. Tagdal is a Songhay language, scattered throughout the central and eastern regions of the modern-day Republic of Niger. In this language, immediate temporal subsequence may be expressed with *təzzar* ‘and then (immediately)’ (Benítez-Torres 2021: 130). There are also some constructions encoded with *ha ʒi n aláqqam* ‘after that’ (lit. ‘the thing behind’; Benítez-Torres 2021: 195) that seem to have an ‘as soon as’ interpretation. Tasawaq is another Songhay language spoken in the Republic of Niger. In this language, there are contexts in which *zààmá* ‘and then (immediately)’ seems to have an immediate temporal subsequence interpretation (Kossmann 2015: 110). However, it is not clear if this language has another way for expressing ‘as soon as’.

10.2.6.3 Discussion

The similarities of the ‘as soon as’ pattern attested across the neighboring but genealogically unrelated languages spoken in Mali is intriguing. They seem not to be the result of chance. Instead, language contact may have played a role here. Some scenarios can be hypothesized.

Heath (personal communication) points out that speakers of Dogon languages borrowed *tan* ‘only’ from Fula, an Atlantic-Congo language. Annett Harrison (personal communication) informs me that *tan* ‘only’ is not used for expressing ‘as soon as’ in Fula. Instead, the most common use of *tan* ‘only’ is as part of a response to a greeting *jam tan* ‘just fine, lit. peace only’ in most Fula varieties spoken in different parts of Africa (e.g Niger, northern Nigeria, and Chad, etc.). Accordingly, what this seems to indicate is that Dogon languages borrowed *tan* ‘only’ from Fula and this adverb(ial) developed a different function in Dogon languages. Fula is spoken in some small villages in eastern Mali, and is the traditional lingua franca of the administrative and market town Douentza (Heath 2014b: 2-3). It is also

worth noting that men speakers of various Dogon languages also acquire Fula through herding experience (McPherson 2013: 6). Herding has traditionally been carried by the Fula (especially cattle) (Heath 2008). Note that Dogon who are born and raised in Pinia learn Fula as a second language (Heath 2016a: 1).

The question is: did Songhay languages spoken in Mali also copy the 'as soon as' pattern from Fula? For this scenario, the story seems to be more complex. Speakers of Songhay languages in Mali have been in contact not only with Fula, but also with Tamashek (Tuareg of Mali). As was discussed in §5.4.4, Tamashek is another language spoken in Mali that indicates 'as soon as' by an adverb(ial) meaning 'only', as in (637).

Tamashek (Afro-Asiatic/Berber)

(637) *Ø- èba-t* ***ɣas,*** *n-ə̀gla.*
3SG.SBJ.M-be.lost.PFV-3SG.OB.M only 1PL.SBJ-go.PFV
'As soon as he died, we went away.' (Heath 2005: 668)

There is very extensive Fula and Tamashek influence in the grammar of Koyra Chiini spoken in Niafunké (Heath 1999a: 3). The local economy of Koyra Chiini is based primarily on farming, fishing, and herding. The latter is primarily associated with the non-Songhay-speaking minorities in the area (i.e. Bella and Fula). The Bella, Tamashek-speaking blacks formerly enslaved to Tuaregs, are the main herding people in the area from Timbuktu to Goundam and specialize in sheep and goats. The bovine specialists, however, are the Fula, who are especially numerous in the area around Niafunké (Heath 1999a: 3)

As for Humburi Senni, their herds used to be tended by Fula people, and there is now a significant Fula-speaking community in Hombori itself and throughout the region (Boni and Douentza; Heath 2014b: 12). There are some Tuaregs in the area, most of them having moved south from the Timbuktu-Goundam or Gourma Rharous areas. There are also some Bellas. Tamashek is the language spoken by Tuaregs and Bellas, and those Homborians who have dealings with them may learn Tamashek (Heath 2014b: 12).

With respect to Koyraboro Senni, many Fula living along the Niger River have been linguistically absorbed and are now monolingual in Koyraboro Senni, but still identify themselves as ethnic Fula. However, Fula has also influenced Koyraboro Senni in that there are quite a few loanwords in Koyraboro Senni (Heath 1999b: 3). Gao, a town of eastern Mali where Koyraboro Senni is spoken is a place where speakers of Koyraboro Senni have also been in contact with speakers of Tamashek (Tuaregs and Bellas; Heath 1999b: 3). Between 1990 and 1995, a Tuareg and Arab insurrection took place, where rebels attacked vehicles and towns. Following the rebel attacks, the Songhays drove nearly all Arabs and Tuaregs, but not the Bellas, into exile.

Note that ‘only’ used for expressing ‘as soon as’ is common not only in Tamashek, but also in other Berber languages. Berber languages are spread all over North-Africa from the Atlantic coast as far as the Egyptian oasis Siwa in the east and Burkina Faso in the south (Mourigh 2015: 1). While some Berber languages express ‘as soon as’ by *ɣir* ‘only’ (e.g. Zuaran Berber; Mitchell 2009: 141), other Berber languages indicate ‘as soon as’ by *ɣas* ‘only’ (Maarten Kossmann, personal communication).

One remark on ‘as soon as’ constructions in Berber languages is in order here. Standard/Classical Arabic has an adverb(ial) meaning *ɣair* ‘only’. It is worth noting that this

lexical item is only used in monoclausal constructions in Standard/Classical Arabic (e.g. *We want only sugar*). One hypothesis is that Berber *ɣir* 'only' or *ɣás* 'only' was borrowed from Standard/Classical Arabic (Maarten Kossmann, personal communication). Note that the *ɣair* has been adjusted to the phonotactics of the receiving Berber languages (e.g *ɣás* 'only'). However, Berber *ɣir* 'only' or *ɣás* 'only' is not only used in monoclausal constructions, but also in biclausal constructions that express 'as soon as' (Saïd Barguigue, personal communication). Interestingly, Moroccan Arabic or Colloquial Moroccan Arabic, also known as "Darija" has developed a similar pattern for encoding 'as soon as' constructions. In Moroccan Arabic, immediate temporal subsequence is signaled by the adverb(ial) *ɣir* 'only', as can be seen in (638). In this scenario, it is likely that Moroccan Arabic developed the 'as soon as' pattern under the influence of Berber languages.

Moroccan Arabic (Afro-Asiatic/Semitic)[99]

(638)	***ɣir***	*i-mʃi*	*bba*	*ukan*	*n-ərjəʔ.*
	only	3SG.M-leave.IPFV	father.1SG.POSS	then	1SG-come.IPFV

'As soon as my dad leaves, I will come back.'

In this section, I have shown that many Dogon languages borrowed the adverb(ial) *tan* 'only' from Fula. Intriguingly, this lexical item is not used in Fula for indicating 'as soon as'. Instead, it is as part of a response to a greeting *jam tan* 'just fine, lit. peace only'. This suggests that Dogon languages borrowed *tan* 'only' from Fula and this adverb(ial) developed a different function in Dogon languages. This seems to match what Johanson (2008: 67) describes as

[99] Example provided by Saïd Barguigue (personal communication).

'selective grammatical copying', a process in which a loanword assumes different functions in the replica language. As for Songhay languages, it is clear that some of them (e.g. Humburi Senni) copied the pattern from Fula. However, for other Songhay languages (e.g. Koyraboro Senni), it is not clear whether they developed the 'as soon as' pattern due to Fula or Tamashek influence.

I have also shown that not only Tamashek, but also other Berber languages signal 'as soon as' with an adverb(ial) meaning 'only'. I have proposed that Berber languages borrowed this lexical item from Standard/Classical Arabic. Interestingly, this item developed an 'as soon as' function in Berber languages. Recall that Standard/Classical Arabic *ɣair* 'only' is only used in monoclausal constructions and not in 'as soon as' constructions. The development of 'as soon as' construction in Berber languages also seems to match what Johanson (2008: 67) describes as selective grammatical copying.

10.2.7 Verb meaning 'to get tired' and 'until': Mali

As was discussed in §7.2.1, there are two West African languages of the sample (i.e. Tommo So and Bangime) that have a construction in which the *until*-clause appears with a verb meaning 'to get tired'. Recall that the 'until' clause does not necessarily denote literal weariness or physical fatigue. Instead, this construction is used in contexts where speakers express that they carried out an activity for a very long time. In Bangime, the *until*-clause marked by *hà* 'until' appears with *báándì* 'to get tired', as in (639). This is a common way to emphasize duration and intensity of the situation expressed in the first clause in linear order, not necessarily involving physical fatigue. Accordingly, the example in (639) denotes the idea 'I cried for a very long time' (Heath & Hantgan 2018: 501). It is worth noting that constructions

encoded by *hà* ‘until’ may also appear in contexts in which they do n ot occur with the verb *báándì* ‘to get tired’, as is shown in (640). Note that in this construction, *hà* ‘until’ marks the endpoint of situation expressed in the figure clause.

Bangime (Isolate)

(639) *ŋ̀* *ʒíín* ***hà***=*à* *ŋ̀* *báándì*.
1SG.SBJ weep.PFV until=COMPL 1SG.SBJ get.tired.PFV
‘I cried for a very long time (lit. *I cried until I got tired*).’ (Heath & Hantgan 2018: 501)

Bangime (Isolate)

(640) *ŋ̀* *déŋgò* ***hà*** *Séédù* *à* ∅ *twáá* *gāndà*.
1SG.SBJ wait.PFV until Seydou COMPL 3SG.SBJ arrive.PFV place
‘I waited until Seydou arrived.’ (Heath & Hantgan 2018: 498)

In what follows, I explore whether other Dogon languages also have a similar ‘until’ construction and then I propose several hypotheses about the directionality of spread of this pattern.

10.2.7.1 Verb meaning ‘to get tired’ and ‘until’: Dogon

Besides Tommo So, there are other Dogon languages that have an ‘until’ construction appearing with a verb meaning ‘to get tired’. An example comes from Bunoge. In (641), the first clause in linear order denotes a prolonged situation, and the following clause encoded by

fá ‘until’ emphasizes the extreme prolongation of the situation of the first clause in linear order. Note that the *until*-clause does not denote literal weariness or physical fatigue (Heath 2014a: 299). Instead, it primarily exaggerates the duration and intensity of the situation denoted by *námà ŋ̀ tɛ́mɛ̀* ‘I ate meat’. Accordingly, the meaning of the construction in (641) is that of ‘I ate meat for a very long time’. *Until*-constructions encoded by the free adverbial subordinator *fá* can also be attested in communicative scenarios in which the *until*-clause does not occur with a verb meaning ‘to get tired’, as in (642), where the *until*-clause indicates the endpoint or end-period of the figure clause situation.

Bunoge (Dogon)

(641) *námà* *ŋ̀* *témɛ̀* ***fá*** ***ŋ̀*** ***dɛ́nɛ̀***.

meat 1SG.SBJ eat.meat.PFV until 1SG.SBJ get.tired.PFV

‘I ate for a very long time (lit. *I ate meat until I got tired*).’ (Heath 2014a: 299)

Bunoge (Dogon)

(642) *àyá-ŋgù* *nálè* *mbà*.

3PL-ACC give.birth.PFV.3PL.SBJ PFV

‘Their mothers bear them.’

fá *dó:wà,* *sòjó* *dà:-gè* *bô*.

until die.IPFV.3PL.SBJ person evil-PL be.3PL.SBJ

‘They are weak people until they die.’ (Heath 2014a: 303)

A similar construction is found in Togo Kan. In this language, speakers indicate a prolonged situation (i.e. ‘for a very long time’) by means of an ‘until’ construction appearing with *dɛ́ⁿ* ‘to get tired’, as in (643). Note that constructions marked by *fó* ‘until’ can also be found in contexts in which the ground clause marks the endpoint of a situation expressed in the figure clause, as in (644).

Togo Kan (Dogon)

(643) *jé* *jɔ̀wɛ́* *jɔ̀wɛ́* ***fó*** ***dɛ́ⁿ-ɛ̀ⁿ***.
run run run until get.tired-PFV
‘He ran and ran for a very long time (lit. *he ran and ran until he was tired*).’ (Heath 2015b: 241)

Togo Kan (Dogon)

(644) *yé* *ɛ́mɛ́* *yă:-jú* ***fó*** *dà:gá* *dɛ̀-ɛ̀*.
going 1PL go-IPFV until night night.fall-PFV
‘We kept walking until night fell.’ (Heath 2015b: 134)

In Penange, the temporal extent of a situation is signaled by a construction marked by *hál* ‘until’ and the verb *nɛ̀nɛ̀* ‘to get tired’, as in (645). Biclausal constructions marked by *hál* ‘until’ can also express a terminal boundary situation holding between clauses, as in (646).

Penange (Dogon)

(645) *káyⁿ* *kànì* *nà* ***hál*** ***nɛ̀nɛ̀-Ø.***

work do.PFV 3SG until get.tired.PFV-3SG

'He worked for a very long time (lit. *he worked until he got tired*).' (Heath 2016b: 255)

Penange (Dogon)

(646) *ùnù* ***hál*** *wáj-jí-yè*.

walk.while until distant-INCH.PFV-3PL

'They walked until they had gone far away.' (Heath 2016b: 250)

10.2.7.2 Discussion

I have shown that *until*-clauses that occur with a verb meaning 'to get tired' are common in Dogon languages. Furthermore, Bangime seems to have a similar pattern. The question is: did Bangime copy this pattern from Dogon languages?

Bangime is a language isolate spoken in the Dogon high plateau in eastern Mali. It has no obvious genetic relatives in West Africa. Bangime is the name of the language, and Bangande denotes the ethnicity (Heath & Hantgan 2018: 1). Neighboring languages of Bangime are Tiranige (Dogon family), Jenaama (Bozo family), and Fula (Atlantic-Congo). Tiranige-speaking villages occur both on the high plateau to the east and the base of the cliffs to the north. There is some intermarriage between Bangande and Tiranige-speaking people, and therefore a degree of bilingualism (Heath & Hantgan 2018: 3). Jenaama is spoken by so-called Marka-Jalla people in Namagué and Kargué villages, which are located at or near the

opening of the valley, so they are immediate neighbors, but by tradition there is no intermarriage between Bangande and Jenaama and therefore very little bilingualism (Heath & Hantgan 2018: 3). Fula is spoken both in several villages and hamlets in the plains west of the Bangande valley. Fula is also the main lingua franca in the area and is used in weekly markets at Sambere (Sundays) and Konna (Thursdays), which are located on the Sevare to Gao highway. Both of these markets are frequented by Bangande people, who go there on foot or on donkey carts (Heath & Hantgan 2018: 3).

A closer look reveals that Tiranige has an ‘until’ construction used in contexts where speakers express that they carried out an activity for a very long time (Heath 2014c: 266). One hypothesis is that Bangime speakers copied the ‘until’ pattern from Tiranige. Note that it has not been possible to determine whether Jenaama and/or Fula could also have served as the model languages of the ‘until’ pattern given that the sources of these languages do not include information regarding ‘until’ constructions.

Another hypothesis is the following. There are Bangande individuals who have spent time in southern Mali and that know some Bambara (Mande family). Denis Creissels (personal communication) informs me that ‘until getting tired’ as a way of expressing ‘for a very long time’ is also attested in Bambara, as in (647). Accordingly, another hypothesis is that Bangime copied the ‘until getting tired’ pattern from Bambara.

Bambara (Mande/Western Mande)[100]

(647) *ń* *yé* *à* *nyɛ́anáfílɛ́* ***fɔ́*** *kà* ***sɛ̀gɛ́n***.

1SG COMPL.TRANS 3SG wait until INF get.tired

'I waited for him a very long time (lit. *I waited for him until I got tired*).'

