UNIVERSITY OF CALIFORNIA, SAN DIEGO

An Experimental Approach to Variation and Variability in Constituent Order

A dissertation submitted in partial satisfaction of the
requirements for the degree
Doctor of Philosophy

in

Linguistics

by

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The dissertation of Savithry Namboodiripad is approved, and it is acceptable in quality and form for publication on micro-film and electronically:

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Chair

University of California, San Diego

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DEDICATION

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EPIGRAPH

(1) kaɳɖuː ɲaːn siːʈeː
     saw   I   Sita.ACC
     VERB SUBJECT OBJECT

     'I *saw* Sita'

<div align="right">

Hanuman to Raman, needing to emphasize that he saw Sita

The Ramayana (Malayalam translation)

</div>

"borrowing (or diffusion, or calquing) of grammar in language contact is not a unitary mechanism of language change. Rather, it is a condition – or an externally motivated situation – under which the above three mechanisms [reanalysis, reinterpretation (or extension) and grammaticalization] can apply in an orderly and systematic way. The status of categories in the languages in contact is what determines the choice of a mechanism [...]".

<div align="right">

Aikhenvald (2003)

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ABSTRACT OF THE DISSERTATION

An Experimental Approach to Variation and Variability in Constituent Order

by

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Professor Grant Goodall, Chair

What does it mean for a language to have flexible constituent order, and what are
the sources of variation in this domain, both within and across languages? This thesis
addresses these questions by combining methods from traditional linguistic fieldwork
with those from psycholinguistics, focusing on Malayalam (Dravidian), in which all
six permutations of subject, object, and verb are grammatical and have the same truth-
conditional meaning. I propose a novel operational measure of flexibility in constituent
order which uses formal acceptability judgment experiments: a greater preference for
canonical versus non-canonical orders is associated with decreased flexibility. I demon-
strate the cross-linguistic validity of this measure by comparing English and Malayalam

(Experiments 1 and 2). After considering in more detail the relationship between information structure and constituent order in Malayalam (Experiment 3), I show that formal acceptability experiments can measure variation in flexibility within Malayalam, with older participants exhibiting greater flexibility than younger participants (Experiment 4). I consider language contact as a potential source of this variation, and conclude with a discussion of the role of flexibility in contact-induced syntactic change. The approach proposed in this thesis not only allows for an enriched typology of constituent order, it also has implications for our understanding of how languages interact and change.

Chapter 1

Introduction

The main contribution of this thesis is introduced in Chapter 2: I propose a novel approach to studying constituent order, using formal acceptability experiments as an operational measure of flexibility. I demonstrate the utility of this approach as a descriptor of variation across and within languages, and consider how a gradient approach to flexibility can enrich models of variation in constituent order and contact-induced change. This introduction provides a summary of the major findings of this thesis, highlighting important terminology and theoretical assumptions along the way. The work presented here is a starting point towards two larger goals: the construction of a taxonomy of flexibility in constituent order and a cognitively motivated model of contact-induced syntactic change.

1.1   Establishing the empirical domain

I establish the empirical domain of this thesis by discussing the title, specifically the terms CONSTITUENT, VARIABILITY, and VARIATION.

The empirical domain of this thesis is the order of the major clausal constituents in a language: SUBJECT, OBJECT, and VERB, as opposed to word order (e.g., Dunn et

al. 2011). Much of the experimental work on constituent order focuses on the order of arguments, and indirect objects are also often included; however, I limit myself to subjects, objects, and verbs. This means that I focus on transitive verbs, and do not account for ditransitives, copulas, applicative constructions, etc. I limit myself to declarative sentences in which the verb form and any case-marking stay the same across orders, though intonation might vary: for example, a change in order is associated with passive constructions in English, but, as passive sentences are different semantically and morphologically, I do not consider this to be a variant of SVO order.

Constituent order can be a variable property in a language; by variable I mean that multiple orders are often possible, and this variability is usually licensed in some manner (typically by discourse context), and I do not consider purported cases of random variability. By variation, I mean a difference in an empirical domain, here, constituent order, within and across languages and language varieties. For example, languages vary as to what the canonical (discourse-neutral) order of major constituents is, and some of these languages have variable constituent order – that is, they have multiple grammatical orders. Variability occurs within a language, language variety, speech community, or individual, and variation occurs across individuals and groups.

1.2   Flexibility as a gradient property

The existence of gradience in syntax is not uncontroversial. In most usual approaches to variability in a syntactic domain, a construction was either used or it was not: language has *wh*-fronting always, sometimes (licensed in some way), or never. Traditionally, typological accounts of variable constituent order have asked questions which presuppose that languages differ in a categorical manner: configurational versus non-configurational, syntactically determined versus pragmatically determined, positional

versus morphological. However, many researchers who have studied this phenomenon in detail have observed that this division does not seem sufficient. Taking just two examples, Salzmann (2004) says "It should have become clear that non-configurationality is not a uniform phenomenon, ranging from rather superficial to deep non-asymmetries between subject and object" and Hale (1983) states "many languages present mixed testimony in the extent to which they exhibit the superficial characteristics of non-configurational languages."

Chapter 2 addresses this issue in a different way, identifying flexibility as the degree to which speakers find non-canonical orders acceptable as compared to canonical orders, and arguing that flexibility must be investigated in its own right as an empirical domain which exhibits considerable cross-linguistic variation. I propose a cross-linguistically valid operational measure of flexibility based on formal acceptability judgment experiments and demonstrate the utility of this measure by comparing two languages which are known to differ in this domain: English (Experiment 1) and Malayalam (Experiment 2). I define decreased flexibility as a greater preference for canonical as opposed to non-canonical orders, and I discuss the possibility that flexibility should be considered a property which varies in a gradient manner across languages.

Using acceptability experiments, which produce gradient results, to measure flexibility does away with the necessity for putting languages into unsatisfyingly heterogeneous categories, while still capturing a relevant dimension along which they differ. A gradient measure allows the data to reveal whether the variation in this domain is gradient or categorical, while asking categorical questions from the outset does not allow for the possibility of a gradient outcome.

1.3   Discourse and (non)canonical orders

Chapter 3 considers the status of canonical and non-canonical orders in Malayalam, providing a set of criteria to diagnose canonical order in highly flexible languages and digging deeper into the functions associated with non-canonical orders. The results of a forced choice experiment in which participants chose between three grammatical orders given a particular discourse context confirms that SOV is the canonical order in Malayalam: no matter the discourse context, SOV is always the most chosen order (Experiment 3). In addition, I compare the results of the forced choice experiment and the gradient (discourse-context-free) acceptability results, showing that these methodologies yield compatible results, with the major difference being a higher preference for SOV when participants are overtly comparing between orders.

1.4   Within-language variation in Malayalam constituent order

Chapter 4 investigates inter-speaker variation in constituent order. The results of Experiment 4 show that younger speakers of Malayalam exhibit reduced flexibility in constituent order as compared to older speakers. I discuss possible sources of this pattern, including cognitive decline, language experience, and language contact and consider implications for applying the apparent-time construct to psycholinguistic data, and discuss the possibility that constituent order is a sociolinguistic variable.

1.5   Flexibility and contact-induced change

This final chapter is a conclusion, and briefly explores some implications of a gradient operational measure of flexibility. I discuss contact effects broadly, distinguishing between borrowing or interaction between grammars which would produce language-specific outcomes from indirect effects of language contact, which should produce the same results no matter the languages in contact, given a similar contact situation. Languages do not come into contact: speakers come into contact with each other, and their language systems coexist in a brain which has limitations on processing and acquisition. I discuss possible connections between societal structure and language structure, drawing on a view of language contact as a complex system with multiple interacting factors. Taking such a view, isolating one variable or another is not explanatory, rather, studying the ways in which variables interact is more informative about how languages change due to contact.

Chapter 2

Cross-linguistic variation in flexible constituent order

Major constituent order, the relative ordering of SUBJECT, OBJECT, and VERB, is among the most well-researched areas in syntactic typology. The canonical (discourse-neutral, intonationally unmarked, basic) constituent order is often the first entry in the "Syntax" section of a language's grammar, making constituent order a natural entry point for the linguist interested in typological comparisons. As such, there is a long history of inquiry from multiple theoretical and methodological perspectives into the sources of cross-linguistic variation when it comes to canonical constituent order (Hall 2012, Sinnemäki 2011, Dryer 2007). From a descriptive standpoint, the World Atlas of Language Structures (WALS) divides all languages into groups based on the "dominant" order, which is the most frequent ordering of constituents in declarative transitive sentences which have overt non-pronominal arguments[1] (Dryer 2013). This divides the world's languages into eight groups: one group for each of the six logical orderings of constituents (SOV, OSV, SVO, OVS, VSO, VOS), one for languages which have two dominant orders,

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[1]The difference between dominant and canonical will be discussed in the following section; canonical as I use it here is not the same as "underlying order" as it is used in the generative tradition.

and one for languages which have been described as having no dominant order. Table 2.1 provides a summary of this.

Table 2.1: Languages divided by dominant order

GROUP	NUMBER OF LANGUAGES
SOV	565
OSV	4
SVO	488
OVS	11
VSO	95
VOS	25
TWO DOMINANT ORDERS	67
NO DOMINANT ORDER	189

Of course, dominant order is but one way to divide the world's languages by their constituent order systems: another dimension along which languages differ is FLEXIBILITY, which has been described as the number of non-canonical orders which are grammatical in a language (Siewierska & Uhlirova 1998), but, on an intuitive level, translates to the degree to which non-canonical orders are used. The distributions of languages reflected in Table 2.1, which is widely used as a descriptive starting point for work on constituent order, was not intended to capture this. For example, both English and Russian are members of the 488 SVO languages, and so are in the same category in Table 2.1.

However, Russian allows all of the six logical orderings of constituents in its grammar, and uses non-canonical orders very often. In English, on the other hand, only two of the six logical orderings of constituents are grammatical and have the same truth-conditional meaning (SVO and OSV, in some limited contexts). Meanwhile, Warlpiri has been claimed not to have a dominant order[2], and belongs to the group of 189 languages which have no dominant order in Dryer's typology. In terms of flexibility, is Russian more like English or Warlpiri?

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[2]Though this does not rule out that it has canonical order.

Here, I argue that flexibility must be investigated in its own right as an empirical domain which exhibits considerable cross-linguistic variation. This chapter does just that by proposing a cross-linguistically valid operational measure of flexibility based on formal acceptability judgment experiments and demonstrating the utility of this measure by comparing two languages which are known to differ in this domain: English and Malayalam (Dravidian). Along the way, I discuss the possibility that flexibility can be considered to be a property which varies in a gradient manner across languages, putting languages like English, Russian, and Warlpiri at different points along the same cline.

2.1   Operationalizing flexibility: defining the question

Based on extant methodological and theoretical tools, the criteria by which one diagnoses a particular language as being more or less flexible than another is relatively subjective. The number of grammatical orders can be determined, as well as the discourse contexts which license felicitous and/or grammatical use of non-canonical orders. So, languages like English and French, which only have one or two non-canonical grammatical orderings of constituents, seem less flexible than languages like Korean or Meskwaki, in which all six logical orders of SUBJECT, OBJECT, and VERB are grammatical and have the same truth-conditional meaning. The degree to which discourse context determines choice of constituent order varies cross-linguistically as well, and some languages like Bardi seem to be more permissive of the number of orders which are allowed in a particular discourse context than Tamil, in which non-verb-final orders are highly restricted[3].

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[3]Case-marking often is cited facilitating or allowing flexibility, but I argue that we need a separate notion of flexibility from case. There are many counter-examples to the relationship between overt case-marking and flexibility: Icelandic has case-marking but rigid order (Kiparsky 1996) and Lao is a "radically isolating language" which allows for flexible order (Enfield 2009, also Gil 2005 for Riau Indonesian). While there may be some type of relationship between case-marking and flexibility, one does not entail the other, and having a separate notion of flexibility is necessary to know more about what the nature of that relationship is.

Obviously the details for each language vary in terms of the syntactic structures and operations associated with each order. However, this approach seeks to abstract away from theoretical constructs as much as possible in service of cross-linguistic comparison.

In order to specify the intuitions which underlie the categorization of a language as being FLEXIBLE or RIGID, consider the following questions:

- Which orders are possible?

- How good are these orders in relation to one another?

The extent to which a language is reliant on a particular order is intuitively related to its flexibility; the more a language relies on a particular order, the more rigid it is; this is another way of describing what people are paying attention to when they say that English is more rigid than Japanese. In languages with multiple grammatical orders, non-canonical orders are associated with different discourse contexts and syntactic representations. There are languages, like Korean, which allow all six logical orders in their grammar, but maybe two of those orders are very peripheral for speakers. This should be distinguished from languages where all orders have a similar status (like Latin) or only one non-canonical order is ever used (like English).

The second question, which asks "how good" about these orders represents a crucial aspect of this approach: moving from assuming categorical variation toward a gradient view by allowing languages to vary along a continuum of flexibility, as opposed to putting a language in the category FLEXIBLE or RIGID – or even MOST-FLEXIBLE, MEDIUM-FLEXIBLE, NOT-FLEXIBLE[4]. The advantage to starting with the assumption of gradience *a priori* is that we can let the data tell us whether or not languages vary along a continuum from more to less flexible; it could very well be that languages *do* fall into

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[4]That said, I will sometimes use the terms "flexible" and "rigid" as shorthand in this thesis; these terms should be interpreted as indicating relative (in)flexibility.

two or three categories, but asking categorical questions from the outset does not allow for the alternative to be true.

2.2 Formal acceptability judgment experiments as a measure of flexibility

In this section, I motivate formal acceptability judgment experiments as a measure of flexibility which can answer the question "how good are these orders in relation to one another?". I do this by using two languages which are known to differ in their degree of flexibility: English and Malayalam. The canonical order is SVO in English and SOV in Malayalam. However, while OSV order is the only grammatical non-canonical order in English (2) all of the six logical orders are grammatical and have the same truth-conditional meaning in Malayalam, as shown in (16):

(2) READ ⟨Leela, book⟩

   a. * Leela a book read

     S O V

   b. A book Leela read

     O S V

   c. Leela read a book

     S V O, canonical

   d. * a book read Leela

     O V S

   e. * read Leela a book

     V S O

   f. * read a book Leela

     V O S

(3) READ ⟨Leela, book⟩

   a. liːla oɾu pusʈakam ʋaːjicu
     Leela a book read
     S O V, canonical

   b. oɾu pusʈakam liːla ʋaːjicu
     a book Leela read
     O S V

   c. liːla ʋaːjicu oɾu pusʈakam
     Leela read a book
     S V O

   d. oɾu pusʈakam ʋaːjicu liːla
     a book read Leela
     O V S

   e. ʋaːjicu liːla oɾu pusʈakam
     read Leela a book
     V S O

   f. ʋaːjicu oɾu pusʈakam liːla
     read a book Leela
     V O S

Each sentence in (16) is well-formed and has the same propositional content; the arguments have the same semantic role in each sentence, and all of these orders are attested in speech (Leela 2016, Mohanan 1982).

Non-canonical constituent orders are usually associated with different syntactic representations than canonical orders are, and, in many syntactic theories, these representations include dependencies analogous to long-distance dependencies, which are well-studied and have been shown to result in reduced acceptability (Cowart 1997) and increased processing difficulty (Kluender & Kutas 1993). If non-canonical orders indeed contain long-distance dependencies or dependencies which result in a similar behavioral outcome, we would expect similar lowering of acceptability and increased processing difficulty associated with these orders. In fact, psycholinguistic measures have consistently

shown that speakers incur some amount of processing difficulty or reduced acceptability associated with non-canonical orders (Kwon et al. 2013 in Korean, Kaiser & Trueswell 2004 in Finnish, Miyamoto & Takahashi 2001 in Japanese).

Not only are there detectable differences between canonical and non-canonical orders, formal acceptability experiments can detect differences between non-canonical orders. Weskott & Fanselow (2012) find a relationship between what they called markedness and acceptability, with increased markedness resulting in decreased relative acceptability. They compare two sets of sentences which differed only in the order of arguments in the embedded clause: SUBJECT-OBJECT versus OBJECT-SUBJECT order and SUBJECT-INDIRECT OBJECT versus INDIRECT OBJECT-SUBJECT order. Example stimuli from their paper are listed in (4) and (5):

(4) Peter has reported that the president has received the sheik.

    a. Peter hat erzählt, dass der   Präsident den   Scheich empfangen hat
        Peter has reported that the$_{\text{NOM}}$ president the$_{\text{ACC}}$ sheik   received   has
        canonical order

    b. Peter hat erzählt, dass den   Scheich der   Präsident empfangen hat
        Peter has reported that the$_{\text{ACC}}$ sheik   the$_{\text{NOM}}$ president received   has
        non-canonical order

(5) Peter has reported that the monk has helped the hunter.

    a. Peter hat erzählt, dass der   Mönch dem   Jäger geholfen hat
        Peter has reported that the$_{\text{NOM}}$ monk   the$_{\text{DAT}}$ hunter helped   has
        canonical order

    b. Peter hat erzählt, dass dem   Jäger der   Mönch geholfen hat
        Peter has reported that the$_{\text{DAT}}$ hunter the$_{\text{NOM}}$ monk   received has
        non-canonical order

The (a) sentences have the canonical order of arguments in a German embedded clause, SOV, while the (b) sentences have non-canonical orders, OSV and IOSV. All of these

sentences are grammatical, but the non-canonical orders are expected to be less acceptable than the canonical orders. In addition, the INDIRECT OBJECT-SUBJECT order is claimed to be less marked than the OBJECT-SUBJECT order. As such, if acceptability can yield gradient results and distinguish between different grammatical non-canonical orders, the difference in acceptability between the sentences in (4) should be greater than the difference in acceptability between the sentences in (5).

Participants rated the acceptability of sentences using a 1-7 scale[5] and asked to rate how acceptable these sentences were. On average, the non-canonical orders were always judged to be less acceptable than the canonical orders. In addition, the difference between the canonical and non-canonical orders in (4) was greater than the difference between the canonical and non-canonical orders in (5), showing that acceptability can capture the relative markedness of grammatical constructions. This is the very property which we want in a measure of flexibility in constituent order: a measure which can capture meaningful differences between grammatical sentences in a language.

So, non-canonical grammatical orders should result in lowered acceptability, and lowered acceptability should correspond to some measure of syntactic or discourse-level complexity. Going back to the intuitive description of flexibility, languages in which orders seem interchangeable "feel" more flexible than languages in which this is not the case: languages in which more orders are grammatical and relatively acceptable are associated with increased flexibility. As such, we expect different results for Malayalam and English.

Flexibility is associated with languages which have more grammatical orders, and, via informal methods, those grammatical orders seem to be relatively acceptable. As such, we expect the difference in acceptability between orders to be smaller in

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[5]The goal of this paper was to compare three different measures of acceptability: 1-7 scales, binary judgments, and magnitude estimation; I focus on the 1-7 scale because that is the method I use in these experiments. However, the pattern of results was the same for all methods.

flexible languages as opposed to those which have been described as being rigid. So, we expect English, a "rigid" language, to have a big difference between canonical and non-canonical orders, and Malayalam, a flexible language, to have a relatively small difference. Experiments 1 and 2 test this prediction in English and Malayalam respectively.

2.3   Experiment 1: English constituent order

The rigid nature of English constituent order is well-known. Each of the six logical constituent orders falls into one of three categories in English: canonical (SVO), grammatical but non-canonical (OSV), and ungrammatical (SOV, VSO, VOS). As such, English is a good language to serve as a model of how the results of a formal acceptability judgment experiment should correspond with existing descriptions and accounts of constituent order in a language.

Under the assumption that non-canonical grammatical orders have the same type of dependency as other types of long-distance movement, we expect that non-canonical grammatical orders should result in the same lowering of acceptability as has been observed in a long line of work, starting with Cowart (1997). The examples below show a canonical SVO sentence and a topicalized OSV sentence in English:

(6)　　a.　I like those trees.

　　　　b.　[Those trees]$_i$ [I like t_i]

Structurally speaking, these two sentences differ in that (b) has a dependency and (a) does not. Work on long-distance dependencies in English and non-canonical argument orders in a variety of other languages (Korean, German, Finnish, etc.) has shown consistently that non-canonical constituent orders and/or constructions with syntactic dependencies of this type are less acceptable than their canonical counterparts. So, English sentences in SVO order should be more acceptable than sentences in OSV order.

Syntactic dependencies are not the only potential source of lowered acceptability, however. Non-canonical orders are associated with particular discourse functions, and it might be that non-canonical orders are not acceptable outside of the proper discourse context. As such, comparing English OSV with ungrammatical orders like VSO and VOS is crucial to know whether this measure is fine-grained enough to distinguish between non-canonical orders outside of the proper discourse context and ungrammatical orders in a language.

The distinctions between canonical, non-canonical, and ungrammatical orders in English are salient enough to be observed using informal methods. In order to test whether formal acceptability judgment experiments are properly sensitive as a measure of flexibility, the results must show distinctions between these three sentences types in the predicted direction, with canonical SVO having the highest acceptability, followed by non-canonical but grammatical OSV, and SOV, OVS, VSO, and VOS having the lowest acceptability.

2.3.1 Methods

Materials

Experimental stimuli consisted of animate subjects, inanimate objects, and transitive verbs. Arguments had indefinite articles; this was chosen for consistency across conditions, in order to avoid a potential confound of definiteness and order. Participants saw five items from each of the six conditions (SOV, OSV, SVO, OVS, VSO, VOS), for a total of 30 experimental items. Six lexicalization sets were created, and items were counterbalanced and distributed among six lists using a Latin Square. There were 56 fillers of varying acceptability, 24 of which were part of a sub-experiment on D-linking.

The sentences above fall into three distinct categories: canonical (SVO), grammatical but non-canonical (OSV), and ungrammatical (SOV, OVS, VSO, and VOS). Based

Table 2.2: Experiment 1 sample stimuli

CONDITION	SAMPLE STIMULUS
SOV	A magician a safe locked.
OSV	A safe a magician locked.
SVO	A magician locked a safe.
OVS	A safe locked a magician.
VSO	Locked a magician a safe.
VOS	Locked a safe a magician.

solely on this, canonical SVO should be most acceptable, followed by OSV, the grammatical but non-canonical order. The ungrammatical orders should be have relatively low acceptability, though OSV order, like in a sentence A SAFE LOCKED A MAGICIAN, could be interpreted by participants as an implausible SVO sentence, perhaps describing an event in which an anthropomorphic safe is locking up a magician. As such, the OVS sentences could potentially be rated relatively high, like the SVO sentences, or relatively low, like the ungrammatical orders.

