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Ellipsis Reconsidered

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by

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The dissertation of Laura Kertz is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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DEDICATION

For Larry.

EPIGRAPH

Botanist: That can all be explained.

Mr. Spock: Please do.

—Star Trek season 1, episode 24

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ABSTRACT OF THE DISSERTATION

Ellipsis Reconsidered

by

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Doctor of Philosophy in Linguistics

University of California, San Diego, 2010

Professor Andrew Kehler, Chair

I present an analysis of antecedent mismatch effects under ellipsis based on information structure, in which apparent syntactic parallelism effects are explained as a consequence of an information structural constraint requiring topic/comment parallelism for contrastive topics. Experimental findings in support of this hypothesis demonstrate first that the penalty associated with antecedent mismatch is greater in contrastive topic structures as compared to simple focus structures and next that mismatched contrastive topics show reduced acceptability in both ellipsis and non-ellipsis contexts. Online reading time results further support this hypothesis showing that mismatched antecedents induce disproportionately larger processing costs in contrastive topic structures as compared to simple focus structures, as evidenced by increased reading times in regions both preceding and following the ellipsis site. The findings that mismatched contrastive topics lead to reduced acceptability offline in the absence of ellipsis and that mismatched contrastive topics disrupt online processing prior to the ellipsis site are consistent with

the hypothesis advanced in this thesis but pose a challenge to models which have instead attributed mismatch effects to special-purpose processes supporting antecedent reconstruction or repair.

Chapter 1

The Ellipsis Impasse

Verb phrase ellipsis is a phenomenon in English which permits a speaker to omit a verb phrase from an utterance when its meaning is recoverable from context. Ellipsis has been a phenomenon of interest within the linguistics literature for decades, in part because it involves multiple interacting components of the grammar—among these phrase structure, co-reference, focus, and intonation, but also because a core set of basic data has, over the years, proven especially recalcitrant to analysis.

The sentence in (1), excerpted from a news article, is a prototypical example, in which conjoined clauses form the 'antecedent' and the 'target' clauses involved in the ellipsis. The target clause, here the second conjunct, contains a verb phrase headed by the auxiliary verb 'did'. The verb phrase complement to that auxiliary has been elided.

(1)   In 1973, no Gallo table wines had corks, and in 1980 only 10% did.
       (1989 Wall Street Journal)

The meaning of the elided verb phrase is supplied by the antecedent (here, the first conjunct). Despite the 'missing' verb phrase in the target, the ellipsis in (1) is understood to have the interpretation in (2), where the target verb phrase is indicated in brackets.

(2)   In 1973, no Gallo table wines had corks, and in 1980 only 10% did. [have corks]

Although the bulk of the literature on ellipsis has focused on conjoined ellipses like this one, ellipses can occur in a variety of syntactic configurations and across a broad range of discourse contexts (Williams 1977, Webber 1978, Winkler 2005, among others). Antecedent and target need not, for example, occur in the same sentence. This is demonstrated in (3), where the antecedent clause (containing the verb 'modify') occurs

in a separate sentence preceding the ellipsis.

(3)   "The conventional wisdom used to be that you couldn't modify the immune response of an infected individual" by innoculating them with synthetic viral proteins, Dr. Redfield said. "We've demonstrated that you can."

(1989 Wall Street Journal)

Antecedent and target may even be uttered by different participants within the discourse, as in (4).

(4)   Sen. LIEBERMAN: Do I understand that the Soviets still deny that that was an explosion that—

Dr. ERLICK: Yes, they do.

(1989 Wall Street Journal)

What all of these examples share in common is a dependency between an elided verb phrase and some antecedent clause in the preceding context. The precise nature of this dependency, however, has been much debated.

1.1 Syntactic Identity and the 'Mismatch' Question

Within the theoretical literature, two approaches to describing this dependency have been explored in considerable detail. Under one approach, the dependency between an elided verb phrase and its antecedent is modeled as a semantic relationship, comparable in many ways to the coreference relationship observed for pronominal anaphors and their antecedents. Under this approach, ellipsis is argued to be licensed by semantic identity between the elided verb phrase and its antecedent. An alternative approach holds that the ellipsis is licensed by a structural identity condition, usually argued to apply at an abstract level of representation referred to as Logical Form (LF). Technically speaking, both the syntactic and the semantic licensing models posit a semantic relationship between an ellipsis and its antecedent. Syntactic models, however, invoke an additional structural constraint.

The question addressed by this thesis is whether syntactic identity is in fact required to license ellipsis. The question seems straightforward enough, as the two approaches make conflicting predictions: syntactic models hold that syntactic identity is required; semantic models don't. The data bearing on this question, however, are inconsistent. In some cases it appears that a syntactically matched antecedent is required

to license the ellipsis; in others it does not. Evidence that a matched antecedent is required comes from minimal pairs contrasting sentences like (5) and (6).

(5)   The driver reported the incident,
       and the pedestrian did too. [report the incident]

(6)   #The incident was reported by the driver,
       and the pedestrian did too. [report the incident]

In (5), the target clause containing the elided verb phrase 'report the incident' is structurally matched to its antecedent, and the ellipsis is well-formed. In (6), by contrast, there is a structural mismatch between antecedent and target—the antecedent is realized in passive voice, while the target is active. The ellipsis in this case is degraded.[1] The reduced acceptability observed for (6) is consistent with the predictions of the syntactic model, which holds that structural identity between antecedent and target is necessary to license ellipsis.

In other cases, however, a mismatch between antecedent and target does not seem to affect acceptability to the same degree. Consider, for example, the sentence in (7).