'Until getting tired' as a way of expressing 'for a very long time' is pervasive in West African languages (Jeffrey Heath, personal communication). This section has only provided a glimpse of how this pattern may have spread in a specific zone (i.e. Bangime speakers may have copied the pattern from Tiranige or Bambara). Accordingly, it does not do justice to the areality of this pattern in other zones in West Africa. For instance, 'until getting tired' as a way of expressing 'for a very long time' is attested in many Manding varieties (Western Mande), and it is possible that Manding was involved in its diffusion across West Africa, given its use as a lingua franca in a large part of West Africa (Denis Creissels, personal communication). However, this pattern is also found in Wolof (*ba tàyyi* 'until getting tired'), spoken in a zone in which Manding does not fulfill the role of lingua franca. This is an area that deserves further scrutiny.

Before I leave the present section, mention should be made of the following. Many West African languages have an 'until' construction used for expressing a prolongation of an activity similar to the one described above. However, in these languages, the 'until' clause does not appear with a verb meaning 'to get tired', as in the Logba example in (648), marked by *tsyɔ̃ɔ* 'until'. The Logba pattern (i.e. leaving unexpressed the predicate of 'until') is a

[100] Example provided by Denis Creissels.

common way of expressing ‘for a long time’. Note that *tsyɔ̃ɔ* ‘until’ can also be used for expressing a terminal boundary situation holding between clauses, as in (649).

Logba (Atlantic-Congo/Kwa)

(648) *o-gridi* *ó-dzí* ***tsyɔ̃ɔ***.
CL-story SG-take.off until
‘The story continues for a long time.’ (Dorvlo 2008: 240)

Logba (Atlantic-Congo/Kwa)

(649) *a-bó-zi=ɛ́* ***tsyɔ̃ɔ*** *nɖú* *m-bí-bé* *iyɛ́* *nu*.
2SG-FUT-cook=3SG.OBJ until water SBJ-FUT-well.cooked 3SG in
‘You will cook it until the water will be well cooked in it.’ (Dorvlo 2008: 347)

Another typical example can be found in Noon. The construction marked by *bi* ‘until’ in (650) is used in contexts where speakers express that they carried out an activity for a very long time. Note that in this simple clause, the predicate is repeated several times for expressing intensity and duration of the situation and this is followed by the restricted device *bi* ‘until’, which simply marks the end of the durative situation (Soukka 2000: 272). Construction marked by *bi* ‘until’ can also be found in contexts expressing terminal boundary relations, as is shown in (651).

Noon (Atlantic-Congo/Cangin)

(650) *ya yaa tíin ya yaa tíin ya yaa tíin* ***bi***.

3SG PROG walk 3SG PROG walk 3SG PROG walk until

'He walks and walks and walks for a long time.' (Soukka 2000: 272)

Noon (Atlantic-Congo/Cangin)

(651) *tíid-aa* ***bi*** *fu hot ɓoh-aa*.

walk-IMP until 2SG see baobab-IRR.SUB

'Walk until you see the baobab.' (Soukka 2000: 279)

A closer look reveals that the pattern leaving unexpressed the predicate of 'until' is common in languages spoken in Côte d'Ivoire, such as Kru and Kwa languages (Denis Creissels, personal communication). In Godié, 'for a long time' is indicated by a construction marked by the device *-aaa* 'until', as in (652). Note that *-aaa* 'until' also indicates the endpoint of a situation expressed in the figure clause, as in (653).

Godié (Atlantic-Congo/Kru)

(652) *pɛliɔ lä ɔ-ku-lɔɔ-**aaa***.

priest.DEF say 3SG-be-there-until

'The priest said he had been around for a very long time.' (Egner 2015: 66)

Godié (Atlantic-Congo/Kru)

(653) *wa* *yä-blɔɔ* *bhlü-**aaa**-kpazebhleku* *wa* *yä-blɔɔ* *mʋ* *mimi-kpazebhleku*.
3PL PERF-road pound-until-NARR 3PL PERF-road POSP do.half-NARR
'They go on the road until they reach half way.' (Egner 2015: 108)

Another language with a similar pattern is Baule. In this language, *lélé* 'until' signals a prolongation of an activity, as in (654). This marker is also used for expressing a terminal boundary relation holding between clauses, as in (655).

Baule (Atlantic-Congo-Kwa)[101]

(654) *màn* *dì* *jùmân* ***lélé***.
1SG.PFV do work until
'I worked for a long time.'

Baule (Atlantic-Congo-Kwa)

(655) *ń* *kà* *wà* ***lélé*** *bé* *bá*.
1SG.FUT stay here until 3PL.FUT come
'I'll stay here until they come.'

Denis Creissels (personal communication) informs me that Ivorian French has a similar pattern for signaling 'for a long time' (*'Il a marché jusqu'à'* 'I walked for a long time'). This construction is simply impossible in European French (even in non-standard varieties).

[101] Examples provided by Denis Creissels (personal communication).

Accordingly, it is very likely that this pattern was copied by speakers of Ivorian French from Ivorian languages (i.e. Kru and/or Kwa languages). Interestingly, in this particular use, *jusqu'à'* 'until' is obligatorily uttered with the special prosody (extra-high pitch) that characterizes ideophonic adverb(ial)s, and expressive/iconic lengthening of a vowel.

In addition to the West African languages discussed above, I have spotted a few other occurrences of 'until' clauses indicating 'for a long time'. In a few languages in north Maluku and northwest New Guinea, 'until' is employed for communicating intensification and unusually long duration of a situation. In Ambel, *aya* 'until' emphasizes the long duration and intensity of the situation expressed in the simple clause, as in (656). The prosody of the 'until' device in this type of construction varies by language. In some cases, it takes low intonation (e.g. Papuan Malay *sampe* 'until'; David Gil, personal communication), in some other cases, it is realized with non-final intonation (despite being in final position), and in some the final vowel is lengthened (Laura Arnold, personal communication).

Ambel (Austronesian/South Halmahera-West New Guinea)[102]

(656) *na-kalép* ***aya***.
3SG-lick until
'He licked for a long time.'

In this section, I have shown examples of Dogon languages that have an 'until' construction appearing with a verb meaning 'to get tired'. Recall that in this type of construction, the *until*-clause does not denote literal weariness or physical fatigue, but it

[102] Example provided by Laura Arnold (personal communication).

primarily exaggerates the duration and intensity of the situation denoted by the other clause. I have proposed that Bangime copied the 'until' pattern either from a Dogon language (i.e. Tiranige) or from a Mande language (i.e. Bambara). I have also shown that 'until getting tired' as a way of expressing 'for a very long time' is very common in other zones of West Africa. It remains to be explored how this pattern spread in these zones.

10.2.8 Adverb(ial)s meaning 'only' and 'until': Australia

'Until' constructions can be realized by adverb(ial)s meaning 'only' (see §7.3.2). Recall that this clause-linking device is for the most part attested in Australian languages in the sample. In Ngankikurungkurr, the primary way for denoting 'until' is by means of the adverb(ial) *napa* 'only'. A parallel situation can be described for Bininj Gun-Wok. In this language, one of the primary ways for expressing 'until' is by the adverb(ial) *djal-* 'only/just'. Another Australian language of the sample with a similar pattern is Marrithiyel. In this language, *until*-constructions are realized by the adverb(ial) *-defen* 'only'.

Given that the Australian languages discussed above are not genetically related and, that 'only' used for conveying 'until' is not common cross-linguistically, it is likely that language contact may have taken place here. A closer look reveals that other Australian languages use 'only' as a clause-linkage pattern for encoding *until*-constructions. In particular, this seems to be very common in Pama-Nyungan languages. In Bilinarra, the adverb(ial) *=rni* 'only' signals an *until*-relation holding between the figure and the ground clause, as can be seen in (657).

Bilinarra (Pama-Nyungan)

(657) *garu-nggu* *dirl* *ba-ni* *marluga* *ngarlaga-ngga*
child-ERG hit.head hit-PST old.man head-LOC
'A kid hit the old man on the head

*gungulu-g-ba=**rni***
bleed-FACT-EP=only
until he bled.' (Meakins & Nordlinger 2014: 386)

A look-alike construction is also attested in Djinang. A terminal boundary relation is expressed in this language by the adverb(ial) *yarimi* 'only/just', as in (658). It is worth noting that the adverb(ial) *yarimi* 'only/just' must occur with the delimitative marker *-pmi*. The functions of the delimitative marker are: (1) to delimit the scope of reference to just the item(s) or person(s) it marks, (2) to delimit the activity to just the one signalled by the verb, and (3) to delimit the goal of motion to just the location specified (Waters 1989: 108).

Djinang (Pama-Nyungan)

(658) *ngarri* *nyini-dji* *djili* *walirr* *bunyin-dji* *yirrpi-gi* ***yarimi**-pmi*.
1SG.NOM sit-FUT this.LOC sun buttock-INSTR set-FUT only-DELIM
'I will keep sitting here until the sun sets.' (Waters 1989: 113)

Another example comes from Martuthunira. In this language, a terminal boundary relation is indicated by the adverb(ial) *yirla* 'only'. This device is only used for indicating the

end point of a period of time during which some situation takes place, as in (659). Dench (1995: 187) mentions that it is easy to relate the use of the adverb(ial) *yirla* 'only' for signaling an *until*-relation in that "here an activity continues as long as the condition expressed by the constituent over which *yirla* has scope continues to be not the case. Only once the condition is satisfied does the activity cease."

Martuthunira (Pama-Nyungan)

(659) *ngurnaa* *kayulu-u* *jarruru* *manku-layi* *wantitha-rninyji*
that.ACC wáter-ACC slowly get-FUT throw-FUT
'Get the water out slowly and keep throwing it away

panyu-npa-waa ***yirla***.
good-INCH-PURP only
until it comes clean.' (Dench 1995: 187)

Dench (1995: 187) mentions that, from a historical perspective, it is likely that this clause-linkage pattern arose out of expressions involving *yirla* 'only' and the verb *kuntirri* 'to cease doing', as can be seen in the example in (660). Note that it is not clear whether this also applies to the other Australian languages discussed above.

Martuthunira (Pama-Nyungan)

(660) *ngayu* *parla-marta-rru* *pariingku-lha*

1SG.NOM rock-PROPR-now hit-PST

'I hit it with a rock

kulhany-ku ***yirla*** ***kuntirri-layi***.

squashed-ACC only cease.doing-FUT

stopping only when it was squashed' (Dench 1995: 187)

One hypothesis is that the clause-linkage pattern discussed above spread from Pama-Nyungan to other, non-Pama-Nyungan languages. However, for this hypothesis, it has not been possible to establish a chronology of the individual historical events that led to the diffusion of 'only' used as a clause-linking device.

10.3 Summary

One of the main findings of this chapter is that most of the time, speakers of replicating languages copy all properties and functions of a clause-linkage pattern from a model language (e.g. correlative attributive temporal clauses in South Asian languages; §10.2.1; 'And then' devices consisting of a demonstrative plus an ablative marker in Australian languages; §10.2.4). However, sometimes only some functions of a clause-linkage pattern are copied. I have shown in §10.2.2 that Indo-Aryan languages have verb-doubling constructions used for indicating 'while' and manner. I propose that some neighboring languages have copied the Indo-Aryan verb-doubling pattern for expressing 'while' and manner. Intriguingly, there are

other neighboring languages that copied the Indo-Aryan pattern for expressing either ‘while’ or manner, but not both.

Another finding of the present chapter comes from languages spoken in Mali, in which Dogon languages borrowed the adverb(ial) *tan* ‘only’ from Fula. Interestingly, *tan* ‘only’ is not used for expressing ‘as soon as’ in Fula. This suggests that speakers of Dogon languages borrowed *tan* ‘only’ from Fula and this adverb(ial) developed a different function in Dogon languages. This seems to match what Johanson (2008: 67) describes as selective grammatical copying, a process in which a loanword assumes different functions in the replica language.

CHAPTER 11

Conclusion

In this dissertation, I have analyzed the range of strategies by which (1) *when*-relations, (2) *while*-relations, (3) *after*-relations, (4) *before*-relations, and (5) *until*-relations are expressed in a variety sample of 218 languages. I have demonstrated that languages may employ not only adverbial subordinators for encoding temporal adverbial clauses, but also other types of restricted devices, such as restricted deranking devices, 'and then' coordinating devices, verb-doubling constructions, and correlative constructions, among others. Restricted devices explicitly indicate the semantic relation of the ground clause to the situation expressed in the figure clause. Furthermore, I have shown that in many languages of the world, temporal clause-linking strategies may make use of open class categories, or devices not (yet) fully grammaticalized, such as temporal nouns used as clause-linking devices and verbs used as clause-linking devices.

One of the most important findings of this dissertation is that restricted devices are more frequent than strategies without restricted devices in the expression of 'when', 'while', 'after', 'before', and 'until'. Regarding the mono/polyfunctionality of restricted devices, I have demonstrated that *after*-clauses, *before*-clauses, and *until*-clauses tend to be encoded by monofunctional devices, *when*-clauses tend to be marked by polyfunctional devices, and *while*-clauses may be encoded by either monofunctional or polyfunctional devices (with a slight, non-significant trend towards polyfunctionality). In discussing this domain, I have proposed that languages have various types of temporal adverbial clause systems based on the mono/polyfunctionality of restricted devices: rigid, almost rigid, mildly rigid, mildly non-rigid, almost non-rigid, and non-rigid systems. While rigid systems are only shaped by

expressiveness, non-rigid systems are only shaped by paradigmatic economy. I have also noted that rigid systems and non-rigid systems are not common cross-linguistically. Instead, languages prefer to have systems that fall in between these two extremes (e.g. mildly rigid systems). What this seems to indicate is that expressiveness and paradigmatic economy are often in competition with one another to shape temporal adverbial clause systems in the languages of the world.

Another important finding of this dissertation is concerned with the polyfunctionality patterns of restricted devices. Polyfunctional devices signaling 'when', 'while', 'after', before', and 'until' tend to be bifunctional. Thus, trifunctional or quadrifunctional devices tend to be dispreferred cross-linguistically. Moreover, I have addressed various polyfunctionality patterns not attested in previous studies, such as the polyfunctionality patterns between (1) 'when' and 'where', (2) 'when' and 'as soon as', (3) 'while' and 'without', (4) 'after' and 'until', (5) 'after' and 'lest', (6) 'before' and 'lest', and (7) 'until' and 'where'. For these rare patterns, I have proposed various conceptual factors that motivate their semantic affinities.

In this work, I have also explored the areality of various temporal clause-linking strategies. This includes investigating the directionality of spread of a pattern: identifying the source and the details of chains of contacts where possible. One of the main findings is that most of the time, speakers of replica languages copy all properties and functions of a clause-linkage pattern from a model language. However, sometimes only some functions of a clause-linkage pattern are copied.

There are a number of areas relevant to the study of temporal adverbial clauses that I could not address to keep the scope of the research manageable. Accordingly, they remain to be investigated by future studies and in what follows I mention some of these fruitful areas.

First, as was shown, sometimes the clause-linking device may appear either in the first or second clause. In these cases, it would be interesting to explore whether there are any correlations between the position of the clause-linking device and its mono/polyfunctionality.

Second, another candidate for larger-scale future investigations is the number of clause-linking devices that may appear in a construction. In various languages of the sample, the complex sentence construction may appear with two restricted devices. Interestingly, one of the devices is always optional. It remains an open task to explore the range of factors that lead to this optionality.

Third, in exploring the polyfunctionality patterns of restricted devices, I have also discussed the range of ways by which the different adverbial interpretations of polyfunctional devices are computed or have become conventionalized. In particular, TAM values, negative markers, and clause order play an important role here. However, it remains an open task to explore other ways in which polyfunctionality patterns have been conventionalized.

Fourth, I have shown in various chapters that intonation may play an important role in the expression of temporal adverbial relations. For instance, as was illustrated in Chapter 5, many Oceanic languages indicate temporal subsequence by a construction in which the ground clause shows a rising intonation pattern and the figure clause shows a falling intonation pattern. Exploring the workings of intonation in complex sentence constructions looks like a very promising area for future research.