Participants and procedure

56 undergraduate students at UC San Diego participated in this experiment in exchange for course credit. The experiment was conducted in a quiet computer lab reserved for this purpose, using the Ibex Farm platform (Drummond, 2016). Sentences were presented visually, one at a time. The 1-7 scale was presented along with the sentence. Participants were able to read the sentence for as long as they liked, and were asked to rate each sentence based on how acceptable it sounded to them as a speaker of English, with 1 being completely unacceptable and 7 being completely acceptable. They could click on the numbers using a mouse or using the number keys on their keyboard. After the response was entered, the next sentence appeared. The setup is shown in Figure 2.1:

Each participant also completed a language background survey within the Ibex-

progress

A butler a door opened.

(Bad) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | *(Good)*

Use number keys or click boxes to answer.

Figure 2.1: Image of the screen seen by participants in Experiment 1.

Farm platform, in which they were asked about their own language experience as well as the language(s) that were spoken in their home. For this initial study, participants who grew up with more than one language in the home were excluded, even if they self-reported as being English dominant. 11 participants were excluded for this reason, leaving 45 participants whose responses were analyzed.

Below is a summary of the predictions for Experiment 1:

Table 2.3: Experiment 1 predictions

CONDITION	SAMPLE STIMULUS	RELATIVE ACCEPTABILITY
SOV	A magician a safe locked.	low
OSV	A safe a magician locked.	second-highest
SVO	A magician locked a safe.	highest
OVS	A safe locked a magician.	unclear
VSO	Locked a magician a safe.	low
VOS	Locked a safe a magician.	low

2.3.2 Results

Responses were transformed into by-subject z-scores to account for individual variation in how the scale was used[6]. Results are plotted as box-and-whisker plots in (2.2). The dashed line represents the average acceptability across all participants for ungrammatical fillers[7].
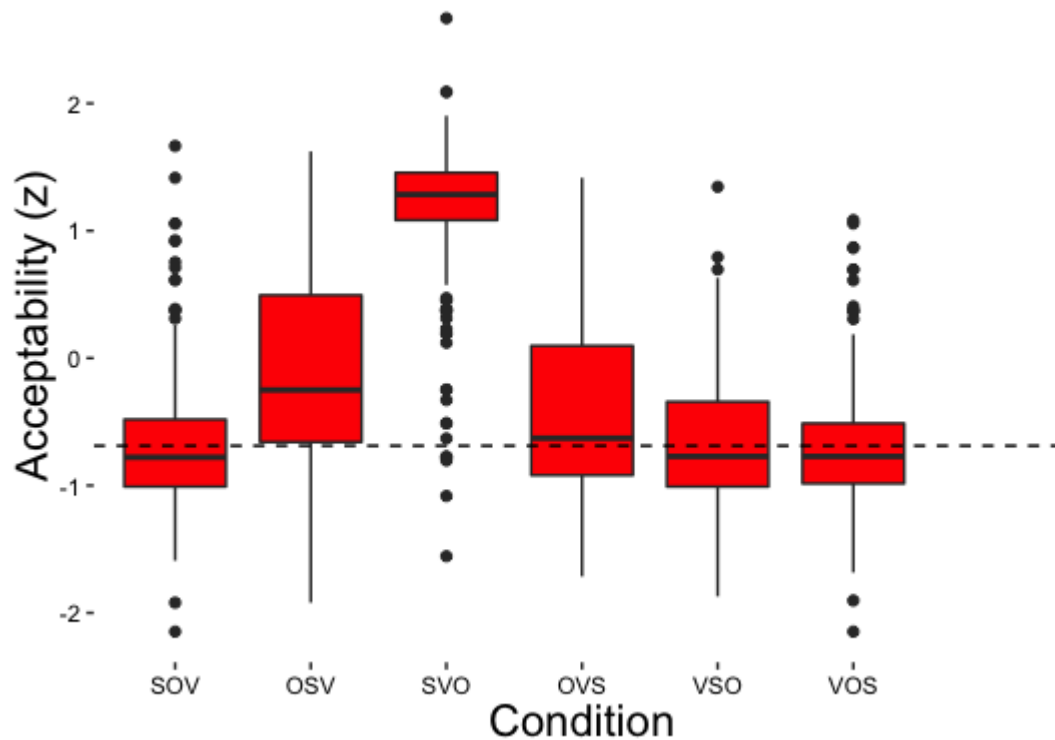
Figure 2.2: Box-and-whisker plots of z-score acceptability rating. The dots are outliers. The dashed line represents the average acceptability of ungrammatical filler items.

Canonical SVO order had the highest acceptability (mean z-score = 1.16), followed by non-canonical OSV (mean z-score = -0.098). The ungrammatical orders were all very low in acceptability, with the average being close to the ungrammatical filler items. Post-hoc pairwise comparisons confirmed that the difference between SVO and the other

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[6]Z-scores were calculated using all of the ratings given by a participant, including fillers.

[7]Ungrammatical fillers consisted of transitivity violations and subject-verb agreement errors.

orders was significant. Though OVS order had relatively low acceptability, pairwise comparisons showed that the response was higher for OVS than for SOV, VSO, and VOS.

I have summarized the results in table form below, with the numbers indicating the relative acceptability of the orders within the experiment:

Table 2.4: Experiment 1 results

CONDITION	SAMPLE STIMULUS	MEAN Z-SCORE	DISTANCE FROM MEAN CANONICAL
SOV	A magician a safe locked.	-0.66	1.83
OSV	A safe a magician locked.	-0.1	1.26
SVO	A magician locked a safe.	1.16	NA
OVS	A safe locked a magician.	-0.38	1.55
VSO	Locked a magician a safe.	-0.68	1.84
VOS	Locked a safe a magician.	-0.69	1.85

2.3.3 Discussion

The formal acceptability judgment experiment presented here was able to distinguish between canonical, non-canonical, and ungrammatical constituent orders. As expected, canonical SVO order was most acceptable, and the ungrammatical orders were least acceptable. There was a large and significant difference between SVO order and the non-canonical OSV order, corresponding to the observation that English is a strongly SVO language.

The acceptability task yielded results which were fine-grained enough to show that speakers treated OVS order differently from topicalized OSV constructions and the clearly ungrammatical SOV, VSO, and VOS orders. In one sense, this is too much information – the goal is to distinguish between canonical, non-canonical, and ungrammatical orders – but the difference between OVS and the ungrammatical orders is small, and the results are interpretable given some very basic assumptions about how speakers are reacting to sentences like *The safe locked the magician*. In future versions of this experiment, it might be useful to construct a context in which the intended propositional content is held constant in order to ensure that participants interpret the sentences in a more uniform way.

It is an empirical question whether non-canonical OSV order might increase in acceptability if embedded in the proper discourse context; however, the degree to which non-canonical orders are tied to a particular discourse context is variable across languages (Fortescue 1993). A parallel set of studies investigating the role of discourse context would be an important avenue of future research to supplement these results.

In sum, Experiment 1 shows that formal acceptability experiments can yield meaningful results in a well-studied language like English, for which the facts about constituent order are relatively agreed upon (e.g., Birner & Ward 1998). In order to test whether this approach can capture cross-linguistic differences, yielding bigger differences

between canonical and non-canonical orders in languages which are more rigid and smaller differences in languages which are more flexible, we turn to Experiment 2: Malayalam constituent order.

2.4 Experiment 2: Malayalam constituent order

As discussed in 2.2, all six logical orderings of SUBJECT, OBJECT, and VERB are grammatical and have the same truth-conditional meaning in Malayalam. However, we do not expect these six orders to have the same status in the language, and, as a consequence, we do not expect them to be equally acceptable. Following the work discussed in Section 2.2, canonical SOV order should have the highest acceptability. We appealed to the existence of a syntactic dependency in order to motivate lower acceptability for topicalized OSV order in English; as OSV order has also been analyzed as containing a syntactic dependency in Malayalam (Jayaseelan 2008), we expect that OSV should be less acceptable than canonical SOV:

(7) a. li:la   oru puṣṭakam ʋa:jicu
         Leela a   book   read

     b. [oru puṣṭakam]$_i$ li:la t_i ʋa:jicu
         [a   book]$_i$ Leela t_i read

In (7b), the object is in brackets to highlight that the whole phrase *oru puṣṭakam* 'a book' participates in this dependency. Note that Malayalam has differential object marking: subjects and inanimate objects are not overtly marked for case, so none of the Malayalam sentences discussed here have overt case-marking. In addition, verbs do not agree with subjects or objects.

However, syntactic accounts of the verb-medial and verb-initial orders in Malayalam are underspecified, and, in fact, these orders are not often included in theoretical accounts. In fact, the most well-known reference grammar for Malayalam (Asher &

Kumari 1997) does not describe any non-verb-final orders. This is not unique to Malayalam: canonically verb-final languages like Korean, Turkish, and Tamil (all of which are better-studied than Malayalam) allow non-verb-final orders, but this property is not usually described outside of work looking specifically at these constructions. This is unsurprising given the peripheral nature of these sentence-types, and is partly a consequence of flexibility not being studied in its own right. In the following section, I briefly discuss previous accounts of constituent order in Malayalam and propose an account which could motivate a difference in acceptability between non-canonical grammatical orders in Malayalam, which possibly extends to other syntactically similar languages as well.

2.4.1 Dependencies as a source of lowered acceptability in verb-medial and verb-initial sentences

Although non-canonical orders are relatively under-described in Malayalam[8], the language played a role in the (non-)configurationality debate. Mohanan (1982) argued that Malayalam does not have a VP; on his analysis, each of these different orders results from the same operation, and a verb's arguments have a symmetrical relation to each other on the level of constituent structure[9]. This account does not make predictions based on differences in syntactic movement about how acceptable the different orders should be relative to each other, as each order is generated through the same operation[10].

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[8]Though see Leela (2016) for a study of the acquisition of a subset of the non-canonical orders in Malayalam

[9]Mohanan worked within Lexical-Functional Grammar (LFG), in which the constituent structure of a sentence (word order) and its semantic structure (valency of arguments) need not be directly mapped onto one another.

[10]Non-movement accounts of constituent order are not limited to a particular theoretical approach; a relatively recent example comes from Fanselow (2003), who works within the Minimalist framework. He argues, using evidence from German, that sentences in non-canonical order need not involve movement unless there is evidence for movement from other domains of the grammar like prosody, so non-canonical orders can also be base-generated.

From a different perspective, Jayaseelan (2008) does not account for non-verb-final orders in his analysis, but argued that the different constituent orders actually result from argument movement into SPEC focus and SPEC topic positions, derived from a basic SOV order; this allows Malayalam to fit into a theory which requires argument structure to be configurationally represented in the syntactic structure. On this analysis, SOV is the underlying order and each deviation from this order requires either topicalization or focus movement. Assuming this type of syntactic movement also assumes that a dependency is created between the moved constituent and its trace in the original position.

These two approaches differ mainly in terms of the level of analysis at which non-canonical orders differ from canonical orders. In an LFG account[11], the dependency is between the argument and the verb, while in an account like Jayaseelan's, the dependency is between the argument and its trace. As discussed by Sag & Fodor (1994), psycholinguistic results are compatible with both conceptions of 'dependency', and, as such, I follow the convention by psycholinguists who use the word dependency in a way that is neutral to these possibilities. Sentences with displaced arguments do result in processing difficulty and lowering of acceptability, no matter the level of analysis at which this dependency resides. Thinking of the difference between canonical and non-canonical orders as resulting from dependencies is additionally advantageous because, as discussed in Section 2.2, the lowering in acceptability associated with non-canonical orders is similar to the lowering in acceptability associated with a long-distance dependency, which are better-understood.

I propose that verb-position should correspond to acceptability in Malayalam constituent order, with verb-final orders being more acceptable than verb-medial orders, which should be more acceptable than verb-initial orders. Previous studies have shown that readers posit a canonical order in languages like German, Korean, Finnish, Japanese

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[11]This also applies to versions of Head-Driven Phrase Structure Grammar or HPSG which do not include traces of movement as syntactic objects (e.g., Sag & Fodor 1994).

and Hindi (Miyamoto & Takahashi 2001; Vasishth 2002), and speakers have expectations about the order of constituents, that, when violated, lead to processing difficulty and reduced acceptability. I sketch an account of what Malayalam speakers' expectations about constituent order might be, given that Malayalam is canonically verb-final, allows argument dropping, and all six orders are grammatical. Namely, I expect that Malayalam speakers experience processing difficulty and reduced acceptability associated with the dependencies created by post-verbal arguments.

Consider the experience of Malayalam speakers (8a) and English speakers (8b) as they hear a sentence which is communicating the following event:

(8)   BOUGHT⟨Ammu, hat⟩

  a.   Ammu oru ṭopːi vaːɳi
        Ammu a   hat bought
  b.   Ammu bought a hat

In both cases, the major constituents are in canonical order. When English speakers hear a subject and a transitive verb, as in (8b), they expect an object to follow. When Malayalam speakers hear the verb in a sentence like (8a), they have already heard a subject and an object, and they have a strong expectation that no additional arguments will follow the verb; the verb signals the end of the sentence. Malayalam also allows argument-dropping: while English speakers find (9a) ungrammatical, even in the context of (9), Malayalam speakers do not find (9b) to be ungrammatical or very unacceptable. In fact, subjects and objects both can be dropped, as in (9c)[12]:

(9)   Where did that hat come from?

  a.   * Ammu bought

  b.   Ammu vaːɳi
        Ammu bought

---

[12]The default interpretation is that the speaker is the subject of the sentence, unless *Ammu* was otherwise salient in the discourse or the speaker was ruled out in some way.

    c. ʋaːŋi
        bought

This means that Malayalam speakers hearing a subject followed by a transitive verb have reason to expect that they are hearing a sentence with a null argument, as in (10), where ∅ represents the canonical position of the null object:

(10)   Ammu ∅ ʋaːŋi
         Ammu ∅ bought

As such, when an object follows the verb, as in (11), we expect that speakers incur some processing cost, as they must associate the null argument with the overt argument:

(11)   Ammu $\emptyset_i$ ʋaːŋi   [oru t̪opːi]$_i$
         Ammu $\emptyset_i$ bought [a   hat]$_i$

This analysis is fully compatible with frameworks which differ as to whether they assume a syntactic object associated with the position of the null argument, as well as syntactic analyses which differ as to whether the ∅ represents a null pronoun or the trace of syntactic movement. In frameworks which do assume that the null argument has an associated syntactic object, this relationship can be stated as a cost associated with syntactic movement or the creation of the dependency between these two elements. In frameworks which do not assume there is syntactic material in this position, this can be stated as a difficulty associated with reanalysis of argument structure/theta role reassignment (as in LFG or HPSG), or cost associated with selecting a less activated or expected syntactic structure[13]. As such, even though the sentence in (11) is grammatical, there is an expectation that the presence of a post-verbal argument will lead to reduced acceptability.

The same logic applies to a sentence in OVS order:

(12) $\emptyset_i$ oru t̪opːi ʋaːŋi   Ammu$_i$
        $\emptyset_i$ a   hat bought Ammu$_i$

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[13]I assume only that there is some difficulty associated with the non-canonical position, as the sentence types tested here do not distinguish between these accounts.

In both of the verb-medial cases, there is processing cost associated with a single argument appearing in a non-canonical post-verbal position, which, as with OSV order, should correspond to reduced acceptability. For verb-initial orders, two arguments appear in non-canonical positions:

(13) $\emptyset_i\,\emptyset_j$ vaːŋi   Ammu$_i$ [oru ʈoːpːi]$_j$
      $\emptyset_i\,\emptyset_j$ bought Ammu$_i$ [a   hat]$_j$

(14) $\emptyset_i\,\emptyset_j$ vaːŋi   [oru ʈoːpːi]$_j$ Ammu$_i$
      $\emptyset_i\,\emptyset_j$ bought [a   hat]$_j$ Ammu$_i$

The fact that there are two arguments in non-canonical positions – and therefore two associations which speakers must make – leads to the expectation that this should result in even lower acceptability for verb-initial sentences as compared with verb-medial sentences.

2.4.2   Analyses for all constituent orders

(15) summarizes the analyses for all orders in Malayalam:

(15)   BOUGHT⟨Ammu, hat⟩

  a. Ammu oru ʈoːpːi vaːŋi
      Ammu a   hat   bought
      SOV canonical

  b. [oru ʈoːpːi]$_i$ Ammu t_i vaːŋi
      [a   hat]$_i$ Ammu t_i bought
      OSV

  c. Ammu $\emptyset_i$ vaːŋi   [oru ʈoːpːi]$_i$
      Ammu $\emptyset_i$ bought [a   hat]$_i$
      SVO

  d. $\emptyset_i$ oru ʈoːpːi vaːŋi   Ammu$_i$
      $\emptyset_i$ a   hat   bought Ammu$_i$
      OVS

e. $\emptyset_i$ $\emptyset_j$ vaːɳi   Ammu$_i$ [oru ʈopːi]$_j$
   $\emptyset_i$ $\emptyset_j$ bought Ammu$_i$ [a   hat]$_j$
   VSO

f. $\emptyset_i$ $\emptyset_j$ vaːɳi   [oru ʈopːi]$_j$ Ammu$_i$
   $\emptyset_i$ $\emptyset_j$ bought [a   hat]$_j$ Ammu$_i$
   VOS

There is reason to suspect that OSV is different from the other non-canonical orders, as the other non-canonical orders involve dependencies which occur across the verb. From an incremental parsing perspective, hearers have heard all of the arguments by the time they hear the verb in OSV sentences. However, in verb-medial and verb-initial sentences, this is not the case: when hearers encounter the verb in an SVO sentence for example, they would be reasonable to assume the sentence is over, since argument-dropping is an option. As such, they have already posited one or two null arguments which must be accounted for when they hear post-verbal arguments. So, canonical order should be most acceptable, followed by OSV, the verb-medial orders (in which hearers have to account for one post-verbal argument), and finally, the verb-initial orders (in which hearers have to account for two post-verbal arguments).[14] This account is appealing because it makes clear predictions which are motivated by relatively basic assumptions. In addition, it makes the prediction that other canonically verb-final argument-dropping languages, like Japanese and Korean, should show the same pattern of acceptability that Malayalam does.

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[14]It could be that the dependency associated with a post-verbal object is easier than the dependency associated with a post-verbal subject, for example, but the account outlined here does not make a prediction either way.

2.4.3 Methods

Materials

Experimental stimuli consisted of animate subjects, inanimate objects, and transitive verbs, as shown in Table 2.5. As a reminder, subjects and inanimate objects are

Table 2.5: Experiment 2 sample stimuli

CONDITION	SAMPLE STIMULUS
SOV	ʈiŋku oru maːɳa ʈiɳːu Tinku a mango ate
OSV	oru maːɳa ʈiŋku ʈiɳːu a mango Tinku ate
SVO	ʈiŋku ʈiɳːu oru maːɳa Tinku ate a mango
OVS	oru maːɳa ʈiɳːu ʈiŋku a mango ate Tinku
VSO	ʈiɳːu ʈiŋku oru maːɳa ate Tinku a mango
VOS	ʈiɳːu oru maːɳa ʈiŋku ate a mango Tinku

not overtly marked for case, so none of these sentences have overt case-marking. In addition, verbs do not agree with subjects or objects. However, because the subjects are animate and objects are inanimate, these sentences are not ambiguous as to who did what to whom. Subjects and objects were bisyllabic in order to avoid possible effects of heavy NP-shift, though objects were preceded with the indefinite article *oru*. Because Malayalam has diglossia and non-canonical orders seem to be more of a spoken language phenomenon[15], stimuli were presented auditorily. Stimuli were recorded in a soundproof booth. The appropriate intonation associated with each order was used, and, as such, each condition had a slightly different intonational contour. This was done in order to avoid the possibility that participants would view non-canonical orders as less acceptable

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[15]As in Korean (Kim 1997).

because the intonation was not appropriate. Care was taken to ensure uniformity within conditions by spot-checking intonational contours in Praat.

30 lexicalization sets were constructed, and items were distributed across 6 lists using a Latin Square. Each participant heard 5 tokens from each of the 6 conditions. There were 40 filler sentences; 30 of these constituted a sub-experiment about adjunct island extraction and were bi-clausal sentences, and the remaining 10 were ungrammatical fillers of varying lengths.[16] A total of 70 sentences, 30 of which were experimental items, were heard by each participant.

Participants and procedure

The participants in this experiment were 18 Malayalam-speaking MA and PhD students in Statistics at University of Cochin in central Kerala, India, which is where Malayalam is spoken. Though their education level is higher than the general population in Kerala, the language backgrounds of these participants are not unusual (as confirmed through educational census data from the Kerala Department of Education, published in 2011).
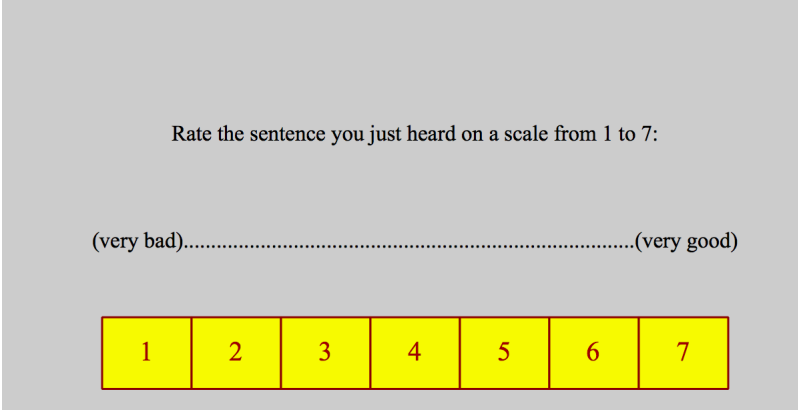
Participants were told to keep in mind everyday conversational Malayalam (as opposed to the written form of the language) and rate each sentence based on how natural it sounded, keeping in mind that some sentences would sound normal and others would be non-sentences. The experiment was run on a laptop using a built-in rating program in Praat (Boersma & Weenink 2013). Stimuli were presented through headphones, with the 1-7 scale on the screen. Participants could enter their respond by clicking on the numbers using the laptop's trackpad or using the number keys. After the response was entered, the next sentence played with a 500 millisecond gap between the participant's response and the next sentence. Each sentence could only be heard once. After completing

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[16]The fillers had transitivity violations and/or errors in case-marking.

the experiment, I conducted a 10 minute language background interview with each participant.

The setup is shown in Figure 2.3:

Figure 2.3: Image of the screen seen by participants in Experiment 2.

2.4.4 Predictions

Unlike in English, the experimental stimuli are all grammatical in Malayalam. We expect at minimum that canonical SOV order should be more acceptable than the other orders. Based on the account discussed in 2.4.2, we further expect that verb-medial orders should have lower acceptability than verb-final orders, and verb-initial orders should have the lowest acceptability of all. This is summarized below:

We also expect that the difference between canonical SOV order and non-canonical orders in Malayalam should be smaller than the difference between canonical SVO order in English and non-canonical OSV, as this is our indicator of reduced reliance on canonical order.

Table 2.6: Experiment 2 predictions

CONDITION	SAMPLE STIMULUS	RELATIVE ACCEPTABILITY
SOV	ʈiŋku oɾu maːŋa ʈin̪ːu Tinku a mango ate	highest
OSV	oɾu maːŋa ʈiŋku ʈin̪ːu a mango Tinku ate	second-highest
SVO	ʈiŋku ʈin̪ːu oɾu maːŋa Tinku ate a mango	third-highest
OVS	oɾu maːŋa ʈin̪ːu ʈiŋku a mango ate Tinku	third-highest
VSO	ʈin̪ːu ʈiŋku oɾu maːŋa ate Tinku a mango	lowest
VOS	ʈin̪ːu oɾu maːŋa ʈiŋku ate a mango Tinku	lowest

2.4.5 Results

Responses were transformed into by-subject z-scores in order to account for individual variation in how the scale was used, and the results are plotted in Figure 2.4. I conducted a linear mixed effects model using the `lme4` package in R (Bates et al. 2015): fixed effects were ORDER and RESPONSE, and random intercepts were fitted for each participant and item. I treated ORDER as a factor with six levels: SOV, OSV, SVO, OVS, VSO, and VOS. A model comparison via ANOVA found a significant main effect of ORDER ($\chi^2 = 114.71$, $p < 0.001$). SOV and OSV had the highest acceptability, followed by SVO and OVS, and, VOS and VSO had the lowest acceptability.
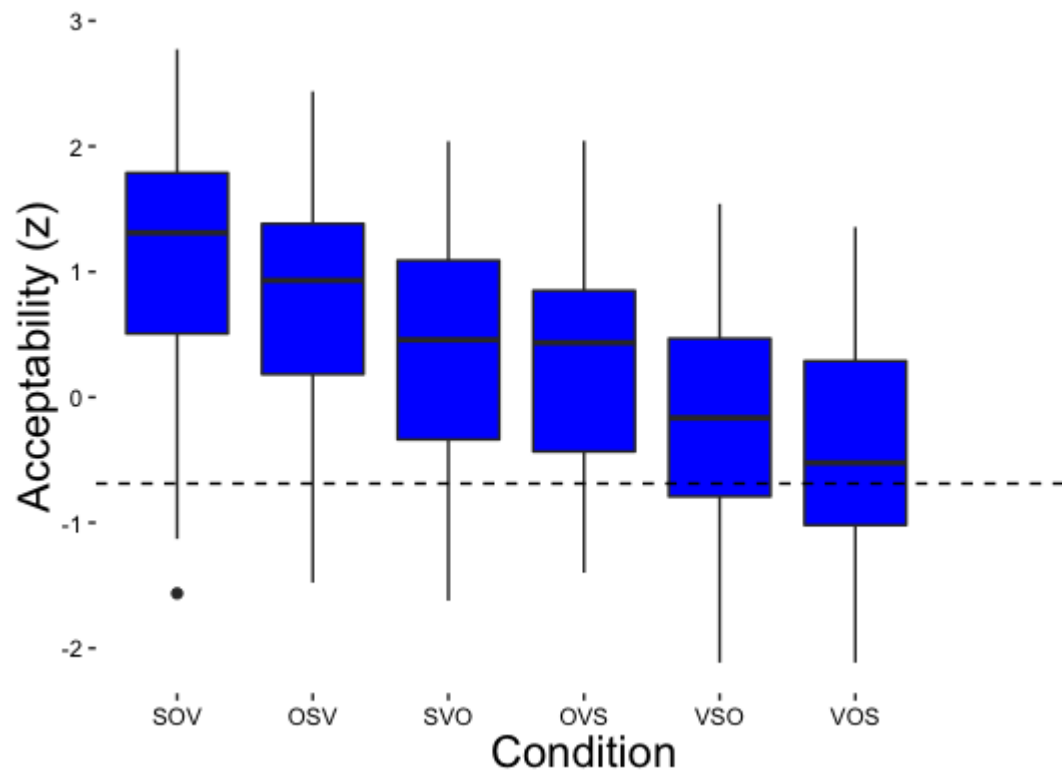
Figure 2.4: Box-and-whisker plots of z-score acceptability rating. The dots are outliers. The dashed line represents the average acceptability of ungrammatical filler items.

Because I made predictions about verb position predicting acceptability, I conducted an additional linear mixed effects model with VERB POSITION as a factor with three levels: final, medial, and initial. A comparison with a null model showed a significant main effect of VERB POSITION ($p < 0.001$); position of the verb predicted how well a sentence was rated, with verb-final sentences being rated highest, followed by verb-medial, and then verb-initial. The differences between each of the verb positions was significant as calculated by pairwise t-tests ($p < 0.001$ for each). Additionally, pairwise t-tests between the orders within each verb position (SOV and OSV, SVO and OVS, and VSO and VOS) were not significant. The model with ORDER only slightly out-performed a model with VERB POSITION ($\chi^2 = 7.49$, $p < 0.06$), despite the fact that the ORDER model had three fewer degrees of freedom. I interpret this as further support for VERB POSITION as a predictor of acceptability in Malayalam constituent order. I have summarized the results in 2.7, with the numbers indicating the relative acceptability of the orders within the experiment.

2.4.6 Discussion

This experiment was a first step toward looking at the full constituent order profile of Malayalam, including all six grammatical orders. Overall, the results align with the predictions made in 2.4.2. There is a relatively small difference between SOV and OSV orders – small enough in fact that the difference was not statistically significant using a post-hoc t-test. This could be explained if the dependency created by fronting the object in the OSV sentences was not difficult enough to show a reduction of acceptability; there was only one word in between the object and its trace. Replicating this study with longer arguments might yield a perceptible difference in acceptability between these two verb-final orders, and I address this further in Chapter 3. The account in 2.4.2 did not predict differences between SVO and OVS orders, nor VSO and VOS orders, and the

results here also did not find a difference between these orders. This does not rule out the possibility that these differences might be present at some other level of analysis, or, as with the verb-final orders, with longer or more complex arguments. Regardless, this methodology was able to detect meaningful differences between non-canonical orders, and between canonical and non-canonical verb positions.

2.5 Relative acceptability as a measure of flexibility

I argued that flexibility should be studied in its own right as a dimension along which languages vary, and I proposed a novel application of formal acceptability judgment experiments: as a cross-linguistically valid measure of flexibility in constituent order. I presented two experiments that showed that this method can capture differences between languages that have been described to differ in flexibility, and these languages differed in the predicted direction: English, which is less flexible than Malayalam, showed a bigger difference in acceptability between canonical and non-canonical orders than did Malayalam.

The results from the two experiments are plotted side-by-side in Figure 2.5. I have plotted all six logical orders for each language. I am calling this the CONSTITUENT ORDER PROFILE for these languages, as it provides a picture of the relative status of each order. The differences in the constituent order profiles of these two languages are visually striking. Of course, this methodology must be replicated in as many different types of languages as possible, and the goal is to construct a taxonomy of flexibility in constituent order. Follow-up work on Korean (Namboodiripad, Kim, & Kim *in prep*) has shown that this method is useful beyond English and Malayalam, and suggests that flexibility might indeed be gradient to some degree, as Korean was less flexible than

Malayalam but more flexible than English[17].

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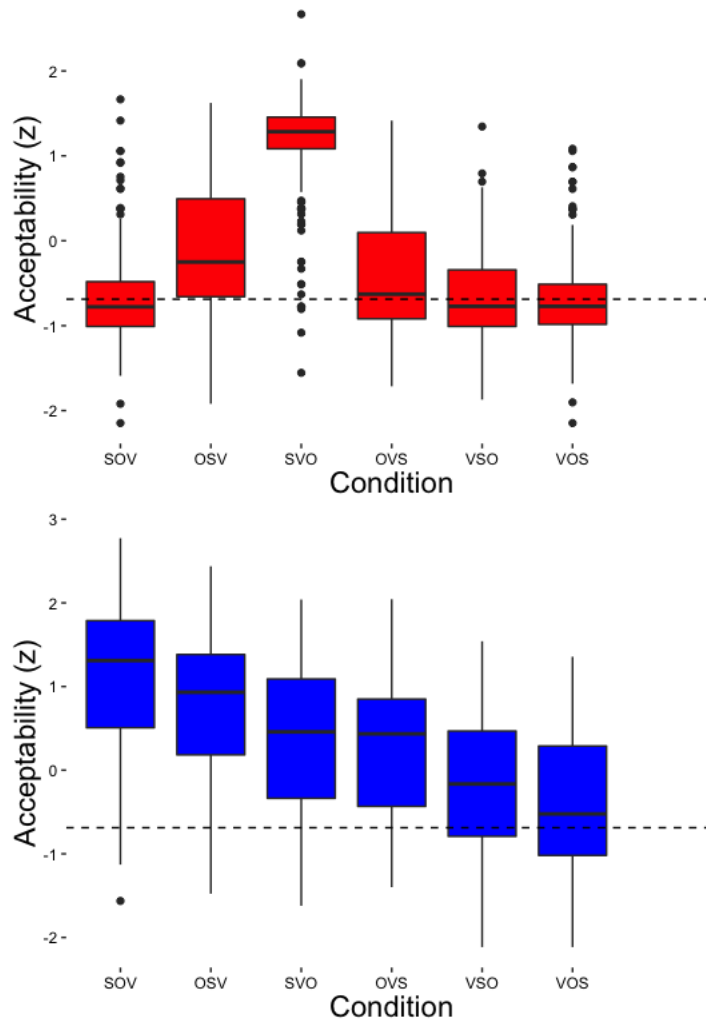
Figure 2.5: Constituent Order Profiles of English (Experiment 1) and Malayalam (Experiment 2). The difference between canonical and non-canonical orders is larger in English than it is in Malayalam.

Table 2.7: Experiment 2 results

CONDITION	SAMPLE STIMULUS	MEAN Z-SCORE	DISTANCE FROM MEAN CANONICAL
SOV	Tinku a mango ate	1.05	NA
OSV	a mango Tinku ate	0.80	0.24
SVO	Tinku ate a mango	0.36	0.69
OVS	a mango ate Tinku	0.30	0.74
VSO	ate Tinku a mango	-0.14	1.19
VOS	ate a mango Tinku	-0.36	1.41

Methodological barriers to studying non-canonical orders are a significant contributor to these constructions being understudied. Existing studies of non-canonical orders have often relied on corpora; however, the relationship between corpus frequencies and flexibility requires further inquiry. The contexts in which a construction appears might be infrequent, though the construction itself could be relatively acceptable. In addition, the relationship between frequency and acceptability is not necessarily bidirectional: while frequent constructions are often relatively high in acceptability, and constructions which are low in acceptability are often relatively infrequent, highly acceptable constructions can be very infrequent (Bermel & Knittl 2012).

However, clearly more work remains to be done in this area, and increased availability of naturalistic online language use can be a rich source of data: Leela (2016) collected and analyzed a database of casual Malayalam from online sources. Her database consisted of 5598 declarative sentences (excluding clefts, passives, and ditransitive sentences). Interestingly, the frequencies in that study align with the acceptability results in Experiment 2: SOV order was the most frequent order, representing 21.4% of all sentences, followed by OSV (17.6%), then the verb-medial orders (SVO 12.2% and OVS 13.9 % of sentences). She did not find any verb-initial orders with all three constituents[18], but verb-initial VO and VS orders represented 6.2 and 8.9 percent of the sentences respectively. While SOV is by the most frequent order in this database, it represents just one-fifth of all declarative transitive sentences. The fact that acceptability and frequency align in this case does not mean that acceptability is a measure of frequency, but the convergent results from these two methodologies is reassuring that these findings are not task-specific.

Unlike the case of English, informal elicitation is very difficult in languages with flexible constituent order; Thomason (2013) describes the cases of Salish and Kadiwéu,

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[18]It is worth noting that 33% of the 5598 sentences had one or more null arguments.

both of which are languages in which each of the six logical orders is grammatical. The elicitation language was less flexible in each case (English and Portuguese, respectively), and this led to initial misdescriptions of the constituent order system of these languages, with the order of the elicitation language being overrepresented due to it being grammatical (though non-canonical). If the differences between non-canonical grammatical orders are relatively subtle, this could be a source of difficulty when speakers are asked to distinguish between these orders. Informal methods, which lend themselves to fieldwork, might not be sensitive enough to find differences between sentence types which are very similar, and corpus studies (when practical/possible) are not often the right method to study this phenomenon. The results presented here show that formal acceptability experiments can be a useful (and fieldwork-friendly, given the right context and careful experimental design) methodology to study constituent order in languages like Malayalam.

Chapter 3

Experiment 3: Information structure and constituent order in Malayalam

Chapter 2 argued that degree of acceptability across constituent orders should supplement descriptions of constituent order which rely on more categorical distinctions. One useful categorical distinction in accounts of constituent order is that of canonical versus non-canonical orders in a language. I took this distinction for granted in Experiments 1 and 2, but, in this chapter, I discuss more carefully what makes an order canonical. I present a forced choice experiment which has the potential to yield bigger differences between orders than the 1-7 ratings from the acceptability experiment, and situate sentences in a particular discourse context by using context questions which manipulate givenness of each constituent.

3.1   Motivation

In Chapter 2, I claimed that all six logical orderings of SUBJECT, OBJECT, and VERB were grammatical in Malayalam. By this I mean that SOV, OSV, SVO, OVS, VSO,

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and VOS sentences are attested, have the same truth-conditional meaning, and are uttered within a single intonational contour; though the shape of the intonational contours varies across orders, these sentences can be uttered without a break. In (16) is a list of example sentences (repeated from Chapter 2):

(16) READ ⟨Leela, book⟩

    a. li:la   oru puṣṭakam va:jit͡ʃu
       Leela a   book   read
       S O V

    b. oru puṣṭakam li:la   va:jit͡ʃu
       a   book   Leela read
       O S V

    c. li:la   va:jit͡ʃu oru puṣṭakam
       Leela read   a   book
       S V O

    d. oru puṣṭakam va:jit͡ʃu li:la
       a   book   read   Leela
       O V S

    e. va:jit͡ʃu li:la   oru puṣṭakam
       read   Leela a   book
       V S O

    f. va:jit͡ʃu oru puṣṭakam li:la
       read   a   book   Leela
       V O S

I also claimed that SOV is the canonical order in Malayalam: how do we know this is the case? By canonical order I do not mean underlying order (e.g., Barbiers 2000 and others who argue that English is underlyingly SOV with short verb movement.), nor do I mean the most frequent order in a language, as the canonical order in a language is often the most frequent but not always, so we must have a definition that does not rely solely on frequency. I work from the definition of 'basic' order from Jackendoff (1972): A sentence is in canonical order if each constituent is able to take the role of the *focus*,

where focus is defined as as any new, asserted, or not-presupposed information. As such, a sentence in canonical order should be felicitous in response to a question which does not presuppose any information (e.g., 'What happened?'), as well as being a felicitous answer to questions which put some or all of the constituents into the discourse context. This is illustrated below, with the new information introduced by the sentence being labeled in brackets ($[_F]$), using Jackendoff's notation:

(17)   a. enṯaː   uɳṯaːjiṯe
             what.is.it that.happened

    b. [$_F$anijan oru paṉṯə eriɲːu]
          Aniyan a   ball threw

In (17), all of the information in the sentence is new, so the whole sentences is the focus. In the examples below, what is given is varied, but SOV is still a felicitous response to each of these sentences. This demonstrates that each constituent in an SOV sentence can be the focus, a further property of the canonical order in a language:

(18)   Focus = subject

    a. aɾaː   paṉṯə eriɲaṯə
          who.is.it ball   threw.COMP
          Who is it that threw the ball?

    b. [$_F$anijan] oru paṉṯə eriɲːu
          Aniyan a   ball threw

(19)   Focus = object

    a. enṯaː   anijan eriɲaṯə
          what.is.it Aniyan threw.COMP
          What is it that Aniyan threw?

    b. anijan [$_F$oru paṉṯə] eriɲːu
          Aniyan a   ball   threw

(20)   Focus = verb

a. eṉṯaː   anijan paṇ̣ṯəveʦ̑ːə t͡ʃaiṯaṯə
   what.is.it Aniyan with.ball   did

   What did Aniyan do with the ball?

b. anijan   oru paṇ̣ṯə [_F eriɲːu]
   Aniyan a   ball   threw

(21) Focus = object and verb

a. eṉ̣ṯaː   anijan ceːṯaṯə
   what.is.it Aniyan that.did

   What is it that Aniyan did?

b. anijan   [_F oru paṇ̣ṯə eriɲːu]
   Aniyan a   ball   threw

(22) Focus = subject and object

a. aːrə eṉ̣ṯə eriɲːu
   who what threw

   Who threw what?

b. [_F anijan oru paṇ̣ṯə] eriɲːu
   Aniyan a   ball   threw

(23) Focus = subject and verb

a. eŋanejaː paṇ̣ṯə iviṭe eṯːijaṯə
   how.is.it ball   here reached.COMP

   How is it that the ball got here?

b. [_F anijan] paṇ̣ṯə [_F eriɲːu]
   Aniyan   ball   threw

The answers listed here do not necessarily represent the most likely response to the questions; for example, it is far more likely that speakers would say 'threw' as a response to 'what did Aniyan do with the ball' as opposed to uttering all of the constituents. Because Malayalam allows dropping of all arguments, 'threw' is a well-formed response, but this is also a known property of question-answer pairs. Even in English, which does not generally allow argument-dropping, a very natural response

to 'what did Aniyan do with the ball' is 'threw it'. Regardless, the fact that SOV is a felicitous response to all of these questions means that it passes the diagnostics of being a canonical order in Malayalam.

The other orders, being categorized as non-canonical, should not exhibit these properties. In addition, if these orders are highly discourse-sensitive, it should be the case that there are contexts which favor some non-canonical orders over others. Testing this informally would require consultants to choose between all 6 grammatical orders simultaneously in a given discourse context. So, in order to have a full understanding of which orders are canonical in Malayalam, it is necessary to take a careful look at whether SOV is preferred in every context, as well as to understand the extent to which the other orders are indeed discourse sensitive. Experiment 2 cannot address these questions sufficiently; the results showed differences in acceptability between the 6 grammatical orders in a discourse-neutral context, which should favor SOV, but SOV and OSV were not statistically different from each other. As it is in theory possible for a language to have multiple canonical orders, we cannot say for sure based on Experiment 2 whether the (in)sensitivity of the 1-7 response method or parity between these two orders really explained the lack of difference between SOV and OSV.

I lay out these questions below:

1. Is SOV truly preferred no matter the context?

2. Are SOV and OSV distinguishable?

3. Are other orders indeed highly sensitive to discourse context?

Based on the informal intuitions presented earlier in this chapter and previous descriptions of Malayalam which state that SOV is the canonical order (though they do not walk through the arguments for its canonical status), the answer to all three of these questions should be 'yes', but neither informal methods nor Experiment 2 can fully answer these

questions. However, the forced choice response method allows for controlled testing of preferences for orders in a given context, and, because participants are directly comparing orders with each other, this method should reflect any existing strong preferences between orders. Experiment 3 is a forced choice experiment which answers the questions above, ultimately confirming that the answer to each question above is, in fact, 'yes.'

3.2   Methods

3.2.1   Procedure

This experiment was conducted in August-September of 2016, in Kerala, the Malayalam-speaking region of India. 47 Malayalam-speakers who grew up in Kerala participated, representing a range of ages, socio-economic statuses, and education levels. All participants resided in the same region of Kerala, within a 10 mile radius of each other. Stimuli were recorded in a soundproof booth and presented via Keynote on a laptop, through Sony MDR7506 headphones. Participants were presented with a context question and three possible answers to that question, marked A, B, and C. Figure 3.1 shows an image of the Keynote slide for the screen as seen by participants. After hearing the questions and answers as many times as they wanted, participants were asked to mark which answers was best (A, B, or C) on a response sheet. Participants could click on the sound files on their own or could ask the experimenter to do so, depending on their comfort with the laptop. More detail about the counterbalancing and distributions of sentences across lists is described in Section 3.2.2 below.
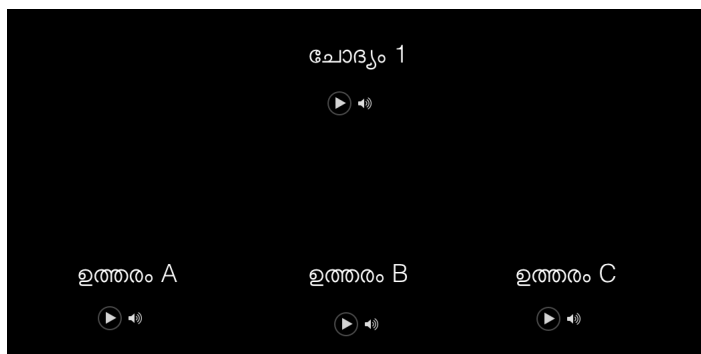
Figure 3.1: Image of the screen seen by participants in Experiment 3.

3.2.2 Materials

To operationalize discourse context, I used context questions that encouraged a specific focus reading of each order. Each context question asked about a single constituent, either the subject, object, or verb, and the three answers were identical lexically, only differing in their order. The asked-about constituent – the focus – was either the first, second, or third constituent in the answer, with the other two constituents held constant in their relative order. For the conditions which had subjects and objects as the focus, the questions were *wh*-questions. (24) and (25) illustrate the design of these conditions with examples[1].

(24) aːraː   aː kaːpi kuɖit͡ʃːatə
      who.is.it that coffee drank.COMP
      Who drank that coffee?

  a. [F oru ʋiḍʰaʋa] aː kaːpi kuɖit͡ʃːu
      a   widow   that coffee drank
      focus-initial, SOV

  b. aː kaːpi [F oru ʋiḍʰaʋa] kuɖit͡ʃːu
      that coffee a   widow   drank
      focus-medial, OSV

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[1] As above, the focused constituent is labeled in brackets ([F]).

c. aː kaːpi kuɖitʃ͡ːu [_Foru viḏʱaṽa]
that coffee drank a   widow
focus-final, OVS

(25) enṯaː   aː viḏʱaṽa kuɖitʃ͡ːaṯə
what.is.it that widow drank.COMP
What did that widow drink?

a. [_Foru kaːpi] aː viḏʱaṽa kuɖitʃ͡ːu
a   coffee that widow drank
focus-initial, OSV

b. aː viḏʱaṽa [_Foru kaːpi] kuɖitʃ͡ːu
that widow a   coffee drank
focus-medial, SOV

c. aː viḏʱaṽa kuɖitʃ͡ːu [_Foru kaːpi]
that widow drank a   coffee
focus-final, SVO

In order to have all possible constituent orders represented, each condition was
presented with the remaining constituents in the opposite order as well. This is shown in
(26) and (27). The orders of responses in (26) are VO as opposed to OV (SVO, VSO, and
VOS), and VS as opposed to SV in (27) (SVO, VSO, and VOS). The context questions also
had the opposite order of constituents, SVO and OVS respectively, as opposed to SOV and
OSV in (24) and (25).