Fifth, many languages have more than one primary strategy for expressing various types of temporal adverbial relations. I have proposed that there are two main factors (i.e. the mono/polyfunctionality and the discourse functions of restricted devices) that play a role in the decision-making process of speakers. Put another way, there are two factors that lead speakers

to choose one strategy over the other. It remains an open task to analyze whether there are other factors involved in this decision-making process.

Needless to say, much remains to be learned about temporal adverbial clauses in terms of their synchronic functions and how they develop diachronically. However, the present work has hopefully paved the way for a better understanding of some domains related to the morphosyntax, semantics, and areality of temporal adverbial clauses. It is hoped that the questions explored in this research bring us closer to a deeper understanding of temporal adverbial clauses. In particular, it is hoped that the methodology put forward here can be helpful to other typologists interested in exploring why areal clusters are the way they are (e.g. the different possible directions from which a particular development could have been stimulated).

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Appendix: Database

Macro-area	Language	Source	Relation	Strategy	Mono/ polyfunctionality
Africa	!Xun	König & Heine (2001)	'When'	Demonstrative *kā*	Polyfunctional
			'While'	Free device *n!àkāē*	Polyfunctional
			'After'	Sequential coordinator *ō*	Polyfunctional
			'Before'	Free device *n!àkāē*	Polyfunctional
			'Until'	Asyndesis	NA
	Bangime	Heath & Hantgan (2018)	'When'	Generic temporal noun *sáŋá*	Monofunctional
			'While'	Asyndesis	NA
			'After'	Asyndesis	NA
			'As soon as'	Free device *gìlāā*	Polyfunctional
			'Before'	Free device *gìlāā*	Polyfunctional
			'Until'	Free device *hà*	Monofunctional
	Beja	Vanhove (2014)	'When'	Bound device *=hoːb*	Monofunctional
				Generic temporal noun *doːr*	Polyfunctional
			'While'	Restricted deranking device *-e*	Polyfunctional
			'After'	Restricted deranking device *-eːtiːt*	Monofunctional
			'Before'	Free device *hanka*	Monofunctional
			'Until'	Free device *hadiːt*	Monofunctional
	Boko	McCallum (1998)	'When'	Generic temporal noun *gɔɔ*	Polyfunctional
				Free device *tó*	Polyfunctional

			‘While’	Generic temporal noun *gɔɔ*	Polyfunctional
				Free device *kɛ́*	Polyfunctional
			‘After’	Sequential coordinator *ɔ̃*	Polyfunctional
			‘Before’	Free device *e*	Polyfunctional
			‘Until’	Free device *e*	Polyfunctional
	Duka	Bendor-Samuel et al. (1973)	‘When’	Generic temporal noun *ha dee*	Monofunctional
			‘While’	Free device *tun*	Polyfunctional
			‘After’	Free device *baa*	Monofunctional
			‘Before’	Free device *kapin*	Monofunctional
			‘Until’	Free device *har*	Monofunctional
	Emai	Schaefer & Egbokhare (2017)	‘When’	Non-generic temporal noun *ìsòkpísòkpá*	Monofunctional
				Generic temporal noun *ẹ́ghe*	Monofunctional
			‘While’	Free device *ke*	Polyfunctional
			‘After’	Free device *ke*	Polyfunctional
			‘Before’	Free device *kpe*	Monofunctional
			‘Until’	Verb *se* ‘to reach’	Monofunctional
	Eton	Van de Velde (2008)	‘When’	Generic temporal noun *jɔ̀ŋ*	Polyfunctional
			‘While’	Non-generic temporal noun *tɛ́*	Monofunctional
			‘After’	Consecutive -*H*	Monofunctional
				Noun *mbùz* ‘back’	Monofunctional
			‘As soon as’	Free device *nina*	Monofunctional
				Verb-doubling	Monofunctional
			‘Before’	Free device *úsúswâ ìn*	Monofunctional

			‘Until’	Free device *vwàz*	Monofunctional
	Fongbe	Lefebvre & Broussea u (2002)	‘When’	Generic temporal noun *hwènù*	Polyfunctional
			‘While’	Generic temporal noun *hwènù*	Polyfunctional
			‘After’	Adverb(ial) *gudo* ‘behind’	Monofunctional
			‘As soon as’	Verb-doubling	Monofunctional
			‘Before’	Free device *co*	Monofunctional
			‘Until’	Free device *káká*	Monofunctional
	Gaahmg	Stirtz (2011)	‘When’	Free device *ɛ́ gārá*	Polyfunctional
			‘While’	Free device *ɛ́ gārá*	Polyfunctional
			‘After’	Sequential coordinator *lâŋ*	Polyfunctional
			‘Before’	Free device *mūū*	Monofunctional
			‘Until’	Sequential coordinator *lâŋ*	Polyfunctional
	Gumuz	Ahland (2012)	‘When’	Bound device *éé-*	Monofunctional
			‘While’	Asyndesis	NA
			‘After’	Sequential coordinator *kaboŋgwa*	Polyfunctional
			‘Before’	Restricted deranking device *-n*	Polyfunctional
			‘Until’	Sequential coordinator *kaboŋgwa*	Polyfunctional
	Hadza	Kirk Miller (personal communi cation)	‘When’	Bound device *kwa-*	Polyfunctional
			‘While’	Bound device *kwa-*	Polyfunctional

			‘After’	Bound device *kwa-*	Polyfunctional
			‘Before’	Bound device *kwa-*	Polyfunctional
			‘Until’	Bound device *kwa-*	Polyfunctional
	Hausa	Bagari (1976) Newman (2000)	‘When’	Generic temporal noun *lokaci*	Polyfunctional
			‘While’	Free device *tun*	Polyfunctional
			‘After’	Free device *bayan da*	Monofunctional
			‘As soon as’	Free device *keda wu ya*	Monofunctional
			‘Before’	Free device *kafin*	Monofunctional
			‘Until’	Free device *har*	Monofuctional
	Hebrew (Modern)	Eitan Grossman (personal communication)	‘When’	Generic temporal noun *et she-*	Monofunctional
			‘While’	Generic temporal noun *be bezman she-*	Monofunctional
			‘After’	Free device *leaHar she-*	Monofunctional
			‘As soon as’	Non-generic temporal noun *harega she-*	Monofunctional
			‘Before’	Free device *lifnei she-*	Monofunctional
			‘Until’	Free device *ad she-*	Monofunctional
	Ik	Schrock (2014)	‘When’	Free device *noo*	Monofunctional
			‘While’	Restricted deranking device *-kɛ*	Monofunctional
			‘After’	Consecutive pattern (floating high tone)	Monofunctional

			‘Before’	Free device *ɗɛmʊsʊ*	Polyfunctional
			‘Until’	Free device *ɗɛmʊsʊ*	Polyfunctional
	Iraqw	Mous (1992)	‘When’	Generic temporal noun *qooma*	Monofunctional
				Generic temporal noun *imi*	Monofunctional
			‘While’	Restricted deranking device *-wa*	Polyfunctional
			‘After’	Consecutive marker *-ri*	Monofunctional
				Consecutive marker *-ay*	Monofunctional
			‘Before’	Restricted deranking device *-wa*	Polyfunctional
			‘Until’	Noun *ay dir* ‘place’	Monofunctional
	Izi	Meier et al. (1975)	‘When’	Free device *me*	Polyfunctional
			‘While’	Generic temporal noun *teke*	Monofunctional
			‘After’	Sequential coordinator *je*	Monofunctional
				Sequential coordinator *bya*	Monofunctional
			‘Before’	Free device *teme*	Monofunctional
			‘Until’	Free device *je asu*	Monofunctional
	Jalkunan	Heath (2017)	‘When’	Non-generic temporal noun *ɲɛ̄ɛ́*	Monofunctional
				Generic temporal noun *sóʔó*	Monofunctional
			‘While’	Asyndesis	NA
				Free device *tɔ́rɔ́*	Polyfunctional

			‘After’	Consecutive pattern (adjoined verb form not specified for TAM)	Monofunctional
			‘Before’	Free device *fɔ̄*	Polyfunctional
			‘Until’	Free device *fɔ̄*	Polyfunctional
	Kabba	Moser (2004)	‘When’	Generic temporal nou *kàrè*	Monofunctional
			‘While’	Free device *kàké*	Polyfunctional
			‘After’	Sequential coordinator *á*	Polyfunctional
			‘Before’	Free device *bbá*	Monofunctional
			‘Until’	Free device *sáráng*	Monofunctional
	Kisi	Childs (1995)	‘When’	Generic temporal noun *lɔ́ɔ́*	Monofunctional
			‘While’	Free device *o*	Monofunctional
			‘After’	General coordinating device *mí*	NA
			‘Before’	Free device *yoni*	Monofunctional
			‘Until’	General coordinating device *mí*	NA
	Koyra Chiini	Heath (1999)	‘When’	Generic temporal noun *saa*	Monofunctional
			‘While’	Asyndesis	NA
			‘After’	Asyndesis	NA
			‘Before’	Asyndesis	NA
			‘Until’	Free device *hal*	Monofunctional
	Lango	Noonan (1992)	‘When’	Generic temporal noun *káré*	Monofunctional
			‘While’	Asyndesis	NA
			‘After’	Verb *àtɛ̂* ‘to go’	Polyfunctional
			‘Before’	Free device *àmɛ̂*	Polyfunctional

			‘Until’	Free device *naka*	Monofunctional
	Lele	Frajzyngier (2001)	‘When’	Generic temporal noun *kur*	Polyfunctional
			‘While’	Free device *na*	Monofunctional
			‘After’	Asyndesis	NA
			‘Before’	Generic temporal noun *kur*	Polyfunctional
			‘Until’	Free device *han*	Monofunctional
	Lumun	Smits (2017)	‘When’	Free device *ámma*	Polyfunctional
				Demonstrative *akka*	Monofunctional
			‘While’	Restricted deranking device (dependent incompletive form of the verb)	Polyfunctional
			‘After’	Restricted deranking device (dependent perfective form of the verb)	Monofunctional
			‘Before’	Restricted deranking device (dependent incompletive form of the verb)	Polyfunctional
			‘Until’	Free device *mena*	Monofunctional
	Ma’di	Blackings & Fabb (2003)	‘When’	Headless attributive temporal clause	Polyfunctional
			‘While’	Free device *zi*	Monofunctional
			‘After’	Correlative pattern	Monofunctional

				(‘first..and then’)	
			‘Before’	Verb *tʃ̀ā* ‘to reach’	Monofunctional
			‘Until’	Verb *mu* ‘to go’	Polyfunctional
	Majang	Joswig (2019)	‘When’	Restricted deranking device *-kɛ*	Monofunctional
			‘While’	Restricted deranking device *-kù꞉n*	Monofunctional
			‘After’	Restricted deranking device *-d*	Monofunctional
				Sequential coordinator *cá꞉L*	Monofunctional
			‘Before’	Free device *gun*	Monofunctional
			‘Until’	Adverb(ial) *dákɛ́꞉dà* ‘only’	Monofunctional
	Makary Kotoko	Allison (2020)	‘When’	Generic temporal noun *se*	Polyfunctional
			‘While’	Asyndesis	NA
			‘After’	Sequential coordinator *kani*	Monofunctional
				Sequential coordinator *aro*	Monofunctional
			‘Before’	Free device *serangí*	Monofunctional
			‘Until’	Verb *sey* ‘to except’	Monofunctional
	Mbembe	Richter (2014)	‘When’	Generic temporal noun *ébɔ̄*	Polyfunctional
			‘While’	Generic temporal noun *ébɔ̄*	Polyfunctional
			‘After’	Consecutive marker *-wa*	Monofunctional
			‘Before’	Free device *be*	Monofunctional

			‘Until’	Generic temporal noun *ébɔ̄*	Polyfunctional
	Mbodomo	Boyd (2008)	‘When’	Generic temporal noun *sin*	Monofunctional
			‘While’	Restricted deranking device *-a*	Monofunctional
			‘After’	Consecutive pattern	Monofunctional
				Sequential coordinator *ka*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Asyndesis	NA
	N/uuki	Collins & Namaseb (2011)	‘When’	Generic temporal noun *kama*	Monofunctional
			‘While’	Free device *terwyl*	Monofunctional
			‘After’	Sequential coordinator *ŋlai*	Polyfunctional
			‘Before’	Adverb(ial) *u nox* ‘not yet’	Monofunctional
			‘Until’	Sequential coordinator *ŋlai*	Polyfunctional
	Ngiti	Kutsch Lojenga (1994)	‘When’	Free device *ra*	Monofunctional
			‘While’	Free device *ambeta*	Monofunctional
			‘After’	Sequential coordinator *ndɨrɔ̀*	Polyfunctional
				Free device *idhu dzido*	Monofunctional
			‘Before’	Free device *tdu*	Monofunctional
			‘Until’	Sequential coordinator *ndira*	Polyfunctional

	Noon	Soukka (2000)	‘When’	Bound device *-aa*	Polyfunctional
				Free device *waa*	Polyfunctional
			‘While’	Free device *waa*	Polyfunctional
			‘After’	Consecutive marker *-ra*	Monofunctional
			‘Before’	Free device *baala*	Monofunctional
			‘Until’	Free device *bi*	Polyfunctional
	Nubian	Abdel-Hafiz (1988)	‘When’	Free device *nawatig*	Monofunctional
			‘While’	Restricted deranking device *-go*	Monofunctional
			‘After’	Free device *godo*	Monofunctional
			‘Before’	Free device *go*	Monofunctional
			‘Until’	Free device *bokodo*	Monofunctional
	Sidaama	Kawachi (2007)	‘When’	Restricted deranking device *-wote*	Monofunctional
			‘While’	Restricted deranking device *-nni*	Polyfunctional
			‘After’	Noun *gedensa* ‘last’	Monofunctional
			‘Before’	Noun *alba* ‘face’	Monofunctional
			‘Until’	Noun *geeššа* ‘degree, extent’	Monofunctional
	Somali	Saeed (1999)	‘When’	Generic temporal noun *mar*	Polyfunctional
			‘While’	Non-generic temporal noun *intuu*	Polyfunctional
			‘After’	Sequential coordinator *dabaeedna*	Monofunctional

			‘As soon as’	Generic temporal noun *mar*	Polyfunctional
			‘Before’	Non-generic temporal noun *intuu*	Polyfunctional
			‘Until’	Non-generic temporal noun *intuu*	Polyfunctional
	Supyire	Carlson (1994)	‘When’	Generic temporal noun *tèni*	Monofunctional
			‘While’	Asyndesis	NA
			‘After’	Sequential coordinator *kà*	Monofunctional
				Sequential coordinator *mà*	Monofunctional
			‘Before’	Free device *sána*	Monofunctional
			‘Until’	Free device *fó*	Monofunctional
	Tamashek	Heath (2005)	‘When’	Generic temporal noun *ajúd*	Polyfunctional
				Generic temporal noun *ælwæqq*	Monofunctional
				Demonstrative *à*	Monofunctional
			‘While’	Free device *dèɤ*	Monofunctional
			‘After’	Free device *šæmá*	Monofunctional
			‘As soon as’	Adverb(ial) *ɤás* ‘only’	Monofunctional
			‘Before’	Free device *har*	Polyfunctional
			‘Until’	Free device *har*	Polyfunctional
	Ts’ixa	Fehn (2014)	‘When’	Free device *no*	Polyfunctional
			‘While’	Bound device *=se*	Polyfunctional
			‘After’	sequential coordinator *thì.ʔà*	Monofunctional