(26) aːraː   kuɖitʃ͡ːaṯə   aː kaːpi
who.is.it drank.COMP that coffee
Who drank that coffee?

a. [_Foru viḏʱaṽa] kuɖitʃ͡ːu aː kaːpi
a   widow drank   that coffee
focus-initial, SVO

b. kuɖitʃ͡ːu [_Foru viḏʱaṽa] aː kaːpi
drank a   widow that coffee
focus-medial, VSO

    c. kuɖit͡ʃːu aː kaːpi [_F oru viɖʱaʋa]
       drank that coffee a widow

    focus-final, VOS

(27) eṇṭaː kuɖit͡ʃːaṱə aː viɖʱaʋa
     what.is.it drank.COMP that widow

     What did that widow drink?

    a. [_F oru kaːpi] kuɖit͡ʃːu aː viɖʱaʋa
       a coffee drank that widow

    focus-initial, OVS

    b. kuɖit͡ʃːu [_F oru kaːpi] aː viɖʱaʋa
       drank a coffee that widow

    focus-medial, VOS

    c. kuɖit͡ʃːu aː viɖʱaʋa [_F oru kaːpi]
       drank that widow a coffee

    focus-final, VSO

Putting the verb in focus required a different strategy from the *wh*-questions which were employed to put arguments in focus: the most natural way to put a verb in focus in Malayalam is to add a question affix to it, so this is how the context questions were constructed for the verb-focus sentences. Each answer had the same verb which was, crucially, different from the verb in the question. Thus, the question-answer pairs had contrastive focus, with an interpretation similar to the following question-answer pair in English:

(28) a. Q: Did the widow *boil* a coffee?

     b. A: (no) the widow *drank* a coffee.

As with the previous conditions, the context questions had focus-initial order, which in this case is verb-initial order[2]. The relative order of the other two constituents

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[2]The frame "What did the widow do with the coffee" sounded very unnatural for many of the sentence contexts, so it was not used.

was held constant (in either SO or OS order), and the focused constituent was either sentence-initial, sentence-medial, or sentence-final. Examples of the verb-focused sentences are below, with (29) representing the SO sentences with variable verb positions and (30) representing the OS sentences with variable verb positions.

(29) t͡ʃilaʋaːkːijo aː ʋiḏʰaʋa oru kaːpi
spent.Q that widow a coffee
Did the widow *spend/use up* a coffee?

    a. [F kuḏit͡ʃːu] aː ʋiḏʰaʋa oru kaːpi
       drank that widow a coffee
       focus-initial, VSO

    b. aː ʋiḏʰaʋa [F kuḏit͡ʃːu] oru kaːpi
       that widow drank a coffee
       focus-medial, SVO

    c. aː ʋiḏʰaʋa oru kaːpi [F kuḏit͡ʃːu]
       that widow a coffee drank
       focus-final, SOV

(30) t͡ʃilaʋaːkːijo oru kaːpi aː ʋiḏʰaʋa
spent.Q a coffee that widow
Did the widow *spend/use up* a coffee?

    a. [F kuḏit͡ʃːu] aː kaːpi oru ʋiḏʰaʋa
       drank that coffee a widow
       focus-initial, VOS

    b. oru kaːpi [F kuḏit͡ʃːu] aː ʋiḏʰaʋa
       a coffee drank that widow
       focus-medial, OVS

    c. oru kaːpi aː ʋiḏʰaʋa [F kuḏit͡ʃːu]
       a coffee that widow drank
       focus-final, OSV

This qualitative difference between the way the verb-focus and subject- and object-focus context questions were constructed could lead us to expect qualitatively different

results. As such, any direct comparisons between the responses to these conditions should be made cautiously, if at all.

The question-answer pairs are summarized in Table 3.1; I call this a summary as opposed to the experimental design because the research questions (repeated in Section 3.3) – and therefore the analyses – do not perfectly align with how the materials are organized. I show the detail here because it is important to keep in mind when considering the results.

12 lexicalization sets were created with animate subjects, inanimate objects, and transitive verbs, and distributed across 6 lists using a Latin Square. Participants were asked to respond to 12 context sentences, 2 examples from each of the 12 conditions in Table 3.1. The order of responses and stimuli were pseudo-randomized. Each participant heard the same practice sentence and answers, and was asked to confirm that they understood the task before proceeding. As the three answer-sentences had the same lexical items but in varying orders, and the flexibility of constituent order in Malayalam is well known by the general population, the goal of the task was very salient.

3.3   Predictions

The questions which motivate this experiment are repeated from Section 3.1, and I discuss the predictions for each question in this section.

1. Is SOV is truly preferred no matter the context?

2. Are SOV and OSV distinguishable?

3. Are non-SOV orders sensitive to what constituent is in focus?

Based on informal intuitions presented earlier in this chapter and previous descriptions of Malayalam, whenever SOV is an option, it should be the preferred order, no

Table 3.1: Experiment 3 stimuli; the focused elements are underlined. Participants heard a context question and chose between the three corresponding responses. They heard 2 items from each of these 6 conditions, for a total of 12 sentences.

		Context question	Position of focused constituent		
			focus-initial	focus-medial	focus-final
subj-foc	OV	WH OV (cleft) who the coffee drank	SOV a widow the coffee drank	OSV the coffee a widow drank	OVS the coffee drank a widow
	VO	WH VO (cleft) who drank that coffee	SVO a widow drank that coffee	VSO drank a widow the coffee	VOS drank a coffee the widow
obj-foc	SV	WH SV (cleft) what that widow drank	OSV a coffee that widow drank	SOV that widow a coffee drank	SVO that widow drank a coffee
	VS	WH VS (cleft) what drank that widow	OVS a coffee drank that widow	VOS drank a coffee that widow	VSO drank that widow a coffee
verb-foc	SO	V.Q SO used.up that widow a coffee	VSO drank that widow a coffee	SVO that widow drank a coffee	SOV that widow a coffee drank
	OS	V.Q OS used.up a coffee that widow	VOS drank a coffee that widow	OVS a coffee drank that widow	OSV a coffee that widow drank

matter the discourse context, so the answer to (1) should be 'yes'. As for question (2), while Experiment 2 did not find a significant difference between the two verb-final orders in Malayalam, as I considered in the discussion for that experiment, it could be the case that the 1-7 response method was not sensitive enough to show differences between these orders. Forced choice responses are more sensitive, so, if it is the case that the sensitivity of the measure was to blame for a lack of difference between these two orders, we expect SOV to be preferred to OSV, even in object-focus contexts.

As for (3), the constituent in focus should have an effect on what order is preferred, but what do we expect this effect to be? The rest of this section considers the possibilities in more detail.

3.3.1 Preference for focused element first

For non-SOV orders, the position of the focused constituent likely influences the choice of answer. Jayaseelan (1988) analyzed Malayalam as having focus movement that optionally triggers movement to a FocusP position. This can also be thought of as movement to the left edge (or beginning) of the sentence. As such, Jayaseelan's analysis motivates the licensing of OSV order in a context where the object is in focus, though it does not make predictions about other orders. It could be that participants always prefer non-canonical orders in which the constituent with discourse-focus is first. If this is the case, when participants encounter a question that causes the subject to be in focus, they should prefer the subject-initial answer, when the object is in focus, they should prefer the object-initial answer, and when the verb is in focus, they should prefer a verb-initial answer. When the subject is in focus, this cannot be separated from a general preference for canonical SOV, but SVO should be preferred to other non-canonical orders in that particular discourse context.

3.3.2 Post-verbal arguments as secondary focus positions

Post-verbal arguments are attested and have associated discourse functions in Malayalam, as has been shown for canonically verb-final languages like Tamil (Herring 1994), Japanese (Clancy 1985; Nomura 2007), Korean (Ahn 1988; Yun 2014), and Turkish (Sener 2010). Although post-verbal positions are available for arguments in focus, the way these stimuli were recorded makes it unlikely that participants will interpret the post-verbal arguments as having focus, as care was taken to make sure that each order was produced with natural intonation as appropriate for that order, and post-verbal arguments were produced as belonging to the same intonational contour as the rest of the sentence.

The motivation for this comes from Herring (1994), who identifies three types of post-verbal arguments, ANTI-TOPICS, ANTI-EMPHATICS, and AFTERTHOUGHTS in Tamil, a Dravidian language closely related to Malayalam. These arguments differ as to how close they are to the main clause, with anti-topics being analyzed as within the main clause, and her taxonomy seems to apply to Malayalam as well. As shown in the examples below, the three types of post-verbal arguments are differentiated by prosodic and contextual factors. The Tamil examples (a) are from Herring, and the (b) examples from Malayalam are my translation:

(31) Anti-topic

    a. veḷije: po:na:n kaṇ:an
       went outside *Kannan*
       Kannan went outside

    b. puraṭ:e:k:ʲə po:ji kaṇ:an
       went outside *Kannan*
       Kannan went outside

(32) Anti-emphatic

    a. veʎijeː poːnaːn, kaɳːan!
        went   outside, *Kannan*!

        Kannan went outside!

    b. puraʈːeːkːʲə poːji,   kaɳːan!
        went   outside, *Kannan*!

        Kannan went outside!

(33)   Afterthought

    a. veʎijeː poːnaːn. kaɳːan
        went   outside. *Kannan*.

        (He) went outside. Kannan (is the one I mean).

    b. puraʈːeːkːʲə poːji.   kaɳːan
        went   outside. *Kannan*.

        (He) went outside. Kannan (is the one I mean).

The type of post-verbal argument relevant to this experiment are anti-topics, which belong to the same intonational contour as the main clause, and are "invariably unstressed." In addition, anti-topics are associated with switch reference or the backgrounding of an argument.

The stimuli in this experiment were intentionally constructed to make it clear that the arguments are part of the sentence, specifically avoiding potential alternative interpretations of the post-verbal arguments belonging to a separate clause from the clause containing the verb. To achieve this, I took care to ensure that the post-verbal arguments were part of the same intonational contour as the rest of the sentence, which means that they have many of the properties Herring ascribes to anti-topics, including backgrounding of the argument. Elements in focus are not typically backgrounded, so it is unlikely that participants would choose a sentence in which the focused argument is sentence-final over a sentence in which the focused argument is sentence-initial. However, if speakers misinterpret the function associated with the post-verbal arguments, it could be that they choose focus-final sentences, while it is very unlikely that they should choose

focus-medial sentences, as this position does not have any associated focus function.

3.3.3 Acceptability absent discourse context

A final possible predictor of the relationship between focus and choice of non-canonical order could be the differential acceptability of the three choices in a discourse-neutral context. The factors underlying the differences in acceptability found in Experiment 2 are presumably present in these sentences as well. If discourse context is not playing a very strong role, we expect that verb-final orders should always be chosen more often than verb-medial orders, which should always more often than verb-initial orders. Because some of the verb-positions are not ever directly compared with each other, the design of this experiment does not allow for us to look directly at the influence of baseline differences in acceptability, but it would be possible to rule out acceptability as the sole predictor of choice if there is a case in which a verb-initial sentence is chosen as often or more often than a verb-medial or verb-final sentence, or if there is a verb-medial sentence which is chosen as often or more often than a verb-final sentence.

3.3.4 Interim summary

Below are the predictions for this experiment:

1. Is SOV truly preferred no matter the context?

    • Prediction: *yes*

2. Are SOV and OSV distinguishable?

    • Prediction: *yes*

3. Are non-SOV orders sensitive to what constituent is in focus?

- Prediction: *yes*

(a) Preference for focused constituent first

(b) Focus-medial sentences should be dispreferred

(c) Acceptability as measured in Experiment 2 could play a role, with verb-final orders being preferred to verb-medial orders being preferred to verb-initial orders.

3.4 Results

This section presents three main findings which directly answer the questions posed in Section 3.3.4: 1) When SOV is an option, it is preferred, 2) SOV is preferred to OSV, and 3) preference of order is sensitive to focus, and cannot be fully predicted by acceptability. Because this experiment had too many possible predictors of choice for a given trial, I did not run statistical analyses; any analyses which accurately modeled a participant's choice of answer given a particular context question would be difficult to interpret. However, the pattern of responses was very clear – in most cases, there was one order which was chosen overwhelmingly – and all conclusions should be taken as strong descriptive trends from which to design future, more focused, experiments.

Figure 3.2 shows the raw counts[3] of choices made by the participants. This figure accurately represents the choices made in each trial of the experiment; the most useful way to read this plot is to compare the orders within each panel. The responses are split based on which constituent was focused (left to right: subject-focus, object-focus, and verb-focus), and whether or not SOV was an option. Each panel shows the pattern of responses given a context question. The height of each bar represents the number of

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[3]I chose to use raw counts instead of percentages because each participant contributed equally to each condition, and each condition had the same number of observations. Thus, percentages were not very different from raw counts, which have the advantage of being intuitive and directly representative of the results.

times that order was chosen, and comparisons can be made within panels. As an example, take the top left panel: the three bars are SVO, VSO, and VOS. These were the three orders which participants had to choose from after hearing a context question which put the subject into focus (e.g., "who drank the coffee?"). The plot shows that SVO was chosen more often than VSO, and VOS. The design of the experiment was such that the top and bottom rows are mutually exclusive[4]; there is no order in the top row that is represented in the bottom row. Additionally, comparisons cannot be made across panels, as the order which participants chose from differed in each panel.

The bottom three panels of Figure 3.2 represent trials in which SOV was an option. SOV is the highest bar in each trial, though there are a non-trivial number of choices of the non-canonical orders. This answers question (1) in Section 3.3.4: SOV is overwhelmingly preferred whenever it is an option. In addition, when SOV and OSV are both options, SOV is still highly preferred, which answers question (2).

Looking at the top three panels, in which SOV is not an option, as expected, there are different patterns in the subject-focus and object-focus conditions as compared to the verb-focus condition. In the subject-focus and object-focus conditions, the three orders participants had to choose from were verb-medial and verb-initial. The verb-medial orders were preferred to verb-initial orders in both cases. Not only are verb-medial orders more acceptable than verb-initial orders, these were also the two orders which had the focused constituent at the beginning of the sentence (presumably, in focus position, á la Jayaseelan). However, unlike all of the other conditions, there is not a clear preference for a particular order for the verb-focus condition in which SOV is not an option. Interestingly, if the acceptability of each order (based on the results of Experiment 2) was the sole determiner of choice of order, that is, if the context questions did not play a role, we

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[4]The bottom right panel is an exception: it has a small number of OSV responses, and thus four bars instead of three. This is due to an error which led to a few participants hearing an OSV sentence instead of SOV for that condition – it was fixed as soon as it was noticed, but I included it here for completeness.
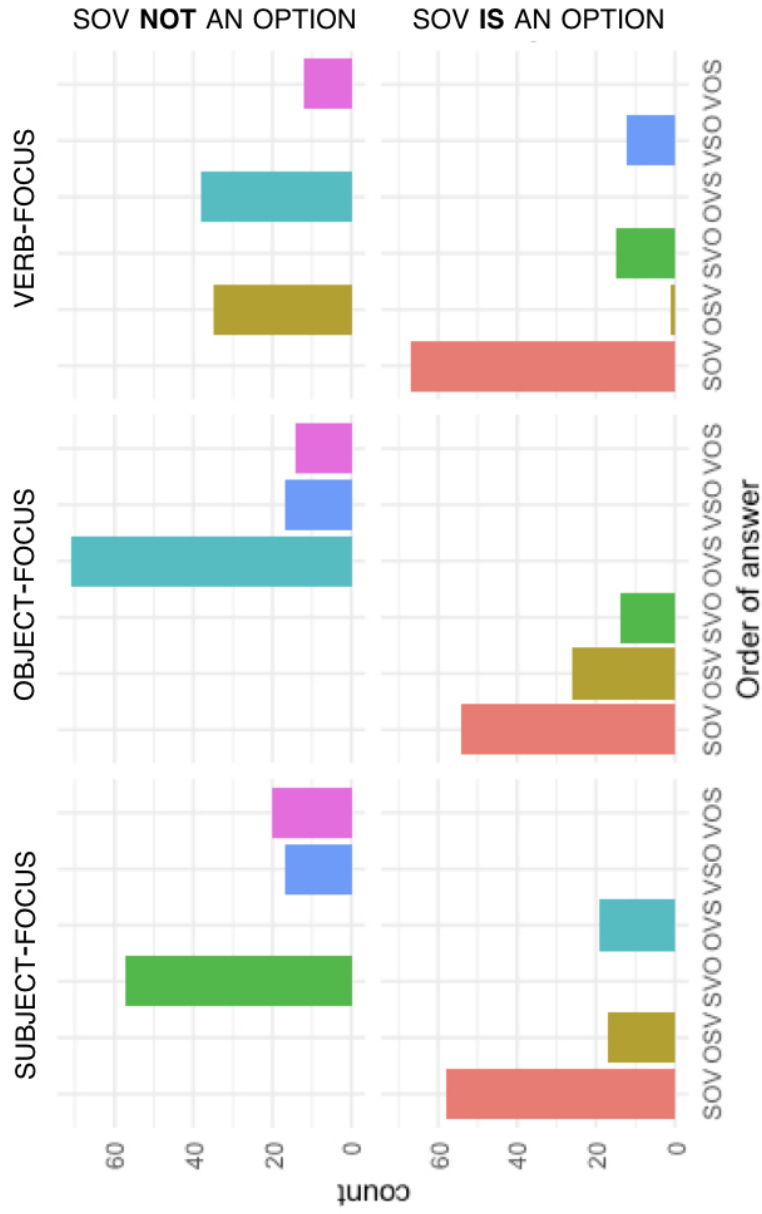
Figure 3.2: Count of choices in Experiment 3, split based on the focused constituent and whether SOV was an option. Each panel represents one condition. Each participant (N=47) contributed 2 data points per panel, with 564 observations in total.

would expect verb-final OSV to be chosen more often than verb-medial OVS. In fact, OVS was chosen slightly more often than OSV, indicating that acceptability as measured in Experiment 2 does not solely explain the pattern of results here, addressing question (3) in Section 3.3.4.

Figure 3.3 shows the relationship between which constituent is in focus and the position of the focused constituent in the chosen response. For each constituent in focus, there are four bars representing the number of times participants chose a sentence in a) canonical SOV order, b) an order in which the focused constituent was sentence-initial, c) an order in which the focused constituent was sentence-medial, and d) and order in which the focused constituent was sentence-final. Again, this figure shows that the answers to all three questions in Section 3.3.4 is 'yes': SOV is chosen the most in all three focus conditions, OSV does not show this pattern, and the pattern of preferred orders varies across focus conditions.

Each bar is labeled with the constituent orders which are represented therein, as this varies by panel: the focus-initial orders for the the object-focus condition are OVS and OSV, while they are VSO and VOS for the verb-focus condition. Unlike Figure 3.2, Figure 3.3 collapses across trials.[5]

Figure 3.3 shows some clear patterns: for subject- and object-focus conditions, the focus-initial positions are preferred to the other orders. The difference in these two conditions between the bar representing sentences with focus-initial orders is explained by the fact that SOV technically is focus-initial, so there were more potential sentences which could have qualified as being focus-initial in the object-focus condition. Looking just at the non-canonical orders, this pattern still holds. Between focus-medial and focus-final, focus-final orders are the next most-preferred, though this preference is less

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[5]When there are two labels within the bar, no participant chose between those two orders for a given condition. So, no participant chose between an OSV and OVS sentence in the object-focus condition. Likewise, when there is one label (SVO for subject-focus, VOS for object-focus), and OSV for verb-focus), no participant ever compared those orders with canonical SOV.
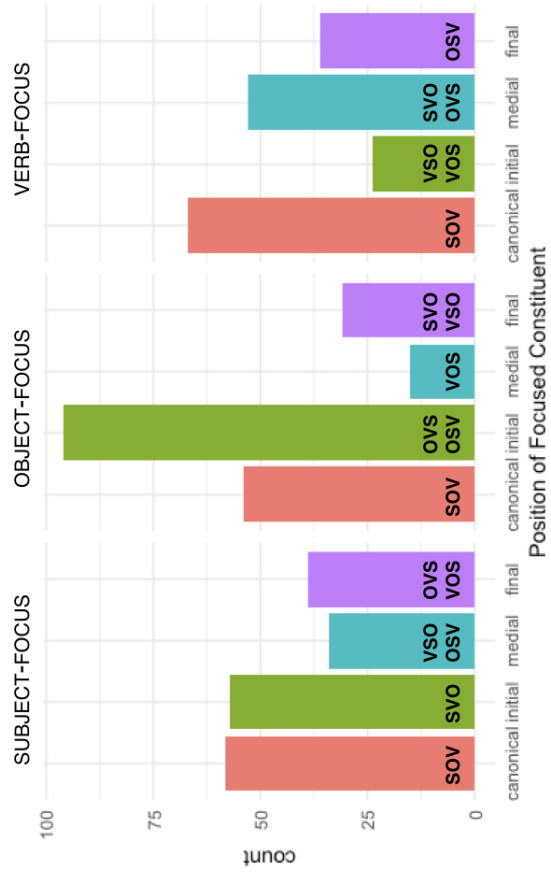
Figure 3.3: Position of focused constituents by condition. Bars represent the number of choices in which the focused constituent was in sentence-initial, -medial, or -final; canonical SOV is plotted separately. Each bar consists of different constituent orders, as labeled.

dramatic, and barely present in the subject-focus case. A preference for focus-final over focus-medial orders was expected given Herring's work on the functions associated with leftward focus movement and post-posing, but strong conclusions cannot be drawn from these results.

Moving to the verb-focus condition, there are many notable differences from the other two conditions. Firstly, the canonical SOV order was chosen most often, even though it was only an option for half of the trials represented in this panel. Among the non-canonical orders, the focus-medial orders were chosen most often, which is the opposite pattern from the other conditions. A partial explanation for this pattern can be found in Figure 3.2: rather than there being a preference for focus-medial position, the fact that participants were just as likely to choose OSV and OVS orders in the condition represented in the top-right panel, combined with SOV being in its own category as opposed to being categorized as focus-final, means that these two focus-medial orders end up being more frequent than the one focus-final order. However, this does not explain the dispreference for focus-initial orders, which sets this condition apart from the others. In fact, this is likely explained by the fact that the verb-initial orders are generally dispreferred overall, as is shown in Figure 3.4, which plots each order which was chosen, regardless of condition.

Figure 3.4 cannot be directly compared with the results from Experiment 2, which measured relative acceptability across all six orders. In this experiment, participants chose between three orders at a time, and, as shown in the other two figures, their choices depended on what the other options were and what constituent was in focus. Despite those caveats, the pattern of overall responses aligns relatively well with the general expectations about the acceptability of constituent order in Malayalam absent discourse context: SOV was chosen most often and the verb-initial orders were chosen least often, and canonical SOV was expected to have the highest acceptability in Experiment 2, while
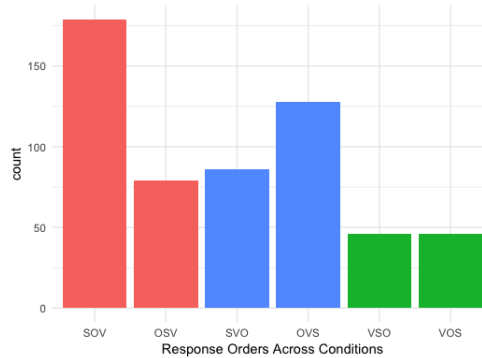
Figure 3.4: The count of all responses, across conditions. Bars are colored by verb-position.

VSO and VOS were least acceptable.

3.5 Discussion

This experiment was an initial experimental look at both the status of canonical SOV and the relationship between discourse context and constituent order in Malayalam. Below are the questions from Section 3.3.4, answered in light of the results:

1. Is SOV truly preferred no matter the context?

    • Result: **yes**

2. Are SOV and OSV distinguishable?

    • Result: **yes**

3. Are non-SOV orders sensitive to what constituent is in focus?

    • Result: **yes**

    (a) Focus-initial sentences are preferred to other focus positions.

(b) Acceptability as measured in Experiment 2 does align with the overall responses, but, as shown in Figure 3.2, this does vary depending on discourse context.

Though it is not surprising that SOV behaves as expected given previous theoretical accounts and the data presented in Section 3.1, this finding is nonetheless valuable as a confirmation that the numerical difference between SOV and OSV in Experiment 2 was likely reflective of an underlying true difference between these orders. Further, SOV is indeed chosen over OSV, even in a discourse context which is supposed to license OSV order (though slightly more people chose OSV in the object-focus condition than they did in the subject-focus condition).

While focus-initial orders were chosen most often for the subject- and object-focus sentences (as expected), there is an additional potential confound, which is the order of the context questions. The context questions in the verb-focus condition were all in either VSO or VOS order: if participants were just choosing the answer which was the same order as the context question across the board, the verb-initial orders should have been chosen most often. In addition, the context questions in the subject- and object-focus sentences *were* focus-initial. This decision made sense at the design stage of the experiment, as it allowed for uniformity across conditions: the structure of the context questions were such that it made the most sense to put the asked-about constituent first in all conditions. Though focus-initial orders were expected to be preferred, we cannot rule out that participants were matching the order of the context question when choosing the best answer to the question. However, this was not uniformly the case for the verb-focus conditions, and participants did not match the order of the question in the trials for which SOV was an option, and the alternatives in the non-SOV trials were verb-initial orders, which were the least-picked order overall. As such, while order-matching cannot be ruled out as a partial predictor of order, it likely does not drive the pattern of results we see.

3.5.1 Verb-focus and verb-initial sentences

As expected, the verb-focus sentences behaved differently from the subject- and object-focus sentences. There are several plausible explanations for this. First, the verb-focus context questions were very different from the others because they were constructed by adding a question-marker to the verb, making the context question a polar yes/no question. So, the verb-focus context questions introduced contrastive focus, unlike the other conditions in which the focused argument was asked about using a *wh*-word in the context question. These different sources of focus could lead to different order preferences, which could be tested if this experiment were run again with all conditions having contrastive focus.

It also could be that arguments and verbs differ in how they are focused. Arguments are maximal projections, while verbs are heads. Fronting of maximal projections has been shown to have information-theoretic consequences, but head-movement has not (to my knowledge) been described to be influenced by discourse context. It is the case, however, that verb-initial sentences can have focus on the verb in Malayalam (as opposed to being derived by post-posing the subject and object). Verb-initial sentences are often imperatives and questions, which have focus. Declarative verb-initial sentences often carry extra meaning: they might be used in a context where one is insisting that something happened or was done (which motivated the design of the materials in this experiment), or when the event is somewhat surprising. Examples are below:

(34) tek͡stiːṭu enːe t͡ʃeriamːa
      texted me aunt
      Aunt texted me

(35) t͡ʃaiṭu aṭe ɲaːn iɲːale
      did that i yesterday
      I did it yesterday

(34) was uttered in a context where the method of communication, texting, was unusual or unexpected, and (35) was uttered in a context where the speaker was being nagged, and he insisted that he had completed the task already. In both cases, intonational prominence was on the verb (with secondary prominence on the adverb 'yesterday' in (35)). This indicates that some aspect of discourse prominence is relevant to verb-initial sentences, but it could be that contrastive focus of the type in this experiment was simply not the right context to elicit verb-initial orders. Again, this is something which can be tested directly in an experiment designed specifically to the contexts in which verb-initial orders are used.

3.6   Conclusion

While this experiment answered the questions posed, the design was not ideal for disentangling the relationship between acceptability and discourse context in every case. For one, not all orders were compared with each other across all conditions. Also, having more trials which did not have SOV as an option could have possibly led to more information about relative preference for non-canonical orders: the presence of SOV could have washed out these distinctions. In addition, the design made statistical analysis effectively impossible, as the number of factors would yield uninterpretable results. A series of follow-up experiments which account for these issues would provide a valuable confirmation of the results presented here.

One important way in which this forced choice experiment was different from the acceptability experiment in Chapter 2 was that participants had a very clear idea what the forced choice experiment was about. In Experiment 2 from Chapter 2, one or two participants mentioned that some of the sentences sounded like they were mixed up, but this was true of many of the sentences (including fillers). Because this forced choice

experiment was so clearly about constituent order, participants could have been more likely to go with their prescriptive ideas about order in Malayalam, which would bias them further to pick SOV order[6]. Despite prescriptive rules likely biasing participants to pick SOV order, this was not the only order picked in *any* context, including the context in which the subject was in focus. Some instances of picking non-canonical orders could be considered noise, but the numbers were more around 15-20% per non-SOV order; this was not limited to one or two participants. This further confirms that non-canonical orders are not extremely peripheral constructions, but, rather, legitimate – though infrequently made – choices as answers to questions. Along with Experiment 2, this supports intuitions and theoretical claims that all six logical orders are grammatical and relatively acceptable.

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[6]During debrief conversations, participants had an idea that SOV is the "correct" order in Malayalam but that all orders are possible; there was no general intuition about the discourse contexts which allow non-canonical orders, and, unlike other rules which are taught about explicitly in grade school Malayalam classes (sandhi, the relationship between gemination and voicing, aspiration), variable constituent order is not taught about – even in graduate programs in Malayalam linguistics.

Chapter 4

Within-language Variation in Constituent Order

4.1 Experiment 4: Age differences in Malayalam constituent order

As demonstrated in Chapter 2, formal acceptability judgment experiments can provide a profile of cross-linguistic variation in constituent order, most notably, capturing differential degrees of flexibility. Here, I extend the approach introduced in Chapter 2 to investigate inter-speaker variation in constituent order, and I show inter-speaker variation in constituent order within a community of Malayalam-speakers residing in India: younger speakers of Malayalam exhibit reduced flexibility in constituent order as compared to older speakers. I conclude the chapter with a discussion of possible sources of this pattern, and argue for language contact as a likely source of inter-speaker variation in constituent order.

Many examples of variation across language varieties in both canonical order and 'flexibility' (in a non-technical sense) have been described; for example, West

Rumelian Turkish, a variety spoken in Macedonia described in Friedman (2003), has a canonical SVO order, though Turkish is canonically SOV. (Campbell, 1980,) describes an immigrant variety of Finnish spoken in the United States, American Finnish, as being rigidly SVO, unlike Standard Finnish, which makes wide use of several non-canonical orders[1]. In addition, changes to canonical order and flexibility have been described within the same variety over different time points. Perhaps the most studied example is that of English, which went from being a canonically SOV language in which many grammatical non-canonical orders were attested to a canonically SVO language which only has one grammatical non-canonical order and is relatively rigid (Kroch et al. 2000; Chapter 2 of this thesis). Another notable example is that of the Romance languages: Latin was a canonically verb-final language with very flexible constituent order (Spevak 2010). However, none of the Romance languages that derived from Latin have verb-final order, and, though the languages and varieties differ in how flexible they are, none approach the level of flexibility ascribed to Latin (e.g., Olarrea 2012). These types of changes are relatively common, and one does not have to look far beyond the Indo-European language family to find more examples: Mande went from being canonically SVO to canonically SOV (Claudi 1994), Mandarin went from being canonically SOV to SVO (Li & Thompson 1974), Tai Khamti went from being canonically SVO to allowing SVO and SOV in neutral contexts (Morey 2006), and Takia and Maisin are two rigidly SOV Austronesian languages which were historically VSO (Ross 1996).

The study presented here differs from previous work in two significant ways. First, the participants are all dominant in Malayalam, and they grew up and currently live in the part of India where Malayalam is the majority language. This is unlike the cases of synchronic variation mentioned earlier, which are comparisons of *in situ* with *ex situ* varieties spoken by communities which are embedded in the majority language (or

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[1]See also work on heritage Norwegian in the United States (Westergaard, forthcoming) and immigrant varieties of Turkish in the Netherlands (Onar Valk, 2013)

languages) of the region. Speakers in *ex situ* communities are often undergoing language shift, and many may be dominant in the majority language, which is not the case for the participants in this study.

The expectation of relatively subtle inter-speaker differences leads to the second contribution of the present study, which is methodological. Formal acceptability judgment experiments can detect small differences between grammatical sentences, differences which are difficult to perceive using informal methods. As such, it is reasonable to approach this experiment with the expectation that this methodology can detect systematic inter-speaker variation, even if that variation is not consciously perceptible to the speakers themselves.

4.2   Methods

4.2.1   Participants

This experiment was conducted in August-September 2016 in Kerala, the Malayalam-speaking region of India. There is no literature which claims that constituent order varies by speech community in Malayalam, and neither my informal observations nor extensive speaker interviews have yielded spontaneous mention of this as a dimension along which varieties of Malayalam differ. Of course, this does not rule out the existence of variation, so I took into account several demographic factors when recruiting participants. Varieties of Malayalam differ along two main dimensions: region and caste/religion; some caste- and religion-associated varieties have their own designations in Ethnologue, along with regional varieties. Due to social changes, caste- and religion-based variants are leveling[2], but there is no evidence that the same is happening for regional variants (Namboodiripad,

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[2]Some examples include de-aspiration of voiced consonants, use of English familial terms as opposed to variety-specific terms which would index identity, and reduction or loss of politeness distinctions in the imperative verbal paradigm.

U. 1989). For this reason, participants were recruited from different communities within a single region.

The majority of participants (35/51) were recruited in and around the village of Cherpu which is in the Thrissur district, central Kerala (Figure 4.1a). The rest were from Poonkunnam, a suburb of the city of Thrissur (9/51) and Trikkur (7/51), a small community nearby. Figure 4.1b shows the relative locations of all three fieldsites; Poonkunnam is about 9 miles from Cherpu, and Trikkur is about 7 miles away.

51 (28 female) Malayalam-speakers residing in central Kerala participated. 6 participants were eliminated because they did not name Malayalam as the sole language with which they were most comfortable[3], and data was lost for 2 participants due to a technical error. This left 43 (22 female) participants whose responses were analyzed. All participants had at least a 10th-grade education (equivalent to a high school diploma); 37/43 had some type of higher education (the equivalent of a U.S associate's degrees or higher), and the other 6 were currently pursuing higher education. The level of educational attainment in this group is relatively high compared to averages in Kerala, where about half of adults 15-49 have completed 10th grade (Dilip 2010, citing the Indian National Family Health Survey from 2005-2006), but, as about 90% of people who entered school between 1996 and 2006 have completed 10th grade (this applies to the younger participants in this study), I wanted to ensure that education levels were relatively uniform across age groups, though education levels are not uniform across the population in Kerala as a whole[4].

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[3]These speakers grew up speaking Tamil at home as a heritage language, and named Malayalam and Tamil or just Tamil as the language(s) they were most comfortable speaking; the other named Malayalam and English.

[4]Such educational differences across generations are not uncommon in apparent-time studies, and they go into the calculation of SES. Holding SES constant across apparent-time cohorts is a common strategy (e.g., Labov 1966), but, as education is associated with other SES measures in a different way in this population than in the United States context, I held education constant and sampled from a variety of economic strata.
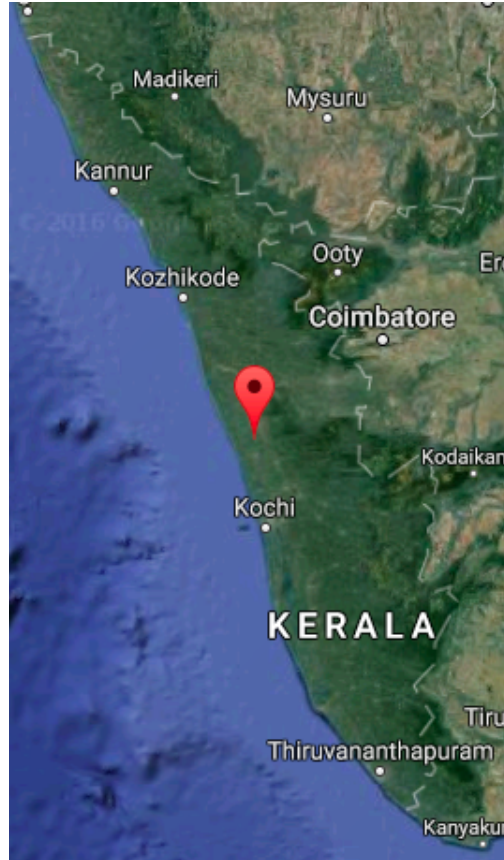
(a) Location of Cherpu, Kerala.
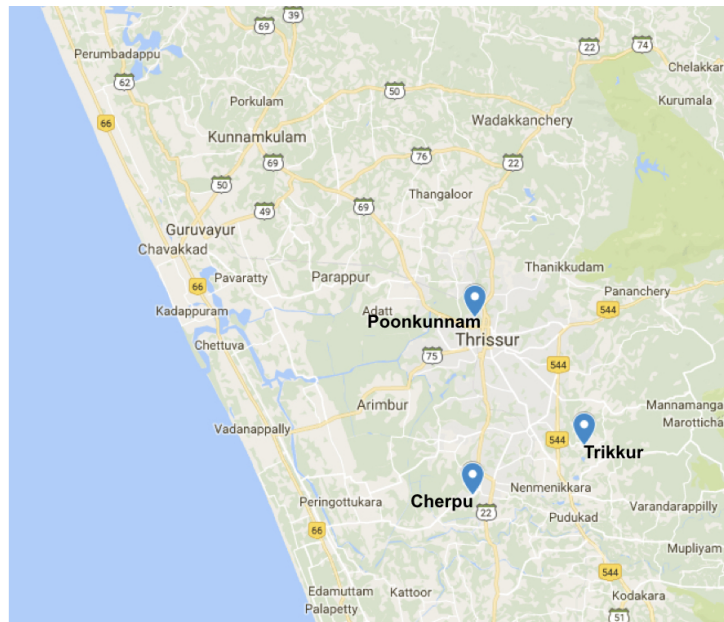
(b) Locations of Cherpu, Poonkunnam, and Trikkur.

Figure 4.1: Fieldsites for Experiment 4 in Central Kerala, India. Images taken from Google Maps.

4.2.2 Procedure

The experiment was conducted in the participants' home or in a quiet area of their workplace, on a laptop using the built-in rating program in Praat (Boersma & Weenink 2013). Participants heard the stimuli through Sony MDR7506 headphones. All participants heard the same 4 practice sentences (two ungrammatical, one grammatical and short, and one grammatical and long) at the beginning of the experiment in order to give them an idea of the types of sentences they would be hearing. Participants were instructed to rate sentences from 1-7 based on their opinion about how good the sentence sounded as regular, everyday sentences in Malayalam[5]. If a participant felt uncomfortable interacting with the computer, they could simply say the 1 - 7 rating out loud, and I would enter their response for them; I arrived at this accommodation after piloting the task with an older participant. In order to avoid interference from any inadvertent changes in my expressions during the course of the experiment, I told the participants that I would not know what sentence they were hearing at a given moment, I turned the screen away from them to avoid interference from the position of the cursor, and I avoided eye-contact as much as possible.

After the experiment, I conducted a language background survey. The list of questions asked are in Table 4.1, in the order that they were asked:

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[5]As opposed to the written language; Malayalam speakers are aware of the diglossia present in the language. There is a specific term for the written form of the language (*eɽuʈːə bʰaːʃa*, lit. 'writing-language') against which I contrasted these stimuli.

Table 4.1: Language Background Survey Questions

QUESTION	CATEGORY
Age	demographic
Medium of Education	language use/exposure
Level of Educational attainment	language use/exposure
Time lived outside of Kerala	language use/exposure
Language most comfortable speaking	language use/exposure
Language most comfortable writing	language use/exposure
Language most comfortable other than Malayalam	language use/exposure
Level of engagement with English media	language exposure/attitude
Language preferred to read the newspaper	language exposure/attitude
Language preferred to watch the news	language exposure/attitude
In what contexts do you use only English?	language use/exposure
Do you speak English with other Malayalees?	language use/attitude
Do you speak English in Kerala?	language use/attitude
Do you code-switch?	language use/attitudes
Are you troubled by code-switching?	language attitude
What do you think about the future of Malayalam?	language attitude
Level of English speaking proficiency (non-academic)	language use
Level of English writing proficiency (non-academic)	language use

All interactions were conducted in Malayalam, though the written information (consent forms, written instructions for the experiment) was in English. No participant had noticeable difficulty understanding any instructions or forms, and the language surveys later confirmed that all participants were moderately to fully proficient in reading English.

4.2.3 Materials

This experiment had a 1x6 design; participants heard four tokens from each of 6 conditions: SOV, OSV, SVO, OVS, VSO, and VOS. Sentences consisted of animate subjects, inanimate objects, and transitive verbs. The subjects were descriptions or professions (e.g., *koɖiːʃvaran* 'millionaire', *viɖʱava* 'widow', *miɖikːikːuʈːi* 'smart-girl'), and preceded by a demonstrative: *aː* 'that'. Malayalam does not have a definite article

which would correspond to English 'the', and, since Experiment 2 used proper names and pronouns, which are definite, this strategy allowed for the subjects to be definite as in the previous experiment. Objects were preceded with the indefinite article *oru* unless it did not make sense given the sentence, as in (36). Here, 'mango' receives no overt number marking, and is unmarked for number, giving it a mass noun interpretation:

(36) maːŋa upːiliʈːu aː ḏehaɳakːaːran
      mango pickled that caterer

      That caterer pickled (some) mango.

The presence or absence of the indefinite articles and demonstratives was held constant across conditions for a given lexicalization set; the sentence in (36) is in OVS order, but *maːŋa* 'mango' appeared without an indefinite article in each of the 6 conditions. Interactions between definiteness and order have been well-documented in other languages, with a general preference for definites before indefinites; the extent to which this holds in Malayalam requires further systematic investigation. As such, I opted for uniformity across conditions and decided on the combination that sounded most natural in all orders.

Verbs were in past tense, and objects and verbs generally were related in order that the sentences would describe a coherent event (e.g., *t͡ʃaːja* 'tea' with *ṯiḻapːit͡ʃːu* 'boiled' and *kuḍa* 'umbrella' with *viḍarṯːi* 'unfurled').

24 lexicalization sets were created, and stimuli were counterbalanced and distributed into 6 lists using a Latin Square. Sample stimuli are in Table 4.2.

In addition to the 24 experimental items, there were three types of filler sentences. The first group of fillers were 24 ungrammatical sentence constructed following the same principles as the experimental items: four sentences with animate subjects, inanimate objects, and transitive verbs in each of the 6 logical orders. However, the objects received incorrect morphological marking (e.g., genitive, locative, or dative case-marking as

Table 4.2: Experiment 4 sample stimuli 'That singer bought a drum'

CONDITION	SAMPLE STIMULUS
SOV	aː paːʈːəkaːri oru mr̩ʈaŋkam vaːŋi that singer.FEM a mrthankam.drum bought
OSV	oru mr̩ʈaŋkam aː paːʈːəkaːri vaːŋi a mrthankam.drum that singer.FEM bought
SVO	aː paːʈːəkaːri vaːŋi oru mr̩ʈaŋkam that singer.FEM bought a mrthankam.drum
OVS	oru mr̩ʈaŋkam vaːŋi aː paːʈːəkaːri a mrthankam.drum bought that singer.FEM
VSO	vaːŋi aː paːʈːəkaːri oru mr̩ʈaŋkam bought that singer.FEM a mrthankam.drum
VOS	vaːŋi oru mr̩ʈaŋkam aː paːʈːəkaːri bought a mrthankam.drum that singer.FEM

opposed to being unmarked for case, or plural marking in singular contexts), making the sentences ungrammatical. These fillers were added to make the ratio of ungrammatical and grammatical sentences more balanced, as compared to Experiment 2, and in order to see if the pattern of acceptability for the ungrammatical sentences mirrored that of the grammatical sentences. An example from this ungrammatical filler set is in Table 4.3.

Table 4.3: Experiment 4 sample morphological error fillers *'That loudmouth.girl burnt coconuthusk's'

CONDITION	SAMPLE STIMULUS
SOV	aː ʋajːaːɖikːuʈi t͡ʃakiriːʈe kaʈ̪ːit͡ʃːu that loudmouth.girl coconuthusk.DATIVE burnt
OSV	t͡ʃakiriːʈe aː ʋajːaːɖikːuʈi kaʈ̪ːit͡ʃːu coconuthusk.DATIVE that loudmouth.girl burnt
SVO	aː ʋajːaːɖikːuʈi kaʈ̪ːit͡ʃːu t͡ʃakiriːʈe that loudmouth.girl burnt coconuthusk.DATIVE
OVS	t͡ʃakiriːʈe kaʈ̪ːit͡ʃːu aː ʋajːaːɖikːuʈi coconuthusk.DATIVE burnt that loudmouth.girl
VSO	kaʈ̪ːit͡ʃːu aː ʋajːaːɖikːuʈi oru t͡ʃakiriːʈe burnt that loudmouth.girl coconuthusk.DATIVE
VOS	kaʈ̪ːit͡ʃːu t͡ʃakiriːʈe aː ʋajːaːɖikːuʈi burnt coconuthusk.DATIVE that loudmouth.girl

The inclusion of *aː* 'that' in front of the subject in these sentences was crucial, as this meant that the dative ending on *t͡ʃakiri*[6] 'coconut husk' could not be interpreted as being part of the subject: this ruled out a interpretations like '(someone) burnt coconut husk's loudmouth girl' or 'coconut husk's loudmouth girl burnt (someone/something).'