			‘Before’	Bound device *=se*	Polyfunctional
			‘Until’	Free device *no*	Polyfunctional
	Tommo So	McPherson (2013)	‘When’	Generic temporal noun *wàgàdù*	Monofunctional
			‘While’	Restricted deranking device *-gu*	Monofunctional
			‘After’	Bound device *=nɛ*	Monofunctional
			‘Before’	Restricted deranking device *-mɔ*	Monofunctional
			‘Until’	Free device *hálè*	Monofunctional
Australia	Anindilyakwa	Leeding (1991)	‘When’	Restricted deranking device *-mwantja*	Monofunctional
			‘While’	Restricted deranking device *-wiya*	Monofunctional
			‘After’	Sequential coordinator *pwiya*	Polyfunctional
			‘Before’	Free device *nariwiya*	Monofunctional
			‘Until’	Free device *yanthilhannwa*	Monofunctional
	Arrernte	Wilkins (1989)	‘When’	Restricted deranking device *-le*	Polyfunctional
			‘While’	Restricted deranking device *-le*	Polyfunctional
			‘After’	Sequential coordinator *imerte*	Monofunctional
				Restricted deranking device *-iperte*	Polyfunctional
			‘Before’	Restricted deranking device *-tyenhenge*	Monofunctional

				Restricted deranking device *-ketye*	Polyfunctional
			‘Until’	Restricted deranking device *-ke*	Monofunctional
	Bardi	Bowern (2012)	‘When’	Restricted deranking device *-marr*	Monofunctional
			‘While’	Restricted deranking device *-ji*	Monofunctional
			‘After’	Sequential coordinator *bijorro*	Monofunctional
				Asyndesis	NA
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Free device *gardi*	Monofunctional
	Bininj Gun-Wok	Evans (2003)	‘When’	Free device *gu*	Polyfunctional
			‘While’	Free device *gure*	Monofunctional
			‘After’	Asyndesis	NA
				Verb *bonj* ‘to finish’	Monofunctional
				Consecutive marker *weleng-*	Monofunctional
				Sequential coordinator *wanjh*	Polyfunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Adverb(ial) *djal-* ‘only’	Monofunctional
				Sequential coordinator *wanjh*	Polyfunctional
	Gaagudju	Harvey (2002)	‘When’	Bound device *=ma*	Polyfunctional

			‘While’	Asyndesis	NA
			‘After’	Sequential coordinator *garrmaarna*	Monofunctional
				Sequential coordinator *baleeru*	Polyfunctional
				Demonstrative *mananggaarr*	Polyfunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Asyndesis	NA
	Gamilaraay	Giacon (2014)	‘When’	Restricted deranking device *-ldaay*	Polyfunctional
			‘While’	Restricted deranking device *-ldaay*	Polyfunctional
			‘After’	Sequential coordinator *nguwamanga*	Monofunctional
			‘Before’	Adverb(ial) *walu* ‘not yet’	Monofunctional
			‘Until’	Verb *wana* ‘to let’	Monofunctional
	Garrwa	Mushin (2012)	‘When’	Free device *minj*	Polyfunctional
				Free device *jal*	Polyfunctional
			‘While’	Restricted deranking device *-nkurri*	Polyfunctional
				Restricted deranking device *-jina*	Monofunctional
			‘After’	Consecutive marker *-jiwa*	Monofunctional
			‘Before’	Free device *waluwa*	Monofunctional
			‘Until’	General coordinating device *baki*	NA
	Gooniyandi	McGregor (1990)	‘When’	Restricted device *-wila*	Polyfunctional

			‘While’	Restricted device *-wila*	Polyfunctional
				Asyndesis	NA
			‘After’	Consecutive marker *-rni*	Monofunctional
				Sequential coordinator *niyinhingi*	Monofunctional
			‘Before’	Free device *ngamo*	Monofunctional
			‘Until’	Restricted device *-yawoo*	Monofunctional
	Gurr-Goni	Green (1995)	‘When’	Asyndesis	NA
			‘While’	Asyndesis	NA
			‘After’	Verb *wulek* ‘to finish’	Monofunctional
				Sequential coordinator *gugarrapukuwa*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Free device *waypu*	Polyfunctional
	Kalkatungu	Blake (1979)	‘When’	Restricted deranking device *-ɲin*	Polyfunctional
			‘While’	Restricted deranking device *-ɲin*	Polyfunctional
				Restricted deranking device *-ta*	Polyfunctional
			‘After’	Consecutive marker *-(m)pa*	Monofunctional
			‘Before’	Free device *nampunutuna*	Monofunctional
			‘Until’	Free device *ŋuna*	Polyfunctional
	Kayardild	Evans (1995)	‘When’	Restricted deranking device *-jarrb*	Polyfunctional

			‘While’	Restricted deranking device *-ki*	Monofunctional
			‘After’	Restricted deranking device *-ngarrba*	Polyfunctional
			‘Before’	Free device *ngarii*	Monofunctional
			‘Until’	Restricted deranking device *-mariij*	Monofunctional
	Mangarrayi	Merlan (1982)	‘When’	Article *-wa*	Polyfunctional
				Bound device *wa-*	Polyfunctional
			‘While’	Bound device *wa-*	Polyfunctional
			‘After’	Restricted deranking device *-wana*	Polyfunctional
				Sequential coordinator *nanaŋganawa*	Polyfunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Sequential coordinator *nanaŋganawa*	Polyfunctional
	Marrithiyel	Green (1989)	‘When’	Asyndesis	NA
			‘While’	Asyndesis	NA
			‘After’	Consecutive marker *-njsjan*	Monofunctional
				Sequential coordinator *gaganngganan*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Adverb(ial) *-defen* ‘only’	Monofunctional

	Meryam Mir	Piper (1989)	‘When’	Free device *nade*	Polyfunctional
			‘While’	Free device *nawar*	Monofunctional
			‘After’	Free device *kéwbu*	Polyfunctional
			‘As soon as’	Adverb(ial) *keko* ‘immediately’	Monofunctional
			‘Before’	Free device *kéwbu*	Polyfunctional
			‘Until’	Adverb(ial) *mena* ‘still’	Polyfunctional
	Miriwung	Kofod (1978)	‘When’	Restricted deranking device *-nginj*	Polyfunctional
			‘While’	Restricted deranking device *-nginj*	Polyfunctional
			‘After’	Consecutive marker *-ra*	Monofunctional
			‘Before’	Free device *wulangem*	Monofunctional
			‘Until’	Restricted deranking device *-gering*	Polyfunctional
	Nakkara	Eather (1990)	‘When’	Free device *warrina*	Monofunctional
			‘While’	General coordinating device *ngarra*	NA
			‘After’	Sequential coordinator *nakkardabbkka wa*	Monofunctional
				General coordinating device *ngarra*	NA
			‘Before’	Asyndesis	NA
			‘Until’	Free device *marda*	Polyfunctional
	Ngankikurungkurr	Hoddinott & Kofod (1988)	‘When’	Free device *gimin*	Polyfunctional

				Restricted deranking device -*nimbi*	Poyfunctional
			‘While’	Free device *gimin*	Polyfunctional
			‘After’	Sequential coordinator *yi*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Adverb(ial) *napa* ‘only’	Monofunctional
	Nyangumartha	Sharp (2004)	‘When’	Restricted deranking device -*ja*	Polyfunctional
			‘While’	Restricted deranking device -*ja*	Polyfunctional
			‘After’	Restricted deranking device -*ja*	Polyfunctional
			‘Before’	Restricted deranking device -*maninyju*	Polyfunctional
			‘Until’	Restricted deranking device -*karti*	Monofunctional
	Wagiman	Cook (1987)	‘When’	Asyndesis	NA
			‘While’	Asyndesis	NA
			‘After’	Consecutive marker -*wi*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Restricted deranking device -*gu*	Monofunctional
	Wambaya	Nordlinger (1993)	‘When’	Asyndesis	NA
			‘While’	Restricted deranking device -*ni*	Monofunctional

			‘After’	Sequential coordinator *ngaba*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Restricted deranking device *-nka*	Monofunctional
	Worrorra	Clendon (2014)	‘When’	Restricted deranking device *-ngku*	Polyfunctional
			‘While’	Restricted deranking device *-aanjanu*	Monofunctional
			‘After’	Restricted deranking device *-nyale*	Monofunctional
			‘Before’	Restricted deranking device *-ngarri*	Polyfunctional
			‘Until’	Restricted deranking device *-nyini*	Monofunctional
Eurasia	Abkhaz	Hewitt (1979)	‘When’	Restricted deranking device *-an*	Polyfunctional
			‘While’	Restricted deranking device *-naca*	Monofunctional
			‘After’	Restricted deranking device *-se*	Polyfunctional
			‘Before’	Restricted deranking device *-aanja*	Polyfunctional
			‘Until’	Restricted deranking device *-aanja*	Polyfunctional
	Ainu	Refsing (1986)	‘When’	Restricted deranking device *-konno*	Polyfunctional

			‘While’	Restricted deranking device *-kane*	Monofunctional
			‘After’	Restricted deranking device *-ayne*	Monofunctional
				Restricted deranking device *-tek*	Monofunctional
			‘Before’	Free device *eotkta*	Monofunctional
			‘Until’	Free device *orpakno*	Monofunctional
	Armenian	Dum-Tragut (2009)	‘When’	Generic temporal noun *ayn žamanak erb*	Polyfunctional
			‘While’	Restricted deranking device *-is*	Monofunctional
			‘After’	Free device *heto*	Monofunctional
			‘As soon as’	Free device *henc’or*	Monofunctional
			‘Before’	Free device *araj*	Monofunctional
				Free device *minč’ew*	Polyfunctional
			‘Until’	Free device *minč’ew*	Polyfunctional
	Atong	van Breugel (2014)	‘When’	Generic temporal noun *somay*	Monofunctional
				Bound device *-butun*	Polyfunctional
			‘While’	Bound device *-butun*	Polyfunctional
			‘After’	Bound device *=məŋ*	Monofunctional
			‘Before’	Free device *dakaŋ*	Monofunctional
			‘Until’	Free device *dabat*	Monofunctional
	Bantawa	Doornenbal (2009)	‘When’	Generic temporal noun *geri*	Monofunctional

			‘While’	Restricted deranking device *-hida*	Monofunctional
			‘After’	Restricted deranking device *-ki*	Monofunctional
				Noun *denda* ‘back’	Monofunctional
			‘Before’	Noun *bu* ‘front’	Monofunctional
			‘Until’	Restricted deranking device *-tari*	Monofunctional
	Baoan	Fried (2010)	‘When’	Generic temporal noun *tɕʰəχaŋnaŋ*	Monofunctional
			‘While’	Free device *reta*	Monofunctional
			‘After’	Free device *ɕintɕʰada*	Monofunctional
			‘Before’	Free device *kuda*	Monofunctional
			‘Until’	Restricted deranking device *-sala*	Monofunctional
	Basque	Hualde & Ortiz de Urbina (2003)	‘When’	Restricted deranking device *-ela*	Polyfunctional
			‘While’	Non-generic temporal noun *bitarte*	Monofunctional
			‘After’	Free device *gero*	Polyfunctional
			‘As soon as’	Non-generic temporal noun *orduko*	Monofunctional
			‘Before’	Free device *atzin*	Monofunctional
			‘Until’	Free device *arte*	Monofunctional
	Bru	Engelkemier (2010)	‘When’	Free device *pa*	Polyfunctional
			‘While’	Free device *pa*	Polyfunctional
			‘After’	Sequential coordinator *ka*	Monofunctional

			‘Before’	Free device *nuaŋ*	Monofunctional
			‘Until’	Free device *tʃon*	Polyfunctional
	Bunan	Widmer (2017)	‘When’	Generic temporal noun *bakta*	Monofunctional
				Bound device *=naŋ*	Polyfunctional
			‘While’	Bound device *=astok*	Polyfunctional
			‘After’	Bound device *=la*	Monofunctional
				Sequential coordinator *nuŋtɕi*	Monofunctional
			‘As soon as’	Verb-doubling	Monofunctional
			‘Before’	Free device *durek*	Monofunctional
			‘Until’	Bound device *=astok*	Polyfunctional
	Burushaski	Yoshioka (2012)	‘When’	Restricted deranking device *-asul*	Monofunctional
				Free device *báiumae*	Polyfunctional
			‘While’	Free device *báiumae*	Polyfunctional
			‘After’	Free device *aljíe*	Monofunctional
			‘Before’	Free device *qháas*	Polyfunctional
			‘Until’	Free device *qháas*	Polyfunctional
	Dargwa	Sumbatova & Mutalov (2003)	‘When’	Restricted deranking device *-quilla*	Polyfunctional
			‘While’	Restricted deranking device *-quilla*	Polyfunctional
			‘After’	Restricted deranking device *-lehetti*	Polyfunctional

				Restricted deranking device -*katla*	Monofunctional
			‘Before’	Restricted deranking device -*sar*	Monofunctional
			‘Until’	Restricted deranking device -*malquina*	Polyfunctional
	Dhimal	King (2009)	‘When’	Restricted deranking device -*lau*	Polyfunctional
			‘While’	Restricted deranking device -*pa*	Monofunctional
			‘After’	Restricted deranking device -*teŋ*	Polyfunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Restricted deranking device -*sa*	Monofunctional
	English	Quirk et al. (1985) Huddleston & Pullum (2002)	‘When’	Free device *when*	Polyfunctional
			‘While’	Free device *while*	Polyfunctional
			‘After’	Free device *after*	Monofunctional
				Sequential coordinator *and then*	Monofunctional
			‘Before’	Free device *before*	Monofunctional
			‘Until’	Free device *until*	Monofunctional
	Finnish	Sulkala & Karjalainen (1992)	‘When’	Free device *kun*	Polyfunctional

			‘While’	Free device *samalla kun*	Monofunctional
			‘After’	Free device *sitten kun*	Monofunctional
			‘As soon as’	Free device *jahka*	Monofunctional
			‘Before’	Free device *ennen kuin*	Monofunctional
			‘Until’	Free device *kunnes*	Monofunctional
	Galo	Post (2007)	‘When’	Bound device *=lo*	Monofunctional
				Bound device *=əm*	Polyfunctional
			‘While’	Restricted deranking device *-la*	Polyfunctional
			‘After’	Sequential coordinator *okə kookɨ̀bə*	Monofunctional
				Restricted deranking device *-lèe*	Monofunctional
			‘Before’	Bound device *=bə́*	Polyfunctional
			‘Until’	Free device *gobə*	Monofunctional
	Georgian	Hewitt (1995)	‘When’	Generic temporal noun *dro*	Monofunctional
				Free device *rodesac*	Monofunctional
			‘While’	Free device *sanamde*	Polyfunctional
			‘After’	Free device *mas sendeg rac*	Monofunctional
			‘As soon as’	Free device *rogorki*	Monofunctional
			‘Before’	Free device *sanamde*	Polyfunctional
			‘Until’	Free device *sanamde*	Polyfunctional
	Greek	Holton et al. (1997)	‘When’	Free device *otan*	Monofunctional

			‘While’	Free device *eno*	Polyfunctional
			‘After’	Free device *metá pou*	Monofunctional
			‘Before’	Free device *prin*	Monofunctional
			‘Until’	Free device *mékhri*	Monofunctional
	Hungarian	Kenesei et al. (1998)	‘When’	Free device *amikor*	Polyfunctional
			‘While’	Free device *amikor*	Polyfunctional
				Restricted deranking device *-va*	Polyfunctional
			‘After’	Free device *utan*	Monofunctional
				Restricted deranking device *-va*	Polyfunctional
			‘Before’	Free device *ellot*	Monofunctional
			‘Until’	Restricted deranking device *-ig*	Monofunctional
	Ingush	Nichols (2011)	‘When’	Generic temporal noun *xaana*	Monofunctional
				Restricted deranking device *-ach*	Polyfunctional
			‘While’	Restricted deranking device *-azh*	Monofunctional
			‘After’	Free device *t'ehwagha*	Monofunctional
			‘As soon as’	Restricted deranking device *-gehw*	Monofunctional
			‘Before’	Restricted deranking device *-lehw*	Monofunctional
			‘Until’	Restricted deranking device *-alca*	Monofunctional