In addition, there were 18 bi-clausal fillers from a subexperiment on adjunct islands, a subset of the 24 sentences used as fillers in Experiment 2. Along with the 4 practice sentences mentioned before, each participant heard a total of 70 sentences.

4.3   Motivating age as a predictor of variation

This study is an exploration of systematic variation in Malayalam constituent order. By systematic variation, I mean variation which can be predicted by some factor, and here, I chose AGE as the predictor for variation in constituent order. Typically, the choice of predictor is based on informal observations from which formal hypotheses are constructed. However, constituent order is not a salient sociolinguistic variable in this population; while speakers were aware of many lexical, prosodic, and phonemic indices of group membership, no mention was ever made of constituent order. Likewise, my own informal observations did not yield any clear patterns. Though speakers do not have a strong intuition about the relationship between constituent order and any particular demographic variable, there are several reasons *a priori* to pick AGE as a predictor.

First, Malayalam is undergoing changes at all levels of the grammar, and the differences between the speech of younger and older Malayalam speakers residing in India is especially salient. As noted in previous research and my own fieldwork, there are many examples of phonological changes, including loss of voicing distinction in

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[6]This is a mass noun in Malayalam.

aspirated consonants[7], loss of palatalization across several consonants[8], and inconsistent use of geminates[9]. As is common, younger speakers are accused by both their elders and their peers of having improper or non-standard grammar, which is a further indication of language change. Finally, using age as a variable is a common practice to study variation and change in sociolinguistics. The apparent-time construct, most prominently used by Labov (e.g. 1963, 1966, but also Bailey 2002), divides speakers into age cohorts and treats differences between age cohorts as evidence of generational change. Though this construct is widely used, there are many legitimate criticisms of the underlying assumptions involved (e.g., Bowie 2005). Most critically, the assumption that differences between older and younger age cohorts only reflects language change to the exclusion of any number of other factors is complicated by research which looks at language change across the lifespan (e.g., Thrainsson 2012, Sankoff et al. 2001) and cognitive decline (e.g., Caplan and Waters 1999), as these focus on how individuals follow the patterns of change in the community at large even after passing through early stages of acquisition and adolescence. As such, while I do compare older speakers with younger speakers, I do not assume *a priori* that language change is the (sole) explanation for any between-group differences.

4.4   Results

Raw numerical responses on the 1-7 scale were transformed into z-scores in order to account for individual variation in how the scale was used. Participants were split into two groups, with those older than the median age of 44 in the OLDER category and those

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[7]/bʰ/</pʰ/

[8]Examples from the Namboodiri dialect include ɾʲ<ɾ and ɕ<ʃ as show in 'moon' daɾʲɕanam<daɾʃanam, as well as d͡ʒʲ<d͡ʒ as in 'ego/ostentatiousness' d͡ʒʲaːɖa<d͡ʒaːɖa (Namboodiripad, U. 1989, p.c.; Namboodiripad & Garellek 2016)

[9]e.g., 'great': asːalə<asalə in casual speech.

younger than 44 in the YOUNGER category. The mean age of the older group was 64.41 (N=20); mean age of the younger group was 28.45 (N=23). A median split was chosen over a larger number of cohorts in order to have enough statistical power. The distribution of ages was not uniform enough to create a third group of middle-aged speakers; there were fewer middle-aged speakers as compared to younger and older speakers, so it was not possible to create three groups with a relatively equal number of participants.

4.4.1 Main results

Results are plotted in Figure 4.2. I conducted a linear mixed effects model in R using the `lme4` statistics package (Bates et al. 2015) for each group (YOUNGER and OLDER) with ZSCORE[10] and ORDER as fixed effects, and ITEM and PARTICIPANT as random effects. A model comparison[11] showed that CONDITION significantly predicted acceptability for both groups ($p < 0.001$ for YOUNGER; $p < 0.02$ for OLDER)[12].

I also conducted the model with the raw responses instead of z-scores; this did not change the pattern of results, and I choose to focus on the z-score analysis because it accounts specifically for variation between participants in how the scale was used (as opposed to other sources of between-participant variation, which are accounted for by included PARTICIPANT as a random effect). Figure 4.3 shows the results using the raw responses as opposed to z-scores. I include this here because, as mentioned in the methods section, among the sentences heard by the participants was a sub-experiment in

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[10]Z-scores were computed within participant across all items.

[11]I conducted an ANOVA comparing a model with CONDITION to a null model without CONDITION

[12]Because VERB POSITION was relevant for the results in Experiment 2, I conducted an additional analysis with ZSCORE and VERB POSITION as random effects, and ITEM and PARTICIPANT as fixed effects. A model comparison showed that VERB POSITION was also a significant predictor of acceptability for both groups ($p < 0.001$ for YOUNGER; $p < 0.002$ for OLDER). A comparison of the ORDER and VERB POSITION models (using an ANOVA) showed that ORDER out-performed VERB POSITION for the younger participants, but not for the older participants. This is likely explained by the fact that SOV is significantly more acceptable than OSV for the younger group, but not the older. I include this additional analysis here solely for parity between Experiment 2 and the current experiment.
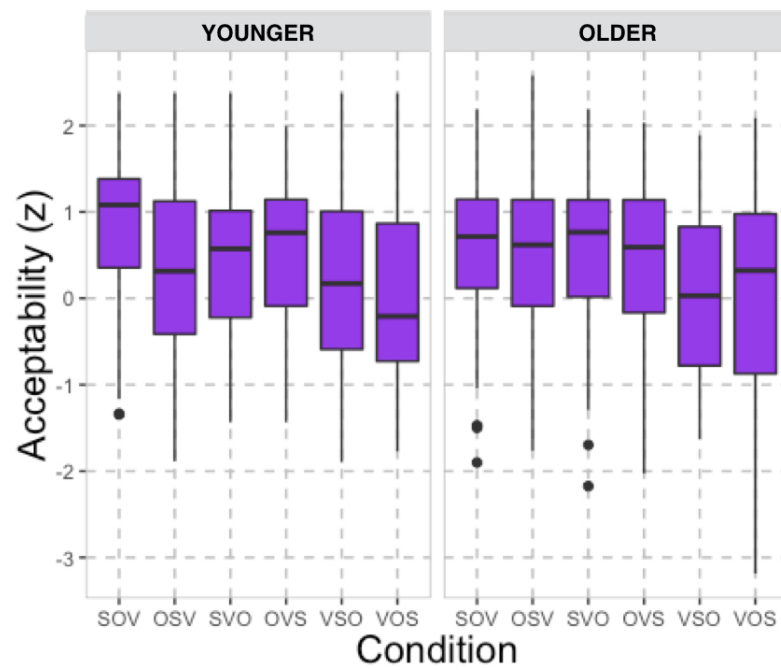
Figure 4.2: Box-and-whisker plots of z-score acceptability rating of constituent order by AGE. The dots are outliers.
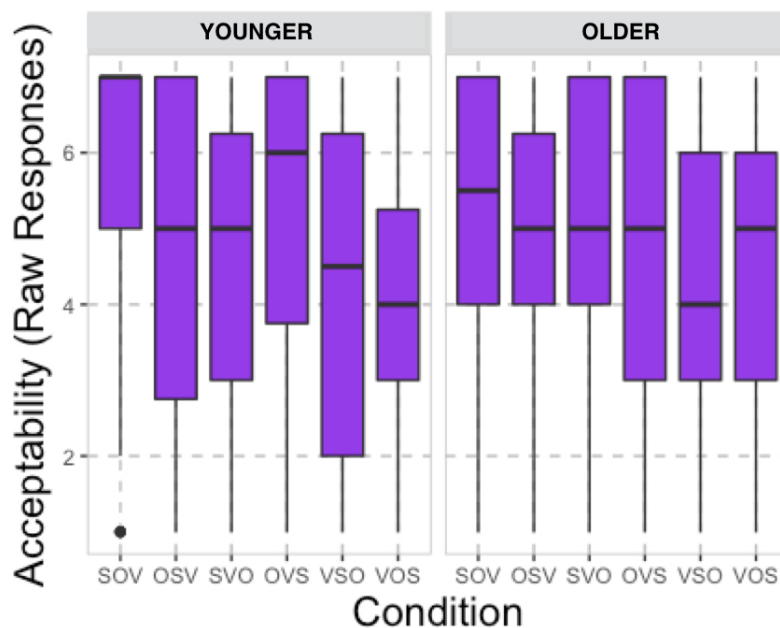
Figure 4.3: Box-and-whisker plots of raw acceptability ratings of constituent order by AGE. The dots are outliers.

which older and younger participants could have had different responses, which would have led to different relative z-scores. As such, it is important to confirm that systematic differences in responses to the sub-experimental items did not affect the pattern of responses in this experiment, and, indeed, there is no evidence that this occurred.

For both younger and older participants, the verb-initial VSO and VOS orders were least acceptable. For the younger group, canonical SOV has the highest mean acceptability numerically, which is not the case for the older group; this is most clearly seen in Figure 4.3, where the dark horizontal line representing the mean responses for the younger group is at ceiling for SOV, while this is not the case for the older group.

Because there are 6 levels for the factor ORDER, the fact that it is a significant predictor of ZSCORE does not provide details about the relative acceptability of each of the 6 conditions. Furthermore, the operational definition of flexibility as discussed in Chapter

2 is specifically about the relative acceptability of canonical and non-canonical orders. As such, I releveled the model, treating canonical SOV as the contrast variable. In Figures 4.4a and 4.4b, I have plotted the standardized fixed effects of this releveled modelFixed effects = ORDER & ACCEPTABILITY; random intercepts = ITEM & PARTICIPANT. Fixed effects were coded against SOV, the mean acceptability of which is represented by the dotted line. Dots represent model coefficients (distance from SOV) for each condition. The number is the model coefficient, and asterisks represent statistical significance (threshold of $p < 0.05$). Bars = 95% confidence intervals.. The dotted line represents the mean acceptability of canonical SOV for each group, and the points show the mean difference in z-scored acceptability from SOV for each condition.

4.4.2 Age as a continuous variable

The main finding is that canonical SOV is significantly higher in acceptability when compared to the non-canonical orders for the younger group, but not the older group. Given my operational measure of flexibility, this means that younger speakers have a less flexible system than older speakers. However, the differences between groups are relatively small, and a model which combined both groups together and treated group membership (YOUNGER versus OLDER) as a covariate did not find group membership to be a significant predictor of ZSCORE given ORDER. Plotting the results with AGE as a continuous variable (Figure 4.5) shows that acceptability of SOV, OSV, and VOS orders are distributed relatively uniformly across ages; this likely explains why AGE was not a significant predictor of acceptability in a model that had all six orders as levels of the factor ORDER. Importantly, this figure also shows that age does not correspond to higher acceptability across the board; this could be a possible explanation of the between-group differences, and it is not borne out (more on this in Section 4.4.3).

Visually, the distributions of SOV and OSV do not look very uniform across ages;
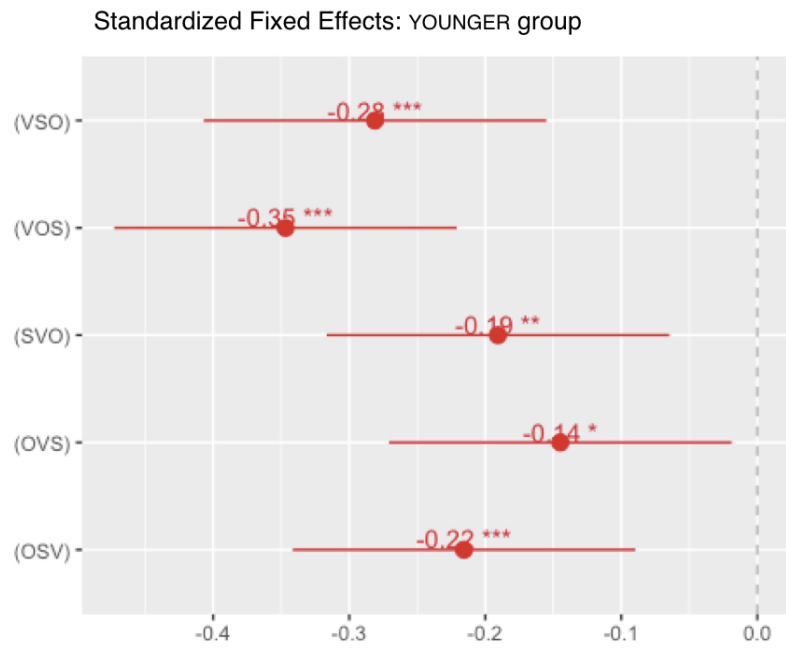
(a) Coefficient plot of the standardized fixed effects in the linear mixed-effects model for the younger group
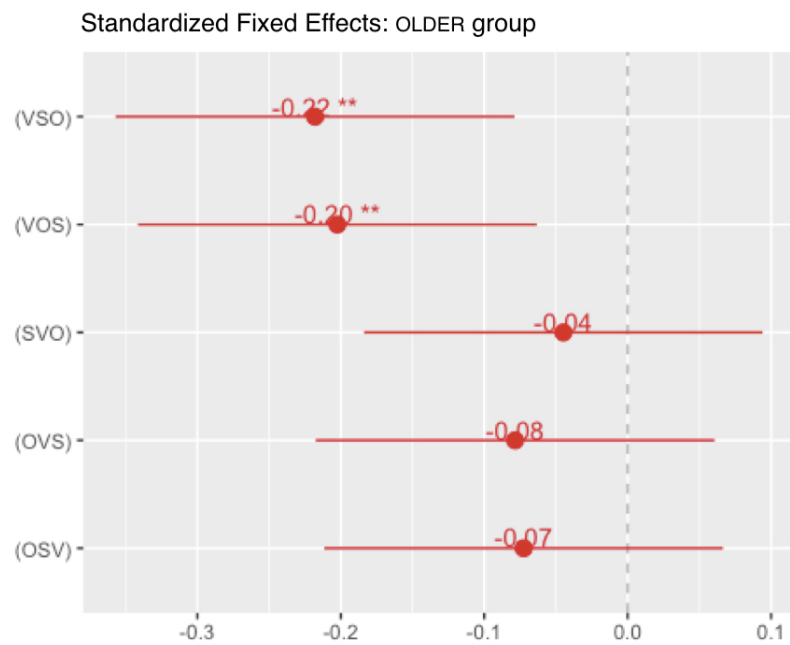
(b) Coefficient plot of the standardized fixed effects in a linear mixed-effects model for the older group.

Figure 4.4: Coefficient plot for the younger and older groups.
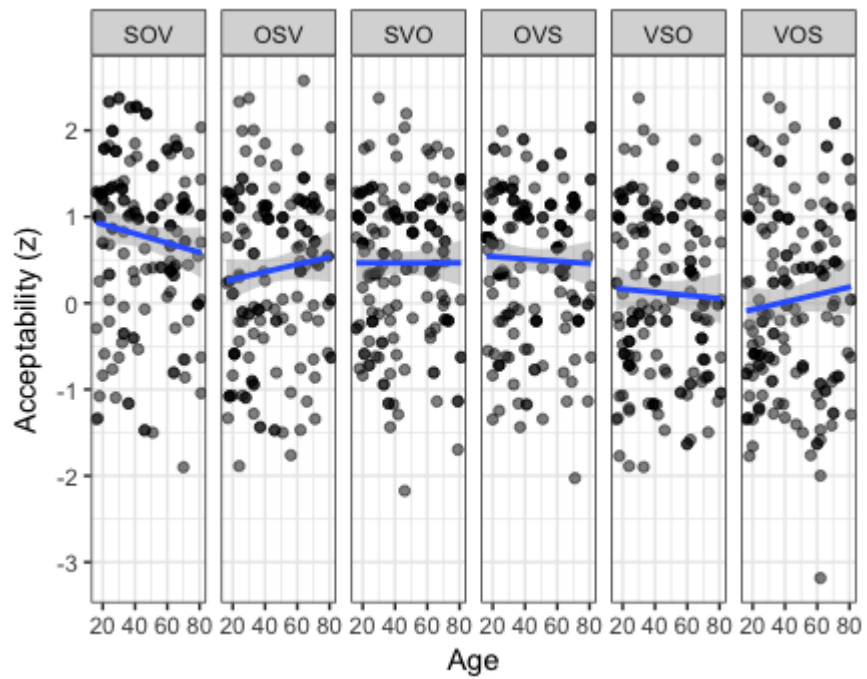
Figure 4.5: Scatter plot of z-scored acceptability ratings of constituent order, with AGE plotted continuously on the x-axis. The line represents a linear model fit, and the shaded areas represent a 95% confidence interval. Each dot represents a single z-scored acceptability rating.
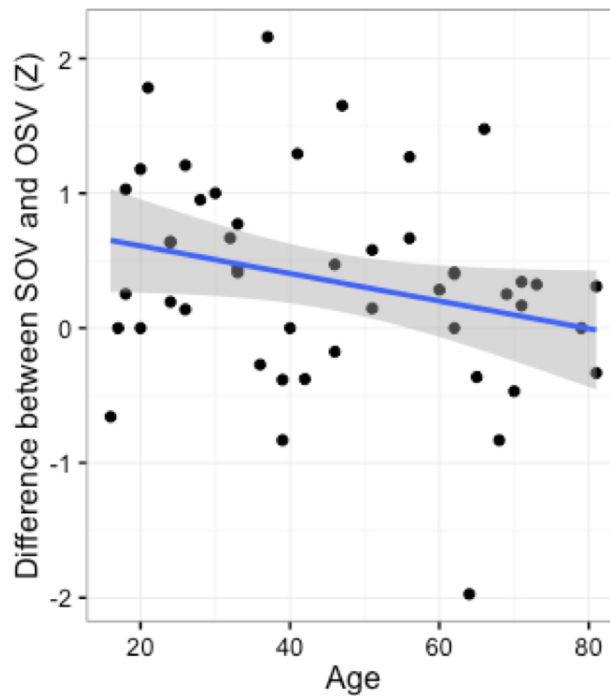
Figure 4.6: Scatter plot of the difference in z-scored acceptability between mean SOV and OSV for each participant; AGE is plotted continuously on the x-axis. The line = a linear model fit; the shaded areas = a 95% confidence interval.

the acceptability of SOV seems to decrease slightly with age, and the acceptability of OSV seems to slightly increase with age, but analyzing SOV and OSV separately from all other orders, there is not a significant correlation between these conditions individually and AGE. However, the difference between SOV and OSV is negatively correlated with age (Figure 4.6), though this correlation is small (Pearson's r=-.27) and just marginally significant (p<0.064).

4.4.3 Filler items

Before moving to the discussion of these results, I address a possible explanation for the difference between the two groups: it could be that the older participants just give higher acceptability ratings overall, which would account for why they do not show a big
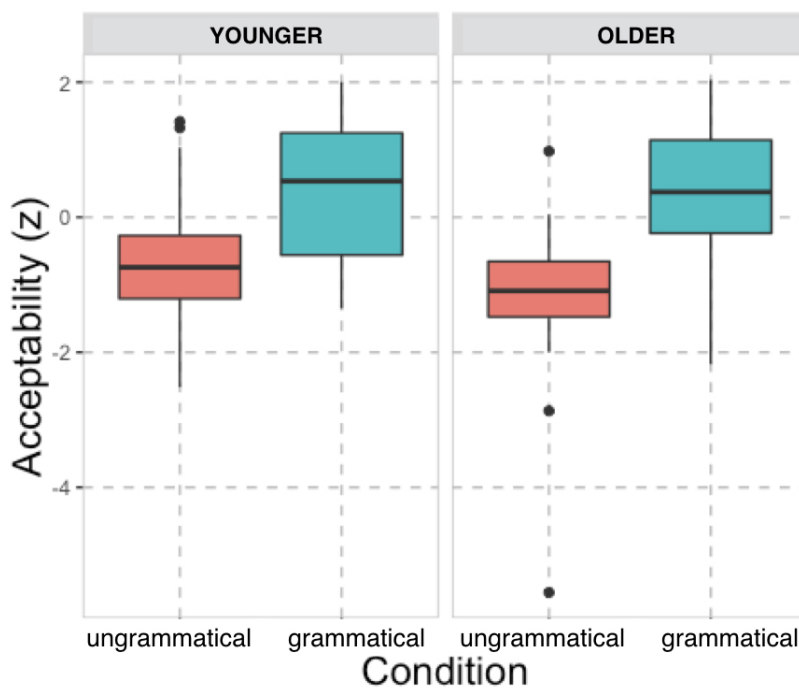
Figure 4.7: Box-and-whisker plots of z-scored acceptability rating of filler items by AGE. The dots are outliers.

difference between canonical and non-canonical orders. I present two pieces of evidence against this as an explanation for the between-group differences: First, a comparison of clearly ungrammatical and grammatical filler items across groups, and, second, a look at the effect of word order in ungrammatical sentences.

Figure 4.7 shows the acceptability of grammatical and ungrammatical filler items; there is no interaction of AGE with ACCEPTABILITY, and it is evident that the older participants do not give higher acceptability scores for these filler items. In fact, on average, they have a slightly lower mean acceptability score for ungrammatical fillers than do younger speakers.

Figure 4.8 shows the responses for the ungrammatical word order fillers, as described in Table 4.3. While the expectations about and theoretical implications of differential acceptability within ungrammatical sentences deserves its own investigation,
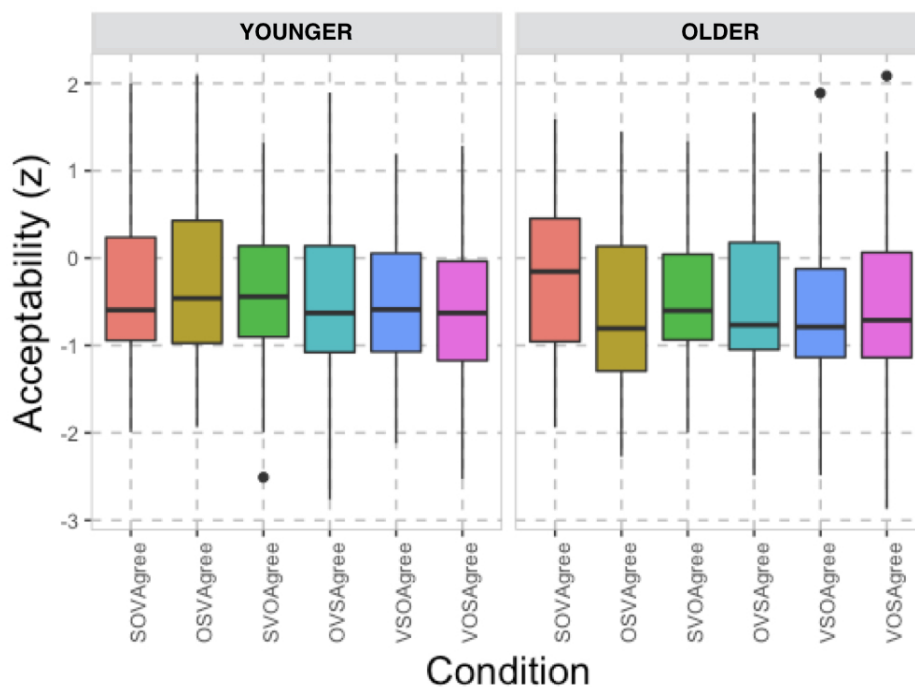
Figure 4.8: Box-and-whisker plots of z-scored acceptability rating of ungrammatical morphological error filler items by AGE. The dots are outliers.

in the context of this study, I present these results to show that the pattern found in the grammatical sentences is not found in the ungrammatical sentences. Showing the exact opposite pattern from the grammatical sentences, older participants found SOV sentences to be more relatively acceptable than younger participants. This demonstrates that the difference between younger and older participants in the main experiment, though it is small, is a property of the participants' differential responses to the experimental items, not due to them performing the task differently in general.

4.4.4 Summary of results

Table 4.4 summarizes the results presented in this section, with mean z-scores (as plotted in Figure 4.2) and the mean distance of each non-canonical order from canonical

SOV[13]. For both groups, canonical SOV had the highest acceptability. However, the difference between SOV and the non-canonical orders was far more pronounced for the younger group than it was for the older group. For the older group, only the verb-initial VSO and VOS orders were significantly different from SOV. For the younger group, all non-canonical orders were significantly different from SOV, and the size of the effects was larger for each condition.

4.5 Discussion

The main finding of this experiment was that the younger group of participants had higher relative acceptability for canonical SOV order than did the older participants, for whom there was no statistically significant difference between canonical SOV and several of the non-canonical orders. This translates to reduced acceptability in younger speakers as compared to older speakers. What is the source of this difference? I consider three possibilities: cognitive decline, entrenchment/lifetime experience, and language contact. Though it is not possible to truly separate differential performance on this task from language variation, I argue that language variation is a more likely explanation of these results.

4.5.1 Cognitive decline

The most salient difference between these groups is that one group is older than the other. As such, cognitive decline is a possible source of between-group variation; that is, speakers could have the same conception of Malayalam grammar, but age differences could lead to differential performance on this task[14]. Waters & Caplan (2001) collected

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[13]n.b. This is different from (but related to) what is plotted in Figures 4.4a and 4.4b, which are the standardized fixed effects of the model.

[14]If there are consistent differences across tasks between younger and older people, the extent to which this is indistinguishable from a difference in speakers' grammars is a philosophical question: that is, one

Table 4.4: Summary of Experiment 4. Asterisks represent conditions which were significantly different from canonical SOV, as measured by linear mixed-effects models (CONDITION and Z-SCORE = fixed effects with SOV as the contrast variable); ITEM and PARTICIPANT = random effects).

CONDITION	SAMPLE STIMULUS	YOUNGER		OLDER	
		MEAN Z-SCORE	DIST. FROM SOV	MEAN Z-SCORE	DIST. FROM SOV
SOV	that singer a drum bought	0.91	na	0.63	na
OSV	a drum that singer bought	0.33	-0.57***	0.44	-0.19
SVO	that singer bought a drum	0.41	-0.50*	0.53	-0.10
OVS	a drum bought that singer	0.53	-0.38**	0.48	-0.15
VSO	bought that singer a drum	0.17	-0.74***	0.05	-0.57**
VOS	bought a drum that singer	0.004	-0.90***	0.07	-0.07**

reading times and acceptability judgments[15] from English speakers aged 18-90, and correlated these to different measures of working memory. Older participants had lower performance on working memory tasks than did younger participants, which the authors predicted would correspond to slower reading times and lower acceptability scores. In fact, the authors found that the acceptability scores did correlate with lower working memory abilities, and older participants gave lower acceptability scores for more complex but grammatical sentences[16].

Taking the present results in this context, we would have expected older participants to give lower acceptability scores for the non-canonical orders than did the younger speakers, or, at least, we would expect the older speakers to have lower acceptability for non-canonical as compared to canonical orders. As discussed in previous chapters, non-canonical orders are more complex than canonical orders in several ways, which leads us to expect these orders to have lower acceptability. However, the older Malayalam speakers showed the opposite pattern – higher relative acceptability for the more complex non-canonical orders – which suggests that the differences in acceptability are not due to cognitive decline of the type described by Waters & Caplan.

I did not conduct working memory measures, so it is in theory possible that the older participants actually have similar working memory measures as younger participants (or higher), though it seems unlikely. Another possibility is that perhaps the non-canonical constituent orders in Malayalam are not analogous to the sentences used by Waters & Caplan; the non-canonical constituent orders in Experiment 4 are less

could argue that consistent behavioral differences between younger and older speakers could mean that older speakers' grammars are always different from younger speakers' grammars. Because I know of no evidence to support this (more work on aging and language remains to be done), I assume here that differences due to cognitive decline are not equivalent to differences in speakers' grammars.

[15]Stimuli ranged in complexity and included both grammatical and ungrammatical sentences.

[16]For all participants, sentences with subject relative clauses, like *The father read the book that terrified the child.*, were more acceptable than sentences with object relative clauses, like *The man that the fire injured called the doctor.* However, there was an interaction with age, and subject relative clauses were rated lower by older speakers than by younger speakers. The authors did not find the same pattern with online measures.

complex than the subject and object relative clauses, so it could be that they are less subject to working memory-related age effects. There are not enough studies of age differences in acceptability of different sentence types to know for sure, but this does raise interesting questions (which will not be addressed here) about possible categorical differences between sub-areas of syntax. Regardless, neither of these possibilities have to do directly with cognitive decline, which is unlikely to be an explanatory factor in this experiment.

4.5.2 Greater lifetime language exposure

Another possible explanation of these results relies on a completely different conception of the relationship between age and constituent order than the one discussed in Section 4.5.1: older speakers could have increased acceptability for non-canonical orders because of lifelong experience with Malayalam[17]. Non-canonical orders result in processing difficulty and reduced acceptability, but, as in other domains, increased practice with these relatively difficult constructions could lead to decreased difficulty. Malayalam speakers use non-canonical orders frequently; it could be that whatever causes the relative difficulty in producing and processing these sentences, over the course of a lifetime, becomes so routinized that it results in little-to-no difficulty by middle-age (i.e., the younger of the old participants). This would explain the result that verb-initial orders, which are most complex syntactically and from a discourse-perspective, were the only orders which were significantly lower in acceptability than SOV for the older speakers.

Taking this view, we would expect the younger speakers in this experiment to show smaller differences between canonical and non-canonical orders if they complete this task in the future. This is a fascinating possibility; though I do not know of published psycholinguistic studies which find this pattern of results, it aligns with theories which

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[17]Thanks to Shota Momma for suggesting this possibility.

consider acquisition to be a lifelong process. This account would predict that older English speakers have less difficulty with long-distance dependencies than younger speakers do simply because of greater exposure to these dependencies. In addition, because practice effects depend on frequency, we would expect any reduction of processing difficulty for older speakers to be greater for more frequent constructions than for less frequent constructions. I am not aware of studies which show this, though frequency does have an effect on language change in other morphosyntactic domains (e.g., Bybee 2006; Diessel 2007).

Regardless, understanding more about the expected differences between younger and older participants on tasks is crucial for research which applies psycholinguistic methods to variation, change, and language documentation. Working with older speakers is often the only option in cases of language shift, and the apparent time construct is much more practical than conducting longitudinal studies. Knowing more about how aging affects language processing, production, and metalinguistic abilities would allow researchers to control for confounds and better interpret results while still having all of the advantages which come with more precise and fine-grained measures.

4.5.3   Language Contact

The next most salient difference between these groups is their level of contact with English. A more detailed description of the language use and attitudes of these speakers merits its own discussion; here, I cover three key points which support language contact as a possible explanation of the results presented here: younger speakers have earlier and more exposure to English than older speakers, there are contact-induced changes in other areas of the grammar, and reduction in flexibility of the type seen here has been described as a contact effect on constituent order.

Exposure to English

About one-third of young people in Kerala are in English immersion grade schools (Kindergarten-Grade 10), and that number is growing (Kerala 2011). Enrollments in schools where the language of instruction is Malayalam are declining, and my interviews confirmed what scholars have observed about other parts of India (e.g. Nakassis & Searle 2013): the growing middle class views proficiency in English as a crucial element of social and economic mobility. This stance is of course not limited to India, but the education policies and socioeconomic realities in Kerala mean that English-immersion education is more accessible (and, after Grade 10, unavoidable) in Kerala than in other parts of the country. However, this is a relatively recent possibility; before the 1970s and '80s, English-immersion education was only available to the very elite, and none of the participants over 50 attended a grade school where English was the language of instruction. As such, the younger and older groups differ as to age of immersion and amount of formal instruction in English: only 1/20 (5%) of the older participants attended English immersion grade school, while 9/23 (39%) of the participants in the younger group did[18]. This means that the younger speakers on average were exposed to and using English at an earlier age than older speakers.

The degree of immersion in English and quality of the English input varies significantly from school to school. On one end of the spectrum, some participants reported being fined or otherwise punished for speaking in Malayalam on school grounds. In other schools, Wednesdays were "English only" days, while some students reported that even their teachers would lecture in Malayalam some of the time, though all written instructional material was in English. The extent to which English immersion translates to less experience with or instruction in Malayalam also varies considerably. Some

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[18]This pattern holds when looking at all 112 speakers I interviewed, 4/51 (8%) of older participants attended English-immersion grade school while 22/61 (36%) of younger participants had.

participants had just as much exposure to Malayalam as English in early grades, with Malayalam being phased out slowly. Others took Malayalam as a second language in later grades, and still others never received any schooling in Malayalam, having limited proficiency with the written form of the language. One outcome of this can be seen in participants' reporting of which language they feel most comfortable writing[19]: 13/20 (65%) older participants said they felt most comfortable writing in Malayalam, while 8/23 (35%) of the younger participants said so[20]. It is important to reiterate that each participant's L1 was Malayalam, and they all considered Malayalam to be the main or only language they felt comfortable speaking.

Even among the younger speakers, there are considerable differences in the amount, timing, and quality of English exposure. However, all younger speakers have peers who had early and sustained exposure to English, which is not the case with older speakers. Younger speakers are exposed to more high-contact speakers of Malayalam than are older speakers, and younger speakers on average have earlier contact with English and English-influenced Malayalam.

Contact effects in other areas of the grammar

Not only do these groups differ in their timing and type of exposure to English, but there are also contact-induced or contact-facilitated changes in other areas of the grammar which support the idea that contact could be a factor in the reduced flexibility in younger speakers. Some of the generational changes described in Section 4.3 can be attributed to contact with English. Use of English-origin words[21] is rampant and has been documented for decades (Kala 1977; Nayar 2008). This phenomenon is not limited

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[19]I asked them which language they felt most comfortable writing everyday things, like a grocery list, or a note to a friend, and specifically contrasted this with formal writing, like an academic essay.

[20]Among all 112 interviewed speakers, 30/51 (59%) of older participants and 24/61 (39%) of younger participants were most comfortable writing in Malayalam.

[21]I do not call these words borrowings because these uses seem to be deeply integrated into the Malayalam lexicon; the extent of this requires further study.

to words like 'television' or 'computer' which are both new words and new concepts. Concepts which would have been named using a relatively esoteric Sanskrit origin word are named in English instead; examples of these types of words are in (37):

(37) a. ʈarkːam

'rhetoric'

b. ɡaʋeːɕaɳam

'research'

It is unsurprising that infrequent words for educational concepts would be now named in English; when these concepts were named solely using the Sanskrit-origin words, education was not available to all parts of society. The era of compulsory education in Kerala went hand-in-hand with higher education being conducted solely in English, and English's status as the language of education lends itself to supplanting Sanskrit-origin words in this domain. In addition, there are strong political reasons for using English as opposed to Sanskrit, whose association with high-caste Hindus is objectionable both for religious minorities and left-wing individuals across ethno-religious strata.

More notably, English-origin words also consistently replace frequent Malayalam-origin words for simple concepts. A representative list is in (38) - (41); the English loanword is followed by the highly frequent Malayalam-origin counterpart[22]:

(38) 'weight'

a. ʋeːtːə

b. kʰ*anam*

(39) 'room'

a. ruːmə

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[22]Some of these words also are derived from Sanskrit, but, unlike the examples in (37), these are the most common, if not the only, words for these concepts.

  b. muri

(40) 'mix'

  a. mik͡s t͡ʃaijuka ('mix' plus light verb 'do' in Malayalam; also shortened to /mik͡siːja/)

  b. kalakːuka

(41) 'side'

  a. saiɖə

  b. ʋaɕam

   There is no clear semantic category or phonological motivation for these words being used in English, though, of course, more investigation into the pattern might reveal otherwise[23]. The extensive use of English-origin words alongside Malayalam-origin words has led to a restructuring of the lexicon, somewhat analogous to Latinate and Germanic words in English[24]. Some examples are in (42) & (43):

(42) 'plate'

  a. kiɳːam

   large plate for meals (Malayalam-origin)

  b. pl̥eːtːə

   small plate for snacks or condiments (English-origin)

(43) 'color'

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[23]A useful contrastive example is with kinship terms, another realm in which speakers consistently use English-origin words. Both the addition of categories not present in Malayalam-origin kinship terms (like words for in-laws, which were not present in many strongly patrilineal groups), and societal pressures to avoid terms which are highly indexing of group membership (kinship terms are shibboleths) are strong motivators for the integration of English-origin kinship terms into existing systems, and, in some cases, replacement of existing terms.

[24]Made all the more interesting by the fact that Malayalam had this division in its lexicon already, between words of Sanskrit and Dravidian origin.

    a. niram

       mainly used to talk about complexion (Malayalam-origin)

    b. kaḷarə

       used in all other contexts (English-origin)

The intuitions about differences between the English- and Malayalam-origin words are much stronger for younger speakers, though older speakers are aware of them. In general, I had many unprompted discussions about increased and unconscious use of English words in Malayalam, both inside and outside the context of my language interviews. I asked participants if they try to avoid using English words when they speak Malayalam, and only 3 out of 112 interviews participants said 'yes', all of whom are above the age of 44.

There have also been phonological changes due to contact with English, including the borrowing of the phoneme /æ/ (Namboodiripad & Garellek 2016), violation of native constraints on word-final clusters in English-origin words, and a relaxing of minimal word constraints in Malayalam- and English-origin words (Namboodiripad, Garellek, & Baković *in prep.*). Morphosyntactic mixing is common (though mostly unsystematic in most varieties), with English endings being added to Malayalam words, and vice-versa. A range of examples are below, with the English-origin elements in bold:

(44) keːʈːo   n̩inte **dedication**? at̪o **miss**.aːjo?
      heard.Q your **dedication**? or **miss**.happened.Q?
      'Did you hear your dedication? Or did you miss it?'

(45) **uɳ**sahikː*ʲ***abḷ**
      un.suffer.**able**
      'unbearable'

(46) kaːjal**selfi**
      backwaters.**selfie**
      'a backwaters-selfie' (a selfie taken on the backwaters)

(47) ɲaːnum eːʈɻanmaːɾum   **and** eːʈaʈimaːɾum
      me.and older.brothers.and **and** older.sisters.and
      'me, my older brothers, and older sisters'

English-origin elements can be lexical roots (44), derivational affixes (45), partic-
ipate in compounds (46), and be used in addition to morphological conjunction in the
case of (47). It is clear that English has had and continues to have a profound impact on
Malayalam at many levels of linguistic analysis; thus, contact effects in constituent order
would coalesce with these other findings.

Contact effects in constituent order

A final support for language contact as the source of between-group variation in
this experiment is the fact that reduced flexibility has been described as an outcome of
language contact in other contexts. This chapter began with some descriptions of within-
language variation in constituent order, including American Finnish, Old-to-Modern
English, and West Rumelian Turkish: each of these is a contact variety, spoken by
bilinguals. Constituent order is susceptible to change due to contact, and it can result in
changes to canonical order as well as reduction in flexibility (Heine 2008). This aligns
with the results of this experiment, and, because younger speakers also have more and
earlier contact with English, contact is a plausible explanation of these results.

Additional evidence comes from an acceptability study comparing English-
dominant Korean speakers who grew up in the United States with Korean speakers living
in Korea. This study, which was a translated replication of Experiment 4, showed that
decreased proficiency and experience in Korean corresponded with decreased flexibility
(lower acceptability of all non-SOV orders) in Korean constituent order (Namboodiripad,
Kim, & Kim *in prep*); even highly-proficient bilinguals who were English dominant
showed a reduction in flexibility as compared to Korean-dominant speakers. The possible
confound of age present in this experiment was not present in that experiment, and the

English-dominant Korean speakers clearly were using and exposed to a high-contact variety of Korean, making the connection between reduced flexibility and contact stronger in that case.

In the context of the present experiment, it can be said for certain that younger Malayalam speakers have more experience with high-contact Malayalam, English has an increasing influence on Malayalam at other levels of the grammar, and the same pattern of reduced flexibility has been found in other cases where contact is unambiguously a factor. Though the effect of lifetime experience with difficult constructions cannot be ruled out, barring additional evidence, the most straightforward interpretation of the results is that there is indeed between-group variation in constituent order, and language contact is a likely source of this variation.

Borrowing of constituent order

Crucially, there was no correspondence between language contact and increased preference for SVO order, the canonical order in English. This is evidence that there is no direct borrowing of English order into Malayalam. Direct borrowing can be operationalized in two ways: bilinguals could use the syntactic structure of English when hearing SVO order in Malayalam, analogous to what has been claimed to occur in L2 acquisition, with speakers mapping lexical items onto their native syntactic structures (e.g., MacWhinney 2005). In the case of Malayalam-English contact in Kerala, this would mean that instead of the structure in (48a) for SVO orders, high-contact speakers would have the structure in (48b):

(48)   'That singer bought a drum'

    a. aː   paːʈːəkaːri $\emptyset_i$ vaːŋi   [oru m̥r̩ʈaŋkam]$_i$
       that singer.FEM $\emptyset_i$ bought a   [mrthankam.drum]$_i$

b. aː paːʈːəkaːri ʋaːŋi   oɾu mr̩ʈaŋkam
   that singer.FEM bought a   mrthankam.drum

Along slightly different lines, the reduced acceptability associated with SVO order in Malayalam could be lessened by experience with English. This differs from the "borrowing" account in that it does not assume that high-contact speakers posit different structures, but that the difficulty associated with (48a) is lessened due to experience with English[25]. Either way, for the acceptability measure, there is no evidence SVO has a special status for high-contact speakers of Malayalam. This outcome must be explained in the context of research in other language contact situations which shows that the canonical order in a contact language is "borrowed" or has a special status.

Aikhenvald (2007) and others describe the process of calquing, whereby speakers in effect "borrow" the syntactic structure from another language by directly translating multi-word constructions from one language into another. For example, many researchers have claimed that Pipil, Xinca, and Copainalá borrowed VOS constituent order from nearby Mayan languages (Hyman 1975, Campbell 1987; M. Harris 1978, 1984; Campbell, Kaufman, & Smith-Stark 1986, Smith 1981, also summarized in Harris & Campbell 1995), and there is evidence from corpus work that V2 order in Northern Middle English was borrowed from Norse (Kroch et al. 2000). Davies (2008) presents evidence from a corpus of naturalistic conversations between Welsh-English bilinguals conducted in Welsh that SVO order is sometimes used in discourse-neutral contexts, though Welsh is canonically VSO. The SVO order in West Rumelian Turkish (Freidman 2003) and in Turkish spoken in the Netherlands (Onar Valk 2013; Backus et al. 2013) has also been cited as a case of direct borrowing of surface order from one language to another.

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[25]Anderssen and Westergaard (*forthcoming*) find that experience with English leads English-dominant Norwegian-speakers to rate English orders lower than Norwegian-dominant speakers do, presumably due to some type of hypercorrection. Though this would predict that the canonical order of a contact language should receive lower acceptability ratings as opposed to higher, the fact that speakers are accessing their knowledge about English indicates that they are importing English structure or expectations from English into Norwegian.

These are but a few described examples of speakers using the order from one language in another, and these could be considered potential counter-examples to the finding that reduced flexibility is associated with contact in Malayalam, and SVO order does not have a special status.

In fact, the results of Experiment 4 might be surprising given the type of explanation that has been given for contact effects in constituent order; flexibility in constituent order has been proposed as a facilitative factor for contact-induced change in this domain. Kroch et. al. (section 3 of their 2005 paper, but also others, including Tily 2010) mention SVO's grammatical status in English as a reason that speakers could accommodate the V2 from Norse: this change was possible because SVO was a grammatical but non-canonical order in Old English, and experience with V2 in Norse facilitated this order changing from being non-canonical to canonical. If this was the case, there should have been a stage at which English speakers were accessing their knowledge of Norse order when using English. We decidedly do not see this in the Malayalam-English bilinguals in Experiment 4. Why is this the case?

It could be that the difference lies in methodology. Most of the previous work on borrowing of constituent order comes from elicitation, corpus studies, or production tasks. Perhaps higher relative acceptability for SOV does not correspond to increased production of SOV order. Relatedly, the contact situation between English and Malayalam in Kerala could be different from the other cases: perhaps increased contact with English would lead to the type of putative borrowing described in other cases, or decreased flexibility could be a starting point to other changes which would allow for direct borrowing. Given that this measure of flexibility is novel, the relationship between reduced flexibility and the contact effects described in the literature merit further inquiry, and combining production experiments with this acceptability measure is a crucial step in making sense of these results in the contact of the previous research.

4.6   Conclusion

This chapter extended the approach from Chapter 2, investigating differences in relative acceptability of canonical and non-canonical orders within a language with flexible constituent order: Malayalam. The results showed that older speakers had smaller relative differences between canonical and non-canonical orders, which translates to increased flexibility relative to younger speakers. I discussed some possible sources of this difference, and argued for language contact leading to variation in flexibility between these two groups; though I could not rule out the possibility of lifetime experience leading older speakers to have less difficulty with non-canonical orders, it seems highly unlikely that cognitive decline is a factor because it would predict that older speakers should show reduced flexibility as compared to younger speakers.

The difference between the two groups was quite small, so the results should be taken as a starting point to further investigation and supplemented with other types of experiments. It is important to note, however, that small differences were expected in this experiment, since most of these participants lived in the same community, and were one or two degrees of separation from each other. Finding any between-group difference at all was somewhat unexpected, which further demonstrates the utility of acceptability judgment experiments as a tool to measure variation. Acquisition research has found constituent order to be acquired quite early across languages, and Leela (2016) found that Malayalam-speaking children around the age of two have full comprehension of SOV, OSV, SVO, and OVS orders. As such, we expect smaller differences between the participants than have been found in other cases of synchronic variation.