	Japanese	Martin (1988)	‘When’	Generic temporal noun *toki*	Polyfunctional
			‘While’	Non-generic temporal noun *aida*	Monofunctional
			‘After’	Free device *ato*	Monofunctional
			‘As soon as’	Verb-doubling	Monofunctional
			‘Before’	Noun *mae ni* ‘in front of’	Monofunctional
				Noun *uti ni* ‘in the interval’	Polyfunctional
			‘Until’	Free device *made*	Monofunctional
	Japhug	Jacques (2014) Jacques (2021)	‘When’	Free device *jɤznɤ*	Monofunctional
			‘While’	Free device *ukʰɯkʰa*	Monofunctional
			‘After’	Verb *tsu* ‘to pass’	Monofunctional
				Free device *ɯqʰu*	Monofunctional
			‘A soon as’	Restricted deranking device *tɯ-*	Monofunctional
			‘Before’	Free device *ɕɯŋgɯ*	Monofunctional
			‘Until’	Free device *mɕtʂa*	Monofunctional
	Kayah Monu	Aung (2013)	‘When’	Free device *ba*	Polyfunctional
			‘While’	Free device *ba*	Polyfunctional
			‘After’	Verb *tʰə̀* ‘to finish’	Monofunctional
				Sequential coordinator *dɤ́*	Monofunctional
			‘Before’	Free device *nɔ́kʰə̀*	Monofunctional
			‘Until’	Free device *tə̀lɔ̀*	Monofunctional

	Kasong	Kamnuan sin (2002)	‘When’	Free device *tɔ:n*	Polyfunctional
				Free device *phɔ:*	Polyfunctional
			‘While’	Free device *tɔ:n*	Polyfunctional
			‘After’	Verb *jɔh* ‘to finish’	Monofunctional
				Sequential coordinator *kɔ*	Monofunctional
			‘Before’	Free device *tɔ̀:j*	Monofunctional
			‘Until’	Free device *con kwa:*	Monofunctional
	Ket	Nefedov (2015)	‘When’	Free device *baŋ*	Polyfunctional
				Free device *kika*	Polyfunctional
			‘While’	Free device *bes*	Monofunctional
				Free device *dukde*	Monofunctional
			‘After’	Free device *kadiqa*	Monofunctional
			‘Before’	Free device *kubka*	Monofunctional
			‘Until’	Free device *baŋdiŋa*	Polyfunctional
	Kharia	Peterson (2011)	‘When’	Correlative construction formed by *ata bhere* ‘which time’ and *hin bhere* ‘that time’	Monofunctional
			‘While’	Free device *deri*	Polyfunctional
				Restricted deranking device *-kon*	Polyfunctional
				Verb-doubling	Polyfunctional
			‘After’	Free device *loʔɖho*	Monofunctional

			‘As soon as’	Correlative pattern formed by *caʈ* and *paʈ*	Monofunctional
				Free device *sariyat*	Monofunctional
			‘Before’	Free device *seŋ*	Monofunctional
			‘Until’	Bound device *jaw-*	Monofunctional
	Khmer	Haiman (2011)	‘When’	Para-hypotactic pattern formed by the generic temporal noun *pee:l* and the general coordinating device *kaw*	Polyfunctional
			‘While’	Para-hypotactic pattern formed by the generic temporal noun *pee:l* and the general coordinating device *kaw*	Polyfunctional
			‘After’	Verb *haeuj* ‘to finish’	Monofunctional
			‘As soon as’	Free device *aoj tae*	Monofunctional
			‘Before’	Free device *mun*	Polyfunctional
			‘Until’	Verb *dawl* ‘to arrive’	Monofunctional
	Khwarshi	Khalilova (2009)	‘When’	Restricted deranking device *-aλa*	Polyfunctional
			‘While’	Restricted deranking device *-zuqʼun*	Monofunctional
			‘After’	Restricted deranking device *-unso*	Polyfunctional

			‘As soon as’	Restricted deranking device *-uč*	Monofunctional
			‘Before’	Restricted deranking device *-šehol*	Monofunctional
			‘Until’	Restricted deranking device *-šeq’a*	Monofunctional
	Korean	Chang (1996) Sohn (2009) Yeon & Brown (2019)	‘When’	Generic temporal noun *ttay*	Polyfunctional
			‘While’	Non-generic temporal noun *tongan*	Monofunctional
			‘After’	Noun *twi* ‘back’	Monofunctional
				Non-generic temporal noun *teum*	Monofunctional
			‘As soon as’	Restricted deranking device *-ca*	Monofunctional
			‘Before’	Non-generic temporal noun *cen*	Monofunctional
			‘Until’	Generic temporal noun *ttay*	Polyfunctional
	Lao	Enfield (2007)	‘When’	Generic temporal noun *tòòn3*	Monofunctional
			‘While’	Generic temporal noun *vêlaa2*	Monofunctional
			‘After’	Free device *lang3caak5*	Monofunctional
			‘As soon as’	Free device *phòdii3*	Monofunctional
			‘Before’	Free device *kòòn1*	Monofunctional

			‘Until’	Free device *thaw*	Monofunctional
	Lawa	Blok (2013)	‘When’	Free device *bat*	Monofunctional
			‘While’	Free device *mah*	Monofunctional
			‘After’	Free device *miat*	Monofunctional
			‘Before’	Free device *kaŋ*	Monofunctional
			‘Until’	Free device *haɨk*	Monofunctional
	Lezgian	Haspelmath (1993)	‘When’	Generic temporal noun *č’awu*	Monofunctional
				Generic temporal noun *waxtunda*	Monofunctional
				Generic temporal noun *arada*	Monofunctional
				Restricted deranking device *-la*	Polyfunctional
			‘While’	Restricted deranking device *-z*	Monofunctional
				Restricted deranking device *-na*	Polyfunctional
			‘After’	Restricted deranking device *-la*	Polyfunctional
				Restricted deranking device *-na*	Polyfunctional
			‘As soon as’	Restricted deranking device *-waldi*	Monofunctional
				Restricted deranking device *-namaz*	Polyfunctional
				Restricted deranking device *-zamaz*	Monofunctional
				Verb-doubling	Monofunctional

			‘Before’	Restricted deranking device *-daldi*	Polyfunctional
				Restricted deranking device *-namaz*	Polyfunctional
			‘Until’	Restricted deranking device *-daldi*	Polyfunctional
	Lithuanian	Ambrazas et al. (2006)	‘When’	Correlative pattern formed by *kai* and *taip*	Polyfunctional
			‘While’	Correlative pattern formed by *kol* and *taip*	Monofunctional
			‘After’	Restricted deranking device (past participle)	Monofunctional
			‘As soon as’	Free device *kaĩ tìk*	Monofunctional
			‘Before’	Adverb(ial) *pirmiau* ‘first’	Monofunctional
			‘Until’	Correlative pattern formed by *tol* and *kol*	Polyfunctional
	Malto	Puttaswamy (2009)	‘When’	Restricted deranking device *-no*	Monofunctional
			‘While’	Verb-doubling	Polyfunctional
			‘After’	Restricted deranking device *-k*	Monofunctional
			‘Before’	Free device *pahle*	Monofunctional
			‘Until’	Free device *jaibtak*	Monofunctional
	Mandarin	Yip & Rimmington (2004) Li & Thompson (1981)	‘When’	Generic temporal noun *shíhuo*	Polyfunctional
			‘While’	Generic temporal noun *shíhuo*	Polyfunctional

				Correlative pattern formed by *yībiān* and *yībiān*	Monofunctional
			‘After’	Correlative pattern formed by *yìhòu* and *jiu*	Monofunctional
			‘As soon as’	Correlative pattern formed by *yī* and *jiù*	Monofunctional
			‘Before’	Free device *yiqian*	Monofunctional
			‘Until’	Correlative pattern formed by *ding* and *cai*	Monofunctional
	Mongsen Ao	Coupe (2006)	‘When’	Restricted deranking device *-lìkàʔ*	Monofunctional
			‘While’	Restricted deranking device *-(ə)k*	Monofunctional
			‘After’	Restricted deranking *-əɹ*	Monofunctional
			‘Before’	Restricted deranking device *-ku*	Polyfunctional
			‘Until’	Restricted deranking device *-təni*	Monofunctional
	Nuosu	Gerner (2013)	‘When’	Generic temporal noun *te*	Polyfunctional
			‘While’	Generic temporal noun *te*	Polyfunctional
			‘After’	Free device *ggup jjux ne*	Monofunctional
				Sequential coordinator *lox*	Monofunctional
			‘As soon as’	Free device *ddix sy ne*	Monofunctional
			‘Before’	Noun *nep* ‘origin’	Monofunctional
			‘Until’	Free device *hnox*	Monofunctional

	Palula	Liljegren (2016)	‘When’	Free device *ta*	Monofunctional
			‘While’	Free device *patugiraá*	Monofunctional
				Restricted deranking device *-ainií*	Monofunctional
			‘After’	Free device *pahúrta*	Monofunctional
			‘Before’	Free device *muṣṭú*	Monofunctional
			‘Until’	Free device *tií*	Monofunctional
	Persian	Yousef (2018)	‘When’	Free device *vaghtike*	Polyfunctional
			‘While’	Free device *dar hālike*	Monofunctional
				Free device *vaghtike*	Polyfunctional
			‘After’	Free device *ba'daz ānke*	Monofunctional
			‘As soon as’	Free device *haminke*	Monofunctional
			‘Before’	Free device *ghablaz ānke*	Monofunctional
			‘Until’	Noun *ta'a* ‘match’	Polyfunctional
	Pnar	Ring (2015)	‘When’	Generic temporal noun *par*	Polyfunctional
				Verb *man* ‘to become’	Polyfunctional
			‘While’	Generic temporal noun *par*	Polyfunctional
			‘After’	Verb *man* ‘to become’	Polyfunctional
			‘Before’	Free device *tswa*	Monofunctional
			‘Until’	Free device *hado*	Monofunctional
	Russian	Wade (2011) Bernard Comrie (personal	‘When’	Free device *kogda*	Polyfunctional

		communi cation)			
			‘While’	Free device *kogda*	Polyfunctional
				Free device *poka*	Polyfunctional
			‘After’	Free device *posle togo kak*	Monofunctional
			‘As soon as’	Free device *kak tol'ko*	Monofunctional
			‘Before’	Free device *do togo kak*	Monofunctional
				Free device *pered tem kak*	Monofunctional
				Free device *prežde čem*	Monofunctional
				Free device *poka*	Polyfunctional
			‘Until’	Free device *poka*	Polyfunctional
	Saami	Feist (2010)	‘When’	Free device *ko*	Polyfunctional
			‘While’	Free device *ko*	Polyfunctional
			‘After’	Free device *mâŋŋa*	Monofunctional
			‘Before’	Free device *ouddâl ku*	Monofunctional
			‘Until’	Free device *poka*	Monofunctional
	Semelai	Kruspe (2004)	‘When’	Free device *staʔ*	Polyfunctional
				Verb *knaʔ* ‘to happen’	Monofunctional
			‘While’	Free device *snih*	Monofunctional
				Free device *samel*	Monofunctional
				Free device *siraŋ*	Monofunctional
			‘After’	Verb *ʔluc* ‘to pass’	Monofunctional
				Free device *staʔ*	Polyfunctional
			‘Before’	Adverb(ial) *lagiʔ daʔ* ‘not yet’	Monofunctional

			‘Until’	Free device *sampai*	Monofunctional
	Spanish	Personal knowledge	‘When’	Free device *cuando*	Polyfunctional
			‘While’	Free device *mientras que*	Polyfunctional
			‘After’	Free device *después de que*	Monofunctional
				Sequential coordinator *y entonces*	Monofunctional
			‘Before’	Free device *antes de que*	Monofunctional
			‘Until’	Free device *hasta que*	Monofunctional
	Tamil	Lehmann (1993)	‘When’	Correlative construction formed by *pootu* ‘time’ and *pootu* ‘time’	Polyfunctional
				Restricted deranking device *-a*	Polyfunctional
			‘While’	Verb *kol* ‘to hold’	Monofunctional
				Restricted deranking device *-a*	Polyfunctional
			‘After’	Free device *appuram*	Monofunctional
			‘Before’	Free device *munnal*	Monofunctional
			‘Until’	Noun *varai* ‘end/limit’	Monofunctional
	Tangsa	Boro (2017)	‘When’	Free device *ke*	Monofunctional
				Free device *be*	Polyfunctional
			‘While’	Free device *be*	Polyfunctional
			‘After’	Free device *ime*	Polyfunctional
			‘Before’	Asyndesis	NA
			‘Until’	Verb-doubling	Monofunctional
	Telugu	Krishnamurti &	‘When’	Correlative construction	Polyfunctional

		Gwynn (1985)		formed by *eppuDu* 'which time' and *appuDee* 'that time'	
			'While'	Correlative construction formed by *eppuDu* 'which time' and *appuDee* 'that time'	Polyfunctional
			'After'	Free device *tarwata*	Monofunctional
			'As soon as'	Adverb(ial) *weNTanne* 'immediately'	Monofunctional
			'Before'	Free device *mundu*	Monofunctional
			'Until'	Free device *waraku*	Monofunctional
	Tundra Nenets	Nikolaeva (2014)	'When'	Free device *s'er°h*	Monofunctional
			'While'	Free device *mal'°ŋkəna*	Monofunctional
				Restricted deranking device *-wa*	Polyfunctional
			'After'	Free device *pūd°*	Monofunctional
				Restricted deranking device *-qma*	Monofunctional
			'Before'	Free device *n'er°n'a(na)*	Monofunctional
				Restricted deranking device *-wa*	Polyfunctional
			'Until'	Free device *ŋesont°h*	Monofunctional
	Turkish	Göksel & Kerslake (2005)	'When'	Generic temporal noun *zaman*	Monofunctional
				Restricted deranking device *-(y)ken*	Polyfunctional

			‘While’	Restricted deranking device *-(y)ken*	Polyfunctional
			‘After’	Free device *sonra*	Monofunctional
			‘As soon as’	Verb-doubling	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Free device *kadar*	Monofunctional
	Udihe	Nikolaeva & Tolskaya (2001)	‘When’	Free device *edeisini*	Polyfunctional
			‘While’	Free device *agdaduni*	Monofunctional
			‘After’	Free device *amä:dani*	Monofunctional
			‘Before’	Free device *zuliete*	Monofunctional
			‘Until’	Free device *dexi*	Monofunctional
	Udmurt	Winkler (2001) Georgieva (2018)	‘When’	Restricted deranking device *-ku*	Polyfunctional
			‘While’	Restricted deranking device *-ku*	Polyfunctional
				Restricted deranking device *-toź*	Polyfunctional
			‘After’	Free device *bere*	Monofunctional
			‘Before’	Restricted deranking device *-toź*	Polyfunctional
			‘Until’	Restricted deranking device *-toź*	Polyfunctional
	Welsh	King (2003)	‘When’	Free device *pan*	Monofunctional
			‘While’	Free device *tra*	Monofunctional

			‘After’	Free device *ar al*	Monofunctional
			‘Before’	Free device *cyn*	Monofunctional
			‘Until’	Free device *nes*	Monofunctional
	Xong	Sposato (2015)	‘When’	Generic temporal noun *ngaonf*	Polyfunctional
			‘While’	Correlative pattern formed by *deit* and *deit*	Monofunctional
				Correlative pattern formed by *biank* and *biank*	Monofunctional
			‘After’	Correlative pattern formed by *aod* and *doub*	Monofunctional
			‘Before’	Noun *neul* ‘front’	Monofunctional
			‘Until’	Free device *chad*	Monofunctional
	Yukaghir	Maslova (2003)	‘When’	Restricted deranking device *-ne*	Polyfunctional
			‘While’	Restricted deranking device *-t*	Polyfunctional
			‘After’	Free device *jola:t*	Monofunctional
			‘Before’	Free device *kieje*	Monofunctional
			‘Until’	Free device *laNide*	Monofunctional
	Zoulei	Li et al. (2014)	‘When’	Correlative construction formed by *tsi* ‘time’ and *tsi* ‘time’	Polyfunctional
			‘While’	Free device *ke*	Polyfunctional
			‘After’	Asyndesis	NA
				Sequential coordinator *teu*	Polyfunctional

				Sequential coordinator *ka*	Polyfunctional
			‘As soon as’	Correlative pattern formed by *ka55* and *jəu31*	Monofunctional
			‘Before’	Sequential coordinator *teu*	Polyfunctional
			‘Until’	Sequential coordinator *ka*	Polyfunctional
North America	Alacatlatzala Mixtec	Zylstra (1991)	‘When’	Correlative pattern formed by *tá* and *ta*	Polyfunctional
			‘While’	Correlative pattern formed by *tá* and *ta*	Polyfunctional
			‘After’	General coordinating device *ta*	NA
			‘Before’	Correlative pattern formed by *tá* and *ta*	Polyfunctional
			‘Until’	Free device *nda*	Monofunctional
	Amuzgo	Buck (2015)	‘When’	Free device *quiana*	Monofunctional
			‘While’	Free device *yoche na*	Monofunctional
			‘After’	Free device *jnda*	Monofunctional
				Sequential coordinator *chii*	Monofunctional
			‘Before’	Free device *cwiitjo̲o̲ na*	Monofunctional
			‘Until’	Free device *hasta na*	Monofunctional
	Ayutla Mixe	Romero-Méndez (2008)	‘When’	Free device *ku*	Polyfunctional
			‘While’	Free device *ku*	Polyfunctional
			‘After’	Free device *ku*	Polyfunctional
			‘Before’	Free device *ku*	Polyfunctional
			‘Until’	Free device *ku*	Polyfunctional
	Barbareño Chumash	Wash (2001)	‘When’	Free device *ʔakimpi*	Polyfunctional

				Free device *mal̓i*	Polyfunctional
			‘While’	Free device *ʔakimpi*	Polyfunctional
			‘After’	Free device *mal̓i*	Polyfunctional
			‘Before’	Free device *ʔakimpi*	Polyfunctional
			‘Until’	Free device *ʔakay hu*	Monofunctional
	Cherokee	Montgomery-Anderson (2008)	‘When’	Restricted deranking device -*v́v́ʔi*	Polyfunctional
			‘While’	Bound device *ni-*	Polyfunctional
			‘After’	Restricted deranking device -*v́v́ʔi*	Polyfunctional
			‘Before’	Bound device *ni-*	Polyfunctional
			‘Until’	Restricted deranking device -*v́v́ʔi*	Polyfunctional
	Central Alaskan Yup'ik	Miyaoka (2012)	‘When’	Restricted deranking device -*liim*	Polyfunctional
			‘While’	Restricted deranking device -*nginaner*	Monofunctional
				Restricted deranking device -*liim*	Polyfunctional
			‘After’	Restricted deranking device -*nr*	Monofunctional
			‘As soon as’	Restricted deranking device -*uti*	Monofunctional
			‘Before’	Restricted deranking device -*pail*	Monofunctional
			‘Until’	Restricted deranking device -*llr*	Monofunctional

	Chitimacha	Daniel Hieber (Personal communication)	'When'	Restricted deranking device *-k*	Polyfunctional
				Restricted deranking device *-nki*	Monofunctional
			'While'	Restricted deranking device *-k*	
			'After'	Restricted deranking device *-tut*	Monofunctional
			'Before'	Restricted deranking device *-i*	Polyfunctional
			'Until'	Asyndesis	NA
	Chontal	O'Connor (2004)	'When'	Free device *kanna*	Monofunctional
			'While'	Free device *myendre*	Monofunctional
			'After'	Verb *joy* 'to finish'	Monofunctional
			'Before'	Correlative pattern ('first..and then')	Monofunctional
			'Until'	Free device *hasta*	Monofunctional
	Cora	Casad (1984)	'When'	Free device *ti'ih*	Polyfunctional
			'While'	Restricted deranking device *-ka*	Monofunctional
			'After'	Restricted deranking device *-an*	Monofunctional
				Free device *ti'ih*	Polyfunctional
			'Before'	Free device *ti'ih*	Polyfunctional
			'Until'	Free device *asta*	Monofuctional

	Creek	Martin (2011)	‘When’	Generic temporal noun *okíta*	Polyfunctional
				Bound device *=of*	Polyfunctional
			‘While’	Adverb(ial) *mônk* ‘still’	Polyfunctional
			‘After’	Verb *atî:k* ‘be up to (an amount)’	Polyfunctional
			‘As soon as’	Verb *apak* ‘be with’	Monofunctional
			‘Before’	Adverb(ial) *mônk* ‘still’	Polyfunctional
			‘Until’	Verb *atî:k* ‘be up to (an amount)’	Polyfunctional
	Crow	Graczyk (2007)	‘When’	Restricted deranking device *-dak*	Polyfunctional
				Demonstrative *hinne*	Polyfunctional
				Restricted deranking device *-t*	Polyfunctional
			‘While’	Restricted deranking device *-dak*	Polyfunctional
			‘After’	Demonstrative *hinne*	Polyfunctional
				Verb *koowee* ‘to finish’	Monofunctional
			‘As soon as’	Adverb(ial) *koota* ‘immediately’	Monofunctional
			‘Before’	Adverb(ial) *it ssaa* ‘not yet’	Monofunctional
			‘Until’	Free device *aa*	Monofunctional
	Cupeño	Hill (2005)	‘When’	Restricted deranking device *-naq*	Polyfunctional
				General deranking device *-nuk*	NA

			‘While’	General deranking device *-nuk*	NA
			‘After’	Sequential coordinator *me aya*	Monofunctional
				General deranking device *-nuk*	NA
			‘Before’	General deranking device *-nuk*	NA
			‘Until’	Restricted deranking device *-pi*	Monofunctional
	Haida	Enrico (2003)	‘When’	Free device *gyen*	Polyfunctional
				Free device *dluu*	Polyfunctional
			‘While’	Free device *nudd*	Monofunctional
				Free device *dluu*	Polyfunctional
			‘After’	Free device *qawd*	Monofunctional
				Free device *raadaangan*	Monofunctional
				Free device *sda*	Monofunctional
				Free device *saliyaa*	Monofunctional
				Free device *daaliigu*	Monofunctional
			‘As soon as’	Free device *rahl*	Monofunctional
			‘Before’	Free device *t'angaasda*	Monofunctional
				Free device *daaliisda*	Monofunctional
			‘Until’	Free device *raa*	Monofunctional
	Isthmus Zapotec	Marcial et al. (2001)	‘When’	Non-generic temporal noun *dix*	Monofunctional
			‘While’	Free device *laga*	Monofunctional

			‘After’	Sequential coordinator *nagá de ngue*	Monofunctional
			‘Before’	Free device *ante*	Monofunctional
			‘Until’	Free device *dede*	Monofunctional
	Lillooet	Van Ejik (1997)	‘When’	Free device *i*	Polyfunctional
			‘While’	Free device *i*	Polyfunctional
			‘After’	Sequential coordinator *ay*	Monofunctional
			‘Before’	Free device *el*	Monofunctional
			‘Until’	Free device *u* (It must be accompanied by a phrase meaning ‘it gets to the point’)	Monofunctional
	Maricopa	Gordon (1986)	‘When’	Bound device *nya-*	Polyfunctional
				Restricted deranking device *-haayli*	Polyfunctional
			‘While’	Bound device *nya-*	Polyfunctional
				Restricted deranking device *-haayli*	Polyfunctional
			‘After’	Correlative pattern (‘first..and then’)	Polyfunctional
			‘Before’	Restricted deranking device *-haayli*	Polyfunctional
				Correlative pattern (‘first..and then’)	Polyfunctional
			‘Until’	Restricted deranking device *-nyk*	Monofunctional

	Musqueum	Suttles (2004)	‘When’	Article *kʷə* plus bound device *s-*	Polyfunctional
				Correlative pattern formed by *haʔ* and *ʔəy̓*	Polyfunctional
			‘While’	Bound device *we-*	Polyfunctional
			‘After’	Article *kʷə* plus bound device *s-*	
			‘As soon as’	Correlative pattern formed by *ʔal̓* and *ʔal̓*	Monofunctional
			‘Before’	Article *kʷə* plus bound device *s-*	Polyfunctional
			‘Until’	General coordinating device *ʔəy̓*	NA
	Huasteca Nahuatl	Olguín Martínez (2016)	‘When’	Free device *kemah*	Polyfunctional
			‘While’	Free device *kemah*	Polyfunctional
			‘After’	Free device *kemah*	Polyfunctional
				Sequential coordinator *huankino*	Polyfunctional
			‘Before’	Free device *kemah*	Polyfunctional
			‘Until’	Sequential coordinator *huankino*	Polyfunctional
	Ottawa	Valentine 2009	‘When’	Changed conjunct. It may appear with the free device *pii*	Polyfunctional
			‘While’	Bound device *shkwaa-*	Polyfunctional
				Changed conjunct. It may appear	Polyfunctional

				with the free device *megwaa*	
			‘After’	Bound device *shkwaa-*	Polyfunctional
				Sequential coordinator *mi dash*	Polyfunctional
			‘Before’	Bound device *ji-*	Polyfunctional
			‘Until’	Free device *biinish*	Monofunctional
	Onondaga	Woodbury (2018)	‘When’	Free device *neʔ nę*	Polyfunctional
			‘While’	Bound device *tci-*	Monofunctional
			‘After’	Free device *neʔ nę*	Polyfunctional
			‘Before’	Noun *nigę* ‘extent’	Polyfunctional
			‘Until’	Noun *nigę* ‘extent’	Polyfunctional
	Rama	Craig (1990)	‘When’	Bound device *-ka*	Polyfunctional
			‘While’	Bound device *-i*	Monofunctional
			‘After’	Bound device *-su*	Monofunctional
				Sequential coordinator *baning*	Polyfunctional
			‘Before’	Free device *kama*	Polyfunctional
			‘Until’	Sequential coordinator *baning*	
	Sahaptin	Worth Jansen (2010)	‘When’	Free device *anaku*	Polyfunctional
			‘While’	Restricted deranking device *-pa*	Monofunctional
			‘After’	Sequential coordinator *ku awku*	Monofunctional

			‘Before’	Adverb(ial) *chawxi* ‘not yet’	Monofunctional
			‘Until’	Free device *anamun*	Monofunctional
	Santiago Chinantec	Anderson (2018)	‘When’	Free device *mɨ*	Monofunctional
			‘While’	Free device *lajee*	Monofunctional
			‘After’	Sequential coordinator *joba’*	Monofunctional
			‘Before’	Free device *nú’guɨ*	Monofunctional
			‘Until’	Free device *cartɨ’*	Monofunctional
	Slave	Rice (1989)	‘When’	Free device *nįdé*	Polyfunctional
				Free device *ʔekúh*	Polyfunctional
			‘While’	Free device *ʔekúh*	Polyfunctional
			‘After’	Sequential coordinator *gots’ęh*	Monofunctional
			‘Before’	Free device *were*	Monofunctional
			‘Until’	Free device *ts’ę́*	Monofunctional
	Southeastern Tepehuan	García Salido (2014)	‘When’	Free device *pai’dhuk*	Polyfunctional
			‘While’	Free device *pai’dhuk*	Polyfunctional
			‘After’	Free device *mikkat*	Monofunctional
			‘Before’	Free device *bajɨk*	Monofunctional
			‘Until’	Free device *asta*	Monofunctional
	Teribe	Quesada (2000)	‘When’	Asyndesis	NA
			‘While’	General coordinating device *ga*	NA

			‘After’	General coordinating device *ga*	NA
				Sequential coordinator *pirga*	Monofunctional
			‘Before’	Free device *bango*	Monofunctional
			‘Until’	General coordinating device *ga*	NA
	Upper Necaxa Totonac	Beck (2004)	‘When’	Free device *akßní*	Polyfunctional
			‘While’	Free device *akßní*	Polyfunctional
				Correlative pattern formed by *li꞉wán* and *li꞉wán*	Monofunctional
			‘After’	Sequential coordinator *ali꞉stá꞉n*	Polyfunctional
			‘Before’	Sequential coordinator *ali꞉stá꞉n*	Polyfunctional
			‘Until’	Free device *asta*	Monofunctional
	Tzeltal	Polian (2013)	‘When’	Free device *k’alal*	Polyfunctional
			‘While’	Restricted deranking device *-el*	Monofunctional
			‘After’	Free device *k’alal*	Polyfunctional
			‘Before’	Free device *k’alal*	Polyfunctional
			‘Until’	Free device *k’alal*	Polyfunctional
	Ute	Givón (2011)	‘When’	General deranking device *-kw*	NA
			‘While’	General deranking device *-kw*	NA

			‘After’	General deranking device *-kw*	NA
			‘Before’	Free device *kachisuru*	Monofunctional
			‘Until’	General deranking device *-kw*	NA
	Warihio	Félix Armendáriz (2005)	‘When’	Free device *amuri*	Monofunctional
			‘While’	General deranking device *-ká*	NA
				Restricted deranking device *-o*	Monofunctional
			‘After’	General deranking device *-ká*	NA
				Restricted deranking device *-so*	Polyfunctional
			‘Before’	Free device *ke’ečó*	Monofunctional
			‘Until’	Free device *ahta*	Monofunctional
	Yaqui	Lindenfeld (1973) Dedrick & Casad (1999) Guerrero (2018)	‘When’	Restricted deranking device *-o*	Polyfunctional
				General deranking device *-ka*	NA
			‘While’	General deranking device *-ka*	NA
			‘After’	General deranking device *-ka*	NA
			‘As soon as’	Restricted deranking device *-patchi*	Monofunctional

			‘Before’	Restricted deranking device *-o*	Polyfunctional
			‘Until’	Restricted deranking device *-tahtia*	Monofunctional
	Yuchi	Linn (2000)	‘When’	Restricted deranking device *-he*	Polyfunctional
			‘While’	Free device *hade*	Monofunctional
			‘After’	Restricted deranking device *-he*	Polyfunctional
				Sequential coordinator *ahende*	Polyfunctional
			‘Before’	Restricted deranking device *-le*	Monofunctional
			‘Until’	Sequential coordinator *ahende*	Polyfunctional
Papunesia	Abau	Lock (2011)	‘When’	Free device *menkin*	Monofunctional
			‘While’	Free device *ankin*	Polyfunctional
			‘After’	Sequential coordinator *nok*	Monofunctional
				Sequential coordinator *sa*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Demonstrative *senkinaw*	Monofunctional
	Abui	Kratochvíl (2007) František Kratochvíl (personal communication)	‘When’	Free device *maiye*	Polyfunctional

				Demonstrative *do*	Polyfunctional
				Demonstrative *nu*	Polyfunctional
			‘While’	Demonstrative *do*	Polyfunctional
			‘After’	Sequential coordinator *ya*	Monofunctional
			‘Before’	Adverb(ial) *dara naha* ‘not yet’	Monofunctional
			‘Until’	General coordinating device *ba*	NA
	Aghu	van den Heuvel (2016)	‘When’	Restricted deranking device *-ke*	Monofunctional
			‘While’	Bound device *=k*	Monofunctional
			‘After’	Restricted deranking device *-ne*	Monofunctional
			‘Before’	Asyndesis	NA
			‘Until’	Asyndesis	NA
	Amele	Roberts (2016)	‘When’	Generic temporal noun *saen*	Polyfunctional
			‘While’	Generic temporal noun *saen*	Polyfunctional
				Restricted deranking device *-en*	Polyfunctional
			‘After’	Restricted deranking device *-im*	Monofunctional
				Restricted deranking device *-oc*	Monofunctional
				Sequential coordinator *odoc*	Polyfunctional
			‘Before’	Restricted deranking device *-en*	Polyfunctional