Evidence from Experiment 4 suggests that speakers of flexible languages show reduced flexibility if they have experience with a less flexible language. First, this must be replicated in Malayalam with participants who are the same age but vary in their

exposure to English. One way to do this is to compare Malayalam speakers living in Kerala with those who live elsewhere, comparing IN SITU to EX SITU varieties.

This experiment is a relatively novel application of acceptability judgments to study ongoing variation and change in syntax (though, see Guajardo 2017). Typically, within-language syntactic variation and change is studied through longitudinal or parallel corpora (e.g., Tily 2010), and contact-induced change is studied by looking at the state of a grammar before and after some known-about historical event (contact with colonial forces, migration, etc.). Adding descriptions of ongoing contact to this rich literature can lead to more insights into the process by which languages change.

In addition, inter-speaker variation in constituent order is not traditionally studied. This is unsurprising from a sociolinguistic perspective, as no studies (that I know of) describe constituent order as a linguistic feature which is used either consciously or subconsciously to index an identity. In fact, psycholinguistic studies have shown that speakers of languages with variable constituent order do not encode surface orders in memory (Ferreira & Yoshita 2003), making constituent order unlikely to have the metapragmatic salience required for it to become a linguistic variable within a speech community (Verschueren 2000; Silverstein 1993). However, there is one exception which I am aware of, which is Jewish English. Prince (1988) describes the borrowing of the topicalization construction from Yiddish into English, analyzing it as analogy from the topicalization in Yiddish to a similar construction in English. In fact, this construction is enough of a shibboleth that it is used by comedians in an indexical manner. I have given an example from a tweet in Figure 4.9, which is listed in (49).

(49)   Her, she kisses?

It is an empirical question whether this would translate to increased acceptability for just this order, or whether the stimuli would have to be presented in audio format to get an effect, but we can make testable predictions about variation across varieties, and this

Figure 4.9: OSV order in English used to index Jewish English

has interesting applications for theories of contact as a source of regional dialects. The results presented here (in concert with previous descriptive work) suggest that variation in constituent order could be a fruitful area of investigation for sociolinguists, especially for those interested in how metapragmatic salience interacts with language change: could linguistic features which are not associated with a particular identity be more subject to change?

The main question brought up by the discussion in this chapter is as follows: Which parts of a speaker's linguistic knowledge can be affected by another linguistic system? This is a core question which unites the areas of bilingual language processing, second language acquisition, and studies of heritage speakers, and this is also a necessary step toward a predictive model of contact-induced syntactic change. Different researchers draw the line at various levels of the grammar. Some claim that syntactic operations can be directly imported across languages (Cuza & Frank 2011; Thomason 2001; Aikhenvald 2003), while others argue that syntactic change can only be effected through change in pragmatic constraints or lexical borrowing (Heine & Kuteva 2005; Tsimpli & Sorace 2006; Sorace 1999). Still others posit that contact effects are only indirectly related to contact, with either interrupted or insufficient language experience causing a reduction in speakers' evidence for the constraints of their language (Montrul 2013; Fortescue

1993). The level at which this line is drawn is indicative of the nature of the linguistic representations and operations assumed, and highlights one more way in which theoretical assumptions shape empirical predictions.

Chapter 5

Flexibility and contact-induced change in constituent order

'Flexibility', the existence of multiple grammatical orders in a language, has been proposed in the contact literature as a facilitative factor in contact-induced change in constituent order (Aikhenvald 2003), the idea being that languages which are more flexible are more susceptible to change. The operational measure of flexibility introduced in this thesis is a starting point toward answering the question of whether more flexible languages are, statistically speaking, more likely to change than more rigid languages. However, the question of how constituent order changes due to contact in a language can also be addressed using the approach from this thesis: the goal of this chapter is to reconsider how flexibility relates to contact in light of the operational measure of flexibility proposed here. I claim that decreased relative acceptability of non-canonical orders corresponds to decreased flexibility. From the perspective of contact and change, the factors which contribute to decreased acceptability are the factors which motivate contact-effects in this domain. I propose some ways to identify these factors, with the ultimate goal of working toward a motivated model of contact-induced syntactic change.

5.1 Difficulty with dependencies modulated by experience

In the previous chapter, I showed that younger speakers of Malayalam have reduced flexibility in constituent order as compared to older speakers, and I considered language contact as a plausible motivation for this pattern. I discussed three potential explanations for this pattern in Chapter 4: 1) cognitive decline, 2) decreased use of Malayalam, 3) increased use of English, ruling out cognitive decline as an explanatory factor for these results. In this section, I go into more detail about 2) and 3), discussing expectations about how language experience might affect difficulty with the dependencies associated with non-canonical orders.

For higher-contact speakers of Malayalam, decreased use of Malayalam and increased use of English go hand in hand: under most circumstances, it is trivially true that more exposure to one language means less exposure to another. However, the extent to which the properties of the contact language (here, English) determines or contributes to a contact effect (here, reduced acceptability), is unknown, and, crucially, requires a comparative approach (i.e., cannot be determined from the results of Experiment 4). The question of how language-specific contact effects are is an ongoing issue in the literature on contact-induced change. Here, focusing on the operational measure of reduced flexibility allows for the creation of specific predictions which can not only distinguish between language-specific and language-general contact effects, but also allows for the possibility that these factors interact.

As discussed in Chapter 2, reduced flexibility means decreased acceptability of the dependencies associated with non-canonical orders. In fact, these types of dependencies are not only associated with reduced acceptability (Weskott & Fanselow 2011), but also with other measures of processing difficulty: Rösler et al. (1998) compared all of

the permutations of subject, object, and indirect object pre-verbally on behavioral and EEG measures, and found that increasing distance from canonical order corresponded with slower performance on behavioral measures of processing[1] with the result that canonical order (subject-indirect object-direct object) was easier to process than subject-direct object-indirect object order, and all other orders were most difficult to process (but not different from each other, statistically speaking). Looking at event-related potentials, left-anterior negativity (LAN) effects, which are associated with processing load, were detected on determiners[2] when they were in non-canonical position, and this also increased with increasing distance from non-canonical order.

This increasing distance from canonical order is functionally equivalent to the analysis of Malayalam constituent order I assume in Chapter 2; I have re-described the German argument orders in an analogous way to Malayalam constituent order below[3]:

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[1]Increased response time from the end of the final word to answering a comprehension question.

[2]Determiners are marked overtly for case in German.

[3]For German, S = subject, DO = direct object, IO = indirect object and all verbs are final. For Malayalam, I continue with S = subject and O = direct object.

(50) Malayalam constituent order

    a. S O V

       canonical

    b. O_i S $\emptyset_i$ V

       one dependency, preverbal

    c. S $\emptyset_i$ V O_i

       one dependency, post-verbal

    d. $\emptyset_j$ O V S_j

       one dependency, post-verbal

    e. $\emptyset_j$ $\emptyset_i$ V S_j O_i

       two dependencies, post-verbal

    f. $\emptyset_i$ $\emptyset_j$ V O_i S_j

       two dependencies, post-verbal

(51) German argument order

    a. S IO DO V

       canonical

    b. S DO_i IO $\emptyset_i$ V

       one dependency

    c. IO_j S $\emptyset_j$ DO V

       one dependency, longer

    d. DO_i S IO $\emptyset_i$ V

       one dependency, longer

    e. IO_j DO_i S $\emptyset_j$ $\emptyset_i$ V

       two dependencies

    f. DO_i IO_j S $\emptyset_j$ $\emptyset_i$ V

       two dependencies

Though analogous processing studies of Malayalam constituent order have yet to be performed, and post-verbal arguments might behave differently from these permutations in German, this and evidence from Kwon et al. (2013) are the basis for a relatively uncontroversial assumption (to be tested in future work): that the dependencies associated with non-canonical orders in Malayalam incur processing cost as well as resulting in the lowered acceptability seen in Experiment 2 of this thesis.

Given this assumption, we can ask the following question: does increased exposure to these dependencies reduce processing difficulty? If this is the case, as discussed in

Chapter 4, older Malayalam speakers could show increased relative acceptability for non-canonical orders because they hear and have occasion to use dependencies at a greater rate than younger speakers, which could plausibly result in a decrease of processing cost associated with these dependencies. Likewise, less experience with Malayalam would mean more difficulty with these dependencies and lowered acceptability. This type of effect, in which experience with a relatively difficult construction decreases difficulty, has been observed in other areas of cognition (often called a practice effect), though the existence of this effect in a language and in constituent order specifically would need to be tested (more on this in the following section). Following the terminology mentioned above, this explanation of reduced flexibility would be a "language-general" contact effect, meaning that the reduced exposure to Malayalam necessarily brought about by exposure and use of another language is driving the results.

Another possibility is that the experience required to decrease difficulty associated with non-canonical orders does not have to be language-specific. That is, the dependencies speakers experience in the other languages they speak could also contribute to reduced difficulty with non-canonical orders. In the case of Malayalam-English contact, this would mean that exposure to English, in which topicalization is only possible in very limited contexts, decreases exposure to constituent-order dependencies in general, leading to increased difficulty when speakers encounter these dependencies in Malayalam.

A final possibility is that Malayalam-speakers do not need very much experience with dependencies in order to show the pattern of older speakers (negligible differences between canonical and non-canonical orders, little difficulty associated with these dependencies), rather, interference via experience with a language like English causes increased difficulty with these dependencies. English is relatively limited in its use of order to encode information structure in basic constituent order; emphasis is used instead to indicate discourse focus:

(52)   subject focus

    a. Who ate the pie?

    b. *that guy* ate the pie.

(53)   object focus

    a. What did that guy eat?

    b. That guy ate *the pie*

(54)   verb focus

    a. What did that guy do with the pie?

    b. That guy *ate* the pie.

As shown in Chapter 3, order fulfills this function in Malayalam. However, it could be that Malayalam-speakers import the emphasis strategy into English[4]. If this is the case, then we expect that order becomes less indexing of discourse structure, in favor of emphasis (i.e., Fortescue 1993 for Native Alaskan languages). Looking at language production could provide evidence as to whether high-contact speakers start relying on prosody to indicate focus as opposed to order[5]. This possibility differs from the previous two because it could be either a cause of reduced flexibility or an outcome of reduced flexibility: if flexibility decreases due to reduced exposure, whether or not that exposure is language-specific, it stands to reason that speakers will employ another strategy to encode information structure.

Again, the basic approach here is to identify potential sources of reduced flexibility, and consider these as mechanisms of contact-induced change in constituent order. Below, I summarize the three sources of change proposed in this section:

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[4]This type of pragmatic borrowing has been described: Prince (1988) shows borrowing from Yiddish to English, resulting in more topicalization in different contexts in varieties of English which were historically in contact with Yiddish.

[5]Anecdotal evidence suggests this might be the case, as one way low-contact Malayalam-speakers make fun of high-contact speakers is by producing exaggerated emphasis.

1. Less exposure to dependencies in Malayalam

2. Less exposure to dependencies in general

3. Exposure to and importation of different strategies of encoding information structure

In the following section, I show how we can test which of these are sources of reduced flexibility by using the experimental paradigm proposed in this thesis.

5.2   Testing the sources of change

Using an experimental approach to variation and variability in constituent order, we can test the potential sources of reduced flexibility in high-contact speakers. The first two possibilities, less exposure to dependencies in Malayalam or less exposure to dependencies in general, can be distinguished by comparing the Constituent Order Profiles of bilinguals who are exposed to languages which differ in terms of difficulty associated with non-canonical orders, that is, which differ in terms of flexibility. Experience with any language would mean reduced experience with non-canonical orders in Malayalam. However, experience with a language like Hindi, which is in contact with Malayalam and has been described as being 'flexible' (e.g., Mahajan 2003) could result in different contact effects if experience with dependencies in other languages influences processing of dependencies in Malayalam[6].

By comparing Hindi-Malayalam bilinguals to English-Malayalam bilinguals, we can make predictions which can tell us about how experience with dependencies might differ depending on the contact language. If it is the case that speakers must be exposed to

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[6]Of course, knowing what low-contact Hindi-speakers' constituent order profiles look like would be necessary in order to confirm that non-canonical orders in Hindi do in fact result in a relatively small amount of difficulty.

dependencies in Malayalam, then comparing English-Malayalam and Hindi-Malayalam bilinguals who have similar ages and amounts of exposure to the contact language should 1) lead to reduced acceptability for both groups as compared to low-contact Malayalam speakers, and 2) this reduced acceptability should be to a similar degree for both groups, that is, the distance between canonical and non-canonical orders should be similar for Hindi-Malayalam and English-Malayalam speakers. However, if it is the case that reduced experience with dependencies in general is what leads to reduced flexibility for high contact English-Malayalam speakers, then we expect Hindi-Malayalam bilinguals should not show reduced flexibility, while English-Malayalam bilinguals should. Finally, it could be the case that experience with dependencies overall contributes to reduced difficulty with non-canonical orders, but experience with these dependencies in Malayalam has more of an effect. This would predict an interaction: we would expect lowered flexibility across the board for high-contact speakers as opposed to low-contact speakers, with this lowering in flexibility begin greater for English-Malayalam bilinguals, who have reduced experience with Malayalam dependencies and do not have as much experience with dependencies overall.

I summarize this in Table 5.1, which has predictions about flexibility for these three groups as a function of "language-specific" and "language-general" sources of contact effects, which here means whether or not speakers need language-specific experience with dependencies to avoid a reduction in flexibility due to contact. Instead of entering numbers for degree of flexibility, I have written 'high', 'medium', and 'low' to indicate high, medium, and low levels of flexibility relative to low-contact Malayalam. Following the results of Experiment 4, I assume that low-contact Malayalam is highly flexible, and ideally, age would be kept constant for the participants in these experiments in order to avoid the potential confounds described in Chapter 4.

This method allows us to test whether (1), (2), or both contribute to reduced

Table 5.1: Predictions about flexibility in Malayalam given different sources of experience with dependencies.

	Low-contact Malayalam	English-Malayalam	Hindi-Malayalam
Malayalam-specific experience	high	low	low
Experience with any dependencies	high	low	high
Malayalam experience counts for more	high	low	medium

flexibility in constituent order. Moving to mechanism (3), the difference between (2) and (3) can be tested in a variety of ways, and convergent evidence from a variety of methodologies would be required to distinguish between the two possibilities. If it is the case that increased lifetime exposure does not in fact reduce difficulty associated with non-canonical orders, then (1) and (2) are ruled out as explanatory factors. In addition, developmental data can tell us whether Malayalam-speaking children have increased flexibility which decreases after more exposure to English. Leela (2016) suggests that non-canonical orders are acquired quite early in Malayalam, so this is a possibility. Comparing Constituent Order Profiles of higher- and lower- proficiency bilinguals could also shed light on this issue: Higher-proficiency bilinguals are less likely to transfer strategies from one language to another, so, even with the same age of acquisition and similar amounts of language exposure, we expect decreased flexibility in higher-proficiency speakers.

5.3 Discussion: a motivated model of contact-induced change

Zooming out from the particular context of English and Malayalam constituent order, the approach outlined here can motivate expectations about contact-induced changes when other languages come into contact: the effect of language exposure on dependencies should occur in the same manner, all else being equal[7]. So, when languages like English come into contact with languages like Malayalam, we expect, on average, the same outcome as what we see when English and Malayalam come into contact under similar circumstances. And, in fact, we can now be more specific about what

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[7]Though, of course, "all else being equal" is not a trivial matter, and what counts as being "equal" is an important and interesting question.

is meant by "languages like English" and "languages like Malayalam": languages like English really means languages in which speakers have relatively more difficulty with non-canonical orders as compared to canonical orders, and languages like Malayalam means languages in which the dependencies associated with non-canonical orders are not as difficult. Following this logic, this account predicts that German-English bilinguals should show increased difficulty for non-canonical argument orders as compared to German monolinguals[8].

Testing the outcomes of contact between typologically similar languages can give us information about the explanatory power of these proposed mechanisms, but they can also tell us something about the nature of the dependencies in non-canonical orders in Malayalam and other languages. Experience with constituent order dependencies could be language-independent, where experience with dependencies in another language protects speakers from difficulty associated with less exposure to the constructions in the target language. Experience with these dependencies could also be construction-independent, where the difficulty (or lack thereof) associated with dependencies writ large in one language could have an effect on dependencies writ large in another. Looking at long-distance dependencies in Malayalam could address this: English has long-distance dependencies, as does Malayalam, so if experience with English dependencies affects Malayalam, then we could expect reduced flexibility in constituent order for high contact speakers, but no difference between high- and low-contact speakers for *wh*-fronting out of embedded clauses, for example. However, Malayalam-speakers who are in contact with a *wh in situ* language which has some limited flexibility in constituent order (like Mandarin) might show a different pattern. Again, if speakers do not have access to experience with

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[8]It is also important to note that reduced flexibility is not a necessary outcome of contact; in fact, (though it should be confirmed quantitatively) the Yiddish-English contact leading to increased topicalization in English is an example of contact leading to increased flexibility. This outcome aligns with the account presented here, as experience with more dependencies in Yiddish could lead to reduced difficulty for OSV order in English.

dependencies in other languages, then we would predict an across-the-board increase in difficulty associated with dependencies in Malayalam for all high-contact speakers.

An aspect which is part of this account but has been backgrounded is frequency: I discussed amount and type of exposure as being mechanisms of these contact effects. Though in English (and, it seems, Malayalam, as per the database collected by Leela (2016)), the 'dependency' analysis has the same explanatory power as frequency, this process could interact with frequency of construction or not: this is an empirical question which merits further inquiry, as the level(s) of analysis and ontogenetic timescale at which frequency operates is a central question for linguists interested in the motivations for language change. It could be that frequency matters more early in development than later in development, or it could take decades of experience for frequency of dependencies in another language to have an effect on processing of dependencies in one's own language. Looking at languages like German, in which some orders with more dependencies are also more frequent, would be crucial to understanding if frequency has a central role or if it is epiphenomenal in this domain.

One type of contact effect that I did not find here is that of transfer of surface order. This has been shown to happen in other cases of contact (Backus et al. 2013). However, the methodology of acceptability judgments could be a contributor to this. In production, high-contact speakers might be more likely to use SVO orders. Or, the level of contact might need to be much greater than in Malayalam-English contact in Kerala, where all participants were dominant in Malayalam[9]. Even outside of production, it might not be that this effect is not detectable in an offline and relatively explicit measure like acceptability, where there is the possibility that high-contact speakers are over-correcting, rating the canonical orders higher (c.f., Anderssen & Westergaard forthcoming): perhaps an online and implicit measure of processing (like EEG) could detect a decrease in

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[9]The results for English-dominant Korean heritage speakers in Namboodiripad, Kim, & Kim (in prep) indicate that this might not be the case.

processing difficulty of SVO order. Regardless, the general approach proposed in this chapter yields testable predictions, and the measure of flexibility proposed in this thesis opens the door for asking more specific questions about how experience with one language affects the other, which is a crucial aspect of any motivated model of contact-induced change.

5.4 Language contact and language structure

This thesis presented a novel approach to variation and variability in constituent order, considering flexibility to be a gradient property which can vary within and across languages. This approach can enrich typological descriptions of constituent order and expand the empirical domain of syntactic variation. Additionally, I introduced formal acceptability judgment experiments as a measure of the perceptible and imperceptible variation between languages and language varieties.

There have been many debates about the extent to which there is a connection between social structure and language structure. This is a central question in the creole literature, as there are similarities between creoles which have led linguists to debate whether creoles are categorically different from other languages (e.g. Faraclas & Klein 2009). Are creoles similar to each other because of the linguistic ecology – that is, the structure of the languages in contact? Or are they similar because they arose from similar circumstances – the consequence of abrupt language creation under violent circumstances like slavery and settler colonization? In constituent order, creoles are said to be relatively rigid (Sinnemäki 2011). Because many creoles arose as a result of European colonization and slavery, the superstrate languages are often related – and many have been described as having relatively less flexible constituent order (though there is variation between these languages: English, French, Spanish, and Portuguese being the most common superstrate

languages). It could also be the case that flexibility in constituent order always reduces in cases of contact: the processing difficulty associated with non-canonical orders could be too taxing for L2 speakers to include as part of a pidgin, or children could regularize this variable pattern, as they do with irregular morphological patterns in pidgins. Under my approach, I expect that there should be an interaction between the features of the languages in contact and the circumstances of their acquisition. In addition, the type of post-colonial contact situation described in Chapter 4 might contribute to this discussion: English has had and is having a profound influence on Malayalam, but language shift is happening a much less abrupt way than in the cases of creole-genesis. Pairing a gradient notion of contact with a gradient notion of flexibility can help answer the question of whether creoles are indeed categorically different from other languages, and, perhaps, why.

The field of language evolution has looked directly at how social structure and contact influences linguistic structure (Roberts and Winters 2002). Dale & Lupyan (2010) demonstrate that languages with more speakers are more likely to have "simpler" inflectional paradigms than languages with fewer speakers, and Bentz & Winter (2013) follow up on this work by showing that this pattern is driven by languages with more second-language (L2) speakers (which are also more likely to be spoken by more people). These are both correlational studies building on the observations made by Wray & Grace (2007) who claim that there are systematic differences between endogenic ("low-contact") and exogenic ("high-contact") languages. The proposed mechanism of this pattern is based on two claims: first, that complex morphological systems are more difficult to acquire for L2 speakers who then regularize irregular systems or drop morphological contrasts all together, and second, that monolingual or native speakers are influenced by the speech of L2 speakers. There is some independent evidence for each of these claims. Monolinguals who are exposed to L2 English are more accepting

of morphological errors (Dale & Lupyan 2011), and L2 and heritage speakers do seems to have trouble with mastering morphology (Bar-Shalom et al. 2008). However, the extent to which these patterns are applicable in different types of contact situations, when the dominant language of the society is highly inflectional, or when there is societal multilingualism, merits further exploration. Comparative psycholinguistic studies which test these mechanisms directly are necessary to supplement the observations made in these correlational studies, and would provide bottom-up evidence for or against these proposals. In the domain of constituent order, this could translate to larger languages being less likely to have flexible constituent order; the operational measure of flexibility proposed in this thesis would allow us to test this hypothesis.

Connecting methods from psycholinguistics with observations and detailed descriptions from the language contact literature can inform a motivated model of how languages change due to contact. In the domain of contact-induced change in phonology, the mechanisms which could underlie such a model are more obvious: the ways in which speech perception and production is influenced by experience with another language (e.g., Beddor 2009, Blevins 2006). In syntax, the analogous mechanisms are processing and production, and how experience with another language influences this. A missing piece in research on contact-induced change is connecting these relatively low-level processes which are measured in an individual (production, processing, perception) to observations made by contact linguists describing what kinds of changes in language structure actually occur. Ultimately, expanding the types of languages and contact situations studied in psycholinguistic experiments and learning more about how linguistic features are affected by different types of interaction and language use can bridge the gap between these fields which are asking many of the same questions in different ways.

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