			‘Until’	Sequential coordinator *odoc*	Polyfunctional
	Awtuw	Feldman (1986)	‘When’	Restricted deranking device *-rek*	Polyfunctional
			‘While’	Restricted deranking device *-rek*	Polyfunctional
			‘After’	Asyndesis	NA
			‘As soon as’	Correlative pattern formed by *tawa* and *tay*	Monofunctional
			‘Before’	Adverb(ial) *apre* ‘not yet’	Monofunctional
			‘Until’	Asyndesis	NA
	Balantak	Van den Berg & Busenitz (2012)	‘When’	Generic temporal noun *ilio*	Monofunctional
				Verb *daa* ‘to finish’	Polyfunctional
				Generic temporal noun *tempo*	Polyfunctional
			‘While’	Generic temporal noun *tempo*	Polyfunctional
			‘After’	Free device *noko*	Monofunctional
			‘As soon as’	adverb(ial) *tongko* ‘only’	Polyfunctional
			‘Before’	Adverb(ial) *koo’po* ‘not yet’	Monofunctional
			‘Until’	Free device *bi*	Monofunctional
				Verb *pataka* ‘to arrive’	Monofunctional
	Barupu	Corris (2006)	‘When’	Generic temporal noun *taim*	Monofunctional
			‘While’	Asyndesis	NA
				Restricted deranking device *-varao*	Monofunctional

			‘After’	Asyndesis	NA
				Sequential coordinator *kope*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Asyndesis	NA
	Batak	Woollams (1996)	‘When’	Free device *anahta*	Polyfunctional
				Free device *dingendu*	Polyfunctional
			‘While’	Free device *anahta*	Polyfunctional
				Free device *dingendu*	Polyfunctional
			‘After’	Free device *enca*	Monofunctional
			‘Before’	Free device *ope*	Monofunctional
			‘Until’	Free device *seh ngayak*	Monofunctional
	Begak	Goudswaard (2005)	‘When’	Generic temporal noun *waktu*	Polyfunctional
			‘While’	Generic temporal noun *waktu*	Polyfunctional
			‘After’	Free device *pog*	Polyfunctional
				Sequential coordinator *sa*	Monofunctional
			‘Before’	Adverb(ial) *apon dan* ‘not yet’	Monofunctional
			‘Until’	Verb *sawot* ‘to arrive’	Monofunctional
	Bilua	Obata (2003)	‘When’	Free device *keru*	Polyfunctional
			‘While’	Free device *keru*	Polyfunctional
				Free device *palate*	Monofunctional

			‘After’	Sequential coordinator *inio*	Polyfunctional
				Sequential coordinator *ti*	Polyfunctional
				Sequential coordinator *ta*	Polyfunctional
			‘Before’	Free device *puliako*	Monofunctional
			‘Until’	Sequential coordinator *inio*	Polyfunctional
	Hatam	Reesink (1999)	‘When’	Generic temporal noun *mpe*	Polyfunctional
				Free device *gino*	Polyfunctional
			‘While’	Generic temporal noun *mpe*	Polyfunctional
			‘After’	Sequential coordinator *lene*	Monofunctional
			‘Before’	Adverb(ial) *big yo* ‘not yet’	Monofunctional
			‘Until’	Serial verb *ug pek* ‘go reach’	Monofunctional
	Ilocano	Galvez Rubino (1997)	‘When’	Free device *ili*	Monofunctional
				Free device *no*	Polyfunctional
				Free device *idinto*	Polyfunctional
			‘While’	Free device *idinto*	Polyfunctional
				Free device *bayat*	Monofunctional
			‘After’	Verb *leppas* ‘to finish’	Monofunctional
				Free device *kalpasan*	Monofunctional
			‘As soon as’	Free device *apaman*	Monofunctional
			‘Before’	Free device *sakbay*	Monofunctional

			‘Until’	Free device *agginga*	Monofunctional
	Inanwatan	de Vries (2004)	‘When’	Restricted deranking device *-qe*	Monofunctional
			‘While’	Adverb(ial) *-de* ‘still’	Monofunctional
			‘After’	Demonstrative *maiwo*	Monofunctional
			‘Before’	Verb *eri* ‘not to be’	Polyfunctional
			‘Until’	Verb *sampai* ‘to arrive’	Monofunctional
	Indonesian	Sneddon et al. (2010)	‘When’	Generic temporal noun *waktu*	Polyfunctional
			‘While’	Generic temporal noun *waktu*	Polyfunctional
			‘After’	Free device *sesudah*	Monofunctional
			‘As soon as’	Bound device *se-*	Monofunctional
			‘Before’	Free device *sebelum*	Monofunctional
			‘Until’	Verb *sampai* ‘to arrive’	Monofunctional
	Kaluli	Grosh & Grosh (2004)	‘When’	Restricted deranking device *-abiki*	Polyfunctional
			‘While’	Restricted deranking device *-abiki*	Polyfunctional
			‘After’	Restricted deranking device *-saga*	Polyfunctional
			‘Before’	Adverb(ial) *semo* ‘not yet’	Monofunctional
			‘Until’	Restricted deranking device *-saga*	Polyfunctional
	Komnzo	Döhler (2018)	‘When’	Free device *fthé*	Polyfunctional
			‘While’	Verb *fiyok* ‘to make’	Monofunctional

			‘After’	Sequential coordinator *watik*	Monofunctional
			‘Before’	Free device *fthé*	Polyfunctional
			‘Until’	Free device *e*	Monofunctional
	Makasae	Huber (2008)	‘When’	Generic temporal noun *watu*	Polyfunctional
			‘While’	Free device *gata*	Monofunctional
				Generic temporal noun *watu*	Polyfunctional
			‘After’	Sequential coordinator *dete*	Monofunctional
			‘Before’	Adverb(ial) *ne’egu* ‘not yet’	Monofunctional
			‘Until’	Free device *au la’a nahi ta rata*	Monofunctional
	Manambu	Aikhenvald (2008)	‘When’	Restricted deranking device *-ku*	Polyfunctional
			‘While’	Restricted deranking device *-tay*	Monofunctional
			‘After’	Restricted deranking device *-ku*	Polyfunctional
			‘As soon as’	Restricted deranking device *-taka*	Monofunctional
			‘Before’	Restricted deranking device *-tay*	Polyfunctional
			‘Until’	Restricted deranking device *-b*	Monofunctional
	Marind	Olsson (2021)	‘When’	Bound device *ha-*	Polyfunctional
			‘While’	Bound device *ha-*	Polyfunctional

			‘After’	Bound device *ha-*	Polyfunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Free device *aaa*	Monofunctional
	Maybrat	Dol (1999)	‘When’	Generic temporal noun *kine*	Monofunctional
				Generic temporal noun *um*	Monofunctional
			‘While’	Correlative pattern formed by *si* and *si*	Monofunctional
			‘After’	Sequential coordinator *mati*	Monofunctional
				Verb *mnan* ‘to finish’	Polyfunctional
			‘Before’	Verb *mnan* ‘to finish’	Polyfunctional
			‘Until’	Asyndesis	NA
	Momu	Honeyman (2016)	‘When’	Bound device *=b*	Polyfunctional
			‘While’	Bound device *=b*	Polyfunctional
			‘After’	Sequential coordinator *yen*	Monofunctional
			‘As soon as’	Restricted deranking device *-essen*	Polyfunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Restricted deranking device *-essen*	Polyfunctional
	Moskona	Gravelle (2010)	‘When’	Generic temporal noun *mona*	Polyfunctional

				Non-generic temporal noun *kus*	Polyfunctional
			‘While’	Generic temporal noun *mona*	Polyfunctional
				Non-generic temporal noun *kus*	Polyfunctional
			‘After’	Sequential coordinator *eda*	Monofunctional
				Verb *okuk* ‘be like’	Polyfunctional
			‘Before’	Verb *okuk* ‘be like’	Polyfunctional
			‘Until’	Free device *jida*	Monofunctional
	Motuna	Onishi (1994)	‘When’	Free device *tii*	Monofunctional
				Generic temporal noun *poti*	Monofunctional
			‘While’	Free device *tiinohno*	Monofunctional
				Restricted deranking device *-juu*	Polyfunctional
			‘After’	Restricted deranking device *-ro*	Monofunctional
				Restricted deranking device *-ku*	Monofunctional
				Sequential coordinator *impa*	Polyfunctional
			‘Before’	Restricted deranking device *-juu*	Polyfunctional
			‘Until’	Sequential coordinator *impa*	Polyfunctional
	Namia	Feldpausch &	‘When’	Correlative pattern formed	Polyfunctional

		Feldpausch 1992)		by *popo e* and *iya*	
			‘While’	Correlative pattern formed by *e* and *iya*	Polyfunctional
			‘After’	Correlative pattern formed by *popo e* and	Polyfunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Free device *e*	Monofunctional
	Oksapmin	Lough (2009)	‘When’	Demonstrative *mox*	Monofunctional
				Bound device *=xe*	Polyfunctional
			‘While’	Verb *=x* ‘to do’	Monofunctional
				Restricted deranking device *-t*	Polyfunctional
			‘After’	Free device *medep*	Monofunctional
				Bound device *=xe*	Polyfunctional
				Verb *mda* ‘to finish’	Monofunctional
			‘Before’	Restricted deranking device *-t*	Polyfunctional
			‘Until’	Asyndesis	NA
	Paiwan	Chang (2006)	‘When’	Free device *ka*	Polyfunctional
				Free device *nu*	Polyfunctional
			‘While’	Free device *ka*	Polyfunctional
			‘After’	Sequential coordinator *sana*	Monofunctional
				Free device *ka*	Polyfunctional
				Free device *nu*	Polyfunctional
			‘Before’	Free device *ka*	Polyfunctional
				Free device *nu*	Polyfunctional
			‘Until’	Asyndesis	NA
	Puyuma	Teng (2008)	‘When’	Free device *an*	Polyfunctional

			‘While’	Free device *an*	Polyfunctional
			‘After’	Noun *LikuDan* ‘behind’	Monofunctional
			‘Before’	Free device *pakanguayan*	Monofunctional
			‘Until’	Verb *palu* ‘to demarcate’	Monofunctional
	Rukai	Zeitoun (2007)	‘When’	Bound device *a-*	Polyfunctional
			‘While’	Bound device *a-*	Polyfunctional
			‘After’	Bound device *a-*	Polyfunctional
				Sequential coordinator *mani*	Monofunctional
			‘Before’	Bound device *a-*	Polyfunctional
			‘Until’	Bound device *maka-*	Monofunctional
	Saaroa	Pan (2012)	‘When’	Free device *maaci*	Polyfunctional
				Free device *akuisa*	Polyfunctional
			‘While’	Free device *akuisa*	Polyfunctional
			‘After’	Asyndesis	NA
			‘Before’	Free device *akuisa*	Polyfunctional
			‘Until’	Verb *iungu* ‘to arrive’	
	Savosavo	Wegener (2008)	‘When’	Free device *kia*	Polyfunctional
				Free device *tuka*	Polyfunctional
			‘While’	Restricted deranking device *-a*	Monofunctional
			‘After’	Sequential coordinator *tulola*	Monofunctional
			‘Before’	Restricted deranking device *-ata*	Monofunctional
			‘Until’	Asyndesis	NA

	Tagalog	Schachter & Otanes (1972)	'When'	Bound device *pag-*	Polyfunctional
				Free device *kapagka*	Polyfunctional
				Non-generic temporal noun *oras*	Monofunctional
			'While'	Free device *haba*	Monofunctional
			'After'	Bound device *pag-*	Polyfunctional
				Verb *matapos* 'to finish'	Monofunctional
			'Before'	Correlative pattern ('first..and then')	Monofunctional
			'Until'	Free device *hanggang*	Monofunctional
	Tetun	van Klinken (1999)	'When'	Non-generic temporal noun *oras*	Polyfunctional
			'While'	Non-generic temporal noun *oras*	Polyfunctional
			'After'	Adverb(ial) *ti'a* 'already'	Monofunctional
				Verb *hotu* 'to finish'	Monofunctional
			'Before'	Correlative pattern ('first..and then')	Monofunctional
			'Until'	Verb *to'o* 'to arrive'	Monofunctional
	Thao	Wang (2004)	'When'	Free device *tu*	Monofunctional
				Free device *ya*	Polyfunctional
			'While'	Asyndesis	NA
			'After'	Sequential coordinator *numa*	Monofunctional
				Free device *ya*	Polyfunctional
			'Before'	Adverb(ial) *niwan* 'not yet'	Monofunctional

			‘Until’	Asyndesis	NA
	Tidore	van Staden (2000)	‘When’	Generic temporal noun *waktu*	Monofunctional
			‘While’	Asyndesis	NA
			‘After’	Sequential coordinator *turus*	Monofunctional
				Sequential coordinator *rasi karehe*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Free device *sido*	Monofunctional
	Tina Sambal	Goschnick & Ramiscal (1979)	‘When’	Free device *topo*	Monofunctional
			‘While’	Free device *lolog*	Monofunctional
			‘After’	Sequential coordinator *bisa*	Polyfunctional
			‘Before’	Sequential coordinator *bisa*	Polyfunctional
			‘Until’	Free device *anggan*	Monofunctional
	Toqabaqita	Lichtenberk (2008)	‘When’	Generic temporal noun *manga*	Polyfunctional
				Verb *laalae* ‘to go’	Polyfunctional
			‘While’	Generic temporal noun *manga*	Polyfunctional
			‘After’	Generic temporal noun *manga*	Polyfunctional
				Verb *sui* ‘to finish’	Monofunctional

			‘Before’	Generic temporal noun *manga*	Polyfunctional
			‘Until’	Asyndesis	NA
	Urim	Hemmilä & Luoma (1987)	‘When’	Generic temporal noun *wang*	Monofunctional
			‘While’	Restricted deranking device *-en*	Monofunctional
			‘After’	Verb *plang* ‘to finish’	Monofunctional
				Sequential coordinator *atom*	Monofunctional
				Sequential coordinator *pa*	Polyfunctional
			‘As soon as’	Adverb(ial) *am* ‘immediately’	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Sequential coordinator *pa*	Polyfunctional
	West Coast Bajau	Miller (2007)	‘When’	Free device *paga*	Monofunctional
				Generic temporal noun *waktu*	Monofunctional
				Verb *teko* ‘to arrive’	Monofunctional
			‘While’	Free device *sambil*	Monofunctional
			‘After’	Free device *lapas*	Monofunctional
				Sequential coordinator *bo*	Monofunctional
			‘Before’	Adverb(ial) *nya’ lagi* ‘not yet’	Monofunctional
			‘Until’	Free device *sampay*	Monofunctional
	Wooi	Sawaki (2017)	‘When’	Non-generic temporal noun *ha*	Polyfunctional

			‘While’	Non-generic temporal noun *ha*	Polyfunctional
			‘After’	Sequential coordinator *marainteri*	Monofunctional
			‘Before’	Asyndesis	NA
			‘Until’	Free device *rao*	Monofunctional
	Yimas	Foley (1991)	‘When’	Restricted deranking device *-nan*	Polyfunctional
			‘While’	Restricted deranking device *-nan*	Polyfunctional
			‘After’	Restricted deranking device *-laa*	Monofunctional
				Sequential coordinator *mnta*	Polyfunctional
				Restricted deranking device *-nan*	Polyfunctional
			‘Before’	Free device *kaŋkran*	Monofunctional
			‘Until’	Sequential coordinator *mnta*	Polyfunctional
South America	Aguaruna	Overall (2009) Overall (2017)	‘When’	Restricted deranking device *-a*	Polyfunctional
				Restricted deranking device *-ku*	Polyfunctional
			‘While’	Restricted deranking device *-ku*	Polyfunctional
				Restricted deranking device *-kawa*	Polyfunctional
				Restricted deranking device *-ma*	Monofunctional

				Restricted deranking device - *tatamana*	Monofunctional
			‘After’	Restricted deranking device -*a*	Polyfunctional
			‘Before’	Restricted deranking device -*ku*	Polyfunctional
				Restricted deranking device -*takama* (frustrative marker)	Polyfunctional
			‘Until’	Verb *tu* ‘to say’ (speech report construction)	Polyfunctional
	Alto Perené	Mihas (2015)	‘When’	Free device *arika*	Polyfunctional
				Bound device *=ra*	Polyfunctional
			‘While’	Verb *kaNt* ‘to happen’	Polyfunctional
			‘After’	Verb *kaNt* ‘to happen’	Polyfunctional
				Sequential coordinator *ponya*	Monofunctional
			‘Before’	Adverb(ial) *tekira* ‘not yet’	Monofunctional
				Free device *irohatzi*	Polyfunctional
			‘Until’	Free device *irohatzi*	Polyfunctional
	Apinajé	Cunha de Oliveira (2005)	‘When’	Free device *ri*	Polyfunctional
			‘While’	Noun *kutep* ‘stead’	Monofunctional
			‘After’	Free device *ri*	Polyfunctional
			‘Before’	Free device *ri*	Polyfunctional
			‘Until’	Free device *ga*	Monofunctional

	Baure	Danielsen (2007)	‘When’	Restricted deranking device *-ro*	Polyfunctional
			‘While’	Restricted deranking device *-ro*	Polyfunctional
			‘After’	Asyndesis	NA
				Restricted deranking device *-wana*	Polyfunctional
			‘Before’	Restricted deranking device *-wana*	Polyfunctional
				Free device *moena’*	Polyfunctional
			‘Until’	Verb *iskon* ‘to go’	Monofunctional
	Cavineña	Guillaume (2008)	‘When’	Restricted deranking device *-(a)tsu*	Polyfunctional
				Bound device *=ju*	Polyfunctional
			‘While’	Bound device *=ju*	Polyfunctional
			‘After’	Restricted deranking device *-(a)tsu*	Polyfunctional
				Bound device *=ju*	Polyfunctional
			‘Before’	Bound device *-wie*	Monofunctional
			‘Until’	Bound device *=tupu*	Monofunctional
	Cholón	Alexander-Bakkerus (2005)	‘When’	Restricted deranking device *-te*	Monofunctional
			‘While’	Restricted deranking device *-he*	Monofunctional
			‘After’	Restricted deranking device *-nap*	Polyfunctional
			‘Before’	Restricted deranking device *-nap*	Polyfunctional

			‘Until’	Restricted deranking device *-le*	Monofunctional
	Cubeo	Morse & Maxwell (1999)	‘When’	Restricted deranking device *-ere*	Monofunctional
			‘While’	Restricted deranking device *-ereka*	Monofunctional
			‘After’	Restricted deranking device *-buru*	Monofunctional
			‘Before’	Restricted deranking device *-kije*	Monofunctional
			‘Until’	Free device *pi*	Monofunctional
	Epena Pedee	Harms (1994)	‘When’	Restricted deranking device *-kari*	Monofunctional
				Restricted deranking device *-de*	Monofunctional
			‘While’	Free device *misa*	Monofunctional
				Restricted deranking device *-a*	Polyfunctional
			‘After’	Restricted deranking device *-peda*	Monofunctional
			‘As soon as’	Restricted deranking device *-ta*	Monofunctional
			‘Before’	Restricted deranking device *-weda*	Monofunctional
			‘Until’	Restricted deranking device *-a*	Polyfunctional
	Garifuna	Quesada (2017)	‘When’	Free device *dan le*	Monofunctional
			‘While’	Free device *lidan*	Monofunctional
			‘After’	Sequential coordinator *aban*	Monofunctional

			‘Before’	Free device *lubaragiñe*	Monofunctional
			‘Unti’	Free device *dari*	Monofunctional
	Huitoto	Wojtylak (2020)	‘When’	Generic temporal noun *fakai*	Monofunctional
			‘While’	Restricted deranking device *-mo*	Monofunctional
			‘After’	Restricted deranking device *-no*	Monofunctional
				Restricted deranking device *-mona*	Monofunctional
			‘As soon as’	Restricted deranking device *-da*	Monofunctional
			‘Before’	Noun *uieko* ‘face’	Monofunctional
			‘Until’	Asyndesis	NA
	Hup	Epps (2008)	‘When’	Restricted deranking device *-kamí*	Monofunctional
				Restricted deranking device *-Vt*	Polyfunctional
			‘While’	Restricted deranking device *-Vp*	Polyfunctional
				Restricted deranking device *-mɨ̌ʔ*	Polyfunctional
			‘After’	Restricted deranking device *-yóʔ*	Monofunctional
			‘Before’	Noun *kótʔah* ‘front’	Monofunctional
			‘Until’	Free device *te*	Monofunctional
	Iquito	Michael (2009)	‘When’	Free device *jɨ̈ticari*	Polyfunctional
				Non-generic temporal noun *iyácari*	Polyfunctional

			‘While’	Non-generic temporal noun *iyácari*	Polyfunctional
			‘After’	Sequential coordinator *jahuáari*	Monofunctional
				Sequential coordinator *atií*	Monofunctional
				Sequential coordinator *atiíjí*	Monofunctional
				Bound device *=cánihuaaca*	Monofunctional
			‘As soon as’	Bound device *-ícuaji*	Monofunctional
			‘Before’	Bound device *=ácuji*	Monofunctional
			‘Until’	Non-generic temporal noun *iyácari*	Polyfunctional
	Kakua	Bolaños (2016)	‘When’	Free device *pũniʔ*	Polyfunctional
			‘While’	Free device *pũniʔ*	Polyfunctional
			‘After’	Verb *pêa* ‘to finish’	Monofunctional
				Sequential coordinator *ŧ̶itimaʔ*	Monofunctional
			‘Before’	Free device *ŧ̶ŧ*	Monofunctional
			‘Until’	Free device *pɨ̶*	Monofunctional
	Kokama Kokamilla	Vallejos (2016)	‘When’	Restricted deranking device *-puka*	Polyfunctional
			‘While’	Restricted deranking device *-puka*	Polyfunctional
				Restricted deranking device *-ri* plus *utsu=ut* ‘AUX-PST’	Monofunctional
			‘After’	Restricted deranking device *-npu*	Monofunctional

				Sequential coordinator *raepetsui*	Monofunctional
			‘Before’	Free device *anan*	Monofunctional
			‘Until’	Free device *hasta*	Monofunctional
	Kwaza	van der Voort (2004)	‘When’	Restricted deranking device *-wy*	Polyfunctional
			‘While’	Verb *hedy* ‘to mix, to put in’	Polyfunctional
				Restricted deranking device *-lete*	Polyfunctional
				Restricted deranking device *-tja*	Polyfunctional
			‘After’	Sequential coordinator *tana*	Monofunctional
			‘As soon as’	Verb *hedy* ‘to mix, to put in’	Polyfunctional
			‘Before’	Restricted deranking device *-wy*	Polyfunctional
			‘Until’	Restricted deranking device *-tja*	Polyfunctional
	Macushi	Abbott (1991)	‘When’	Free device *ya*	Polyfunctional
			‘While’	Free device *yai*	Polyfunctional
			‘After’	Free device *tîpo*	Monofunctional
			‘Before’	Free device *rawîrî*	Monofunctional
			‘Until’	Free device *tîpose*	Monofunctional
	Mako	Rosés Labrada (2015)	‘When’	Restricted deranking device *-ena*	Polyfunctional
			‘While’	Restricted deranking device *-ɨ*	Polyfunctional

			‘After’	Restricted deranking device -*ɨ*	Polyfunctional
				Restricted deranking device -*ah*	Monofunctional
				Verb *kabatɨ* ‘to finish’	Monofunctional
			‘Before’	Restricted deranking device -*akʷ*	Monofunctional
			‘Until’	Free device *baiban*	Monofunctional
	Mamaindé	Eberhard (2009)	‘When’	Restricted deranking device -*kʰatoʔ*	Polyfunctional
				Restricted deranking device -*hɰ̃ʔ*	Polyfunctional
			‘While’	Restricted deranking device -*taku*	Monofunctional
			‘After’	Restricted deranking device -*kʰatoʔ*	Polyfunctional
				Restricted deranking device -*hɰ̃ʔ*	Polyfunctional
			‘Before’	Restricted deranking device -*tãnʔ*	Monofunctional
			‘Until’	Restricted deranking device -*kʰatoʔ*	Polyfunctional
	Mapuche	Smeets (2008)	‘When’	Restricted deranking device -*lu*	Polyfunctional
			‘While’	Restricted deranking device -*n*	Polyfunctional
			‘After’	Sequential coordinator *fey*	Monofunctional
				Sequential coordinator *wula*	Polyfunctional

			‘Before’	Restricted deranking device *-n*	Polyfunctional
			‘Until’	Sequential coordinator *wula*	Polyfunctional
	Matsés	Fleck (2003)	‘When’	Restricted deranking device *-sho*	Polyfunctional
				Restricted deranking device *-ac*	Polyfunctional
			‘While’	Restricted deranking device *-ec*	Polyfunctional
				Restricted deranking device *-quin*	Polyfunctional
				Restricted deranking device *-nuc*	Polyfunctional
			‘After’	Restricted deranking device *-ash*	Polyfunctional
				Restricted deranking device *-shun*	Polyfunctional
				Restricted deranking device *-tanec*	Polyfunctional
			‘Before’	Restricted deranking device *-teno*	Monofunctional
			‘Until’	Restricted deranking device *-nuk*	Monofunctional
	Mosetén	Sakel (2002)	‘When’	Bound device *=ya’*	Monofunctional
				Verb *ji* ‘to pass’	Polyfunctional
			‘While’	Restricted deranking device *-tom*	Monofunctional
			‘After’	Sequential coordinator *ish*	Monofunctional

			‘Before’	Free device *poroma*	Monofunctional
			‘Until’	Free device *ashta*	Monofunctional
	Movima	Haude (2006)	‘When’	Article *nos*	Polyfunctional
			‘While’	Article *nos*	Polyfunctional
			‘After’	Sequential coordinator *jayle*	Monofunctional
			‘Before’	Adverb(ial) *mo:* ‘not yet’	Monofunctional
			‘Until’	Verb *ka’de* ‘to end’	Monofunctional
	Paez	Gerdel & Slocum (1976)	‘When’	Restricted deranking device - *pcachja*	Polyfunctional
			‘While’	Restricted deranking device -*iin*	Monofunctional
				Restricted deranking device -*ynu*	Monofunctional
				Restricted deranking device - *pcachja*	Polyfunctional
			‘After’	Restricted deranking device -*ju*	Monofunctional
			‘As soon as’	Restricted deranking device - *pcachja*	Polyfunctional
			‘Before’	Adverb(ial) *yna* ‘not yet’	Monofunctional
			‘Until’	Restricted deranking device -*pcach*	Monofunctional
	Paresi	Barros Brandão (2014)	‘When’	Restricted deranking device -*natse*	Polyfunctional
			‘While’	Restricted deranking device -*natse*	Polyfunctional

			‘After’	Free device *natxikini*	Monofunctional
			‘Before’	Free device *hetati*	Monofunctional
			‘Until’	Free device *kitxia*	Monofunctional
	Paumarí	Chapman & Derbyshire (1991)	‘When’	Free device *kamahini*	Monofunctional
			‘While’	Free device *kaba’i*	Polyfunctional
			‘After’	Asyndesis	NA
				Free device *naothinia*	Monofunctional
			‘Before’	Free device *viahani*	Monofunctional
			‘Until’	Free device *oadani*	Monofunctional
	Piro	Hanson (2010)	‘When’	General deranking device *-ini*	NA
			‘While’	General deranking device *-ini*	NA
			‘After’	General deranking device *-ini*	NA
			‘Before’	General deranking device *-ini*	NA
			‘Until’	General deranking device *-ini*	NA
	Sanuma	Borgman (1990)	‘When’	Free device *tehe*	Polyfunctional
				Free device *ha*	Polyfunctional
			‘While’	Free device *pa*	Monofunctional
			‘After’	Restricted deranking device *-no*	Monofunctional
				Free device *tehe*	Polyfunctional
				Free device *ha*	Polyfunctional
			‘Before’	Free device *pai*	Monofunctional
			‘Until’	Asyndesis	NA

	Tariana	Aikhenvald (2003)	'When'	Restricted deranking device *-kariku*	Polyfunctional
				Free device *mañ*a	Polyfunctional
			'While'	Restricted deranking device *-nikhe*	Monofunctional
				Restricted deranking device *-nisawa*	Monofunctional
			'After'	Restricted deranking device *-hyume*	Polyfunctional
				Restricted deranking device *-kayami*	Monofunctional
			'As soon as'	Restricted deranking device *-se*	Monofunctional
			'Before'	Restricted deranking device *-peya*	Monofunctional
			'Until'	Free device *te*	Monofunctional
	Trumai	Guirardello (1999)	'When'	Restricted deranking device *-s*	Polyfunctional
				Restricted deranking device *-tl*	Monofunctional
			'While'	Free device *tam*	Polyfunctional
			'After'	Restricted deranking device *-s*	Polyfunctional
				Free device *t'atske*	Monofunctional
				Sequential coordinator *inis*	Polyfunctional
			'Before'	Noun *hukki* 'front'	Monofunctional
			'Until'	Sequential coordinator *inis*	Polyfunctional

	Urarina	Olawsky (2006)	‘When’	Bound device *=ne*	Polyfunctional
				Free device *hana*	Monofunctional
			‘While’	Free device *tonoana*	Monofunctional
				Free device *najnia*	Polyfunctional
				Restricted deranking device *-i*	Polyfunctional
			‘After’	Free device *baja*	Monofunctional
				Restricted deranking device *-i*	Polyfunctional
			‘Before’	Free device *ahinia*	Monofunctional
			‘Until’	Free device *rẽetiaĩ*	Monofunctional
	Yagua	Payne (1985)	‘When’	Free device *numaatiy*	Polyfunctional
			‘While’	Free device *numaatiy*	Polyfunctional
			‘After’	Sequential coordinator *várityiy*	Monofunctional
			‘Before’	Free device *néétimyúy*	Monofunctional
			‘Until’	Free device *sąąrájų*	Monofunctional
	Yauyos Quechua	Shimelman (2017)	‘When’	Restricted deranking device *-pti*	Polyfunctional
			‘While’	Restricted deranking device *-shpa*	Polyfunctional
				Restricted deranking device *-shtin*	Monofunctional
				Restricted deranking device *-kaman*	Polyfunctional
			‘After’	Restricted deranking device *-shpa*	Polyfunctional

				Restricted deranking device *-pti*	Polyfunctional
				Bound device *-taq*	Monofunctional
			‘Before’	Correlative pattern (‘first..and then’)	Monofunctional
			‘Until’	Restricted deranking device *-kaman*	Polyfunctional
	Yurakaré	van Gijn (2006)	‘When’	Bound device *=ja*	Polyfunctional
				Bound device *=ya*	Polyfunctional
			‘While’	Bound device *=ja*	Polyfunctional
			‘After’	Bound device *=jsha*	Monofunctional
				Sequential coordinator *latikjsha*	Monofunctional
			‘Before’	Bound device *=ja*	Polyfunctional
				Bound device *=ya*	Polyfunctional
			‘Until’	Asyndesis	NA

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