(7)   The incident should have been reported by the driver,
       but he didn't. [report the incident]

Here, a voice mismatch between antecedent and target is again present, but the ellipsis in this case is acceptable, perhaps comparable even to the matched version of the sentence, as shown in (8).

(8)   The driver should have reported the incident,
       but he didn't. [report the incident]

The acceptability of a sentence like (7), despite the syntactic mismatch between antecedent and target, is consistent with the predictions of the semantic approach to ellipsis, which places no special constraints on the syntactic form of the antecedent clause.

Given the conflicting data patterns observed for mismatched ellipses—some cases are good, some cases are bad—the question of whether a syntactically matched antecedent is required to license an ellipsis is not an especially useful one for adjudicating

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[1] I make use of the hash symbol (#), as opposed to the linguist's star (*), to indicate reduced acceptability without presupposing the nature of the violation.

between the syntactic and semantic approaches to ellipsis. Indeed, the mismatch data present a puzzle in themselves: why would syntactic identity be required to license ellipsis in some contexts but not in others? Neither the syntactic nor the semantic approach to ellipsis has an answer. Perhaps for this reason, the question has for some time been sidestepped in the literature.

1.2 Mismatch and the Syntax/Semantics Debate

Sag (1976a) established what would, for many years, be the standard syntactic model of ellipsis, arguing for an identity condition on ellipsis operative at the level of Logical Form or 'LF'. Building on observations from Halliday and Hasan (1976) and Quirk et al. (1972), Sag argued that while a Surface Structure identity condition was too strict, and a semantic identity condition was too permissive, the LF formulation was just right. Sag demonstrated, for example, that affix identity was not required under ellipsis. In a sentence like (9), Sag showed, the elided VP is uninflected for tense/aspect ('complain' is a bare verb form), while the antecedent verb phrase occurs with present progressive marking.

(9)   Peter is complaining about the noise,
        but John won't. [complain about the noise]
        (Sag 1976a no. (1.2.1)(3))

The fact that an ellipsis like (9) is acceptable, despite this mismatch in affix marking indicates that Surface Structure identity is not required. Sag also considered, however, ellipses like (10), which demonstrates a voice mismatch comparable to that in (6) and (7) above. Sag judged the ellipsis in (10) to be unacceptable,[2] and he attributed the violation to the lack of syntactic identity between antecedent and target.

(10)   *Paul denied the charge,
         but the charge wasn't by his friends. [denied]
         (Sag 1976a (1.2.3)(b))

Mismatched ellipses like (10), Sag argued, demonstrate that a semantic relationship between antecedent and target is not sufficient to license ellipsis; structural identity (encoded at the level of LF) is also required.

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[2]The * here is Sag's.

In a footnote, however, Sag mentioned that in some instances, voice mismatch does not seem to affect acceptability in the same way. Sag cited the example in (11), taken from a Star Trek rerun, and pointed out that the difference in voice is in this case 'ignored'.

(11)   Botanist: That can all be explained.
        Mr. Spock: Please do. [explain]
        (Sag 1976a ch. 1 fn. 2)[3]

Over the years researchers working on ellipsis have collected more examples like this one, usually from corpora and spontaneous conversation, assembling what amounts to a canon of acceptable mismatches—data that have been cited and re-cited over the years. (See, e.g. Merchant 2008 for a compendium and some new data.) A handful of these examples are repeated below.

(12)   A lot of this material can be presented in a fairly informal and accessible fashion,
        and often I do.
        (Dalrymple et al. 1991 no. 59a)

(13)   This information could have been released by Gorbachev,
        but he chose not to.
        (Hardt 1993 no. 131)

(14)   Four fireworks manufacturers asked that the decision be reversed,
        and on Monday the ICC did.
        (Dalrymple et al. 1991 no. 11)

(15)   This problem was to have been looked into,
        but obviously nobody did.
        (Kehler 2000 no. 24)

In each case, a mismatch between antecedent and target is observed, but the ellipsis is acceptable.

Data like these have figured prominently in semantic analyses which argue against the need for a syntactic identity constraint, but those analyses typically have not offered an explanation for why some cases of antecedent mismatch (like Sag's (10) above) induce a violation. Dalrymple (1991) offers a case in point. Following the introduction of a

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[3]Star Trek: The Original Series - This Side of Paradise (Season 1, Episode 24).

variety of cases of acceptable mismatches including (12) above, Dalrymple reviews a number of arguments against the syntactic proposal, most of them concerning possible binding patterns for ellipses which contain pronouns and traces and the problems these pose for a syntactic account. Dalrymple does not return to the issue of antecedent mismatch, however, and does not address cases where a syntactic identity constraint seems to be at play.

This tactic, in reverse, has been pursued on the syntactic side of the fence, where cases of unacceptable mismatches number among the arguments in favor of a syntactic account, and the issue of acceptable mismatch, following Sag's example, is footnoted or downplayed. Kennedy (2003) marks an exception in addressing the mismatch question directly: after a review of data consistent with the syntactic approach (including unacceptable mismatches as well as binding and extraction violations), Kennedy turns to challenges for the syntactic model, including the acceptable mismatch cases. Although he does not concede that such examples are grammatical, or even acceptable, Kennedy notes that they are attested and, as such, constitute a 'fact about English'.

Over the last decade, theoretical interest in the question of antecedent mismatch has increased, due, apparently, to a confluence of two trends in the field: a renewed interest in the question of the role gradience plays in the grammar and an increased reliance on experimental methodologies in establishing the empirical base for analysis. Within this setting, two influential proposals have been advanced to account for cases of acceptable and unacceptable mismatch, each offering the potential of resolving the tension between the competing syntactic and semantic approaches. Kehler (2000; 2002) described a semantic model of ellipsis which invokes constraints on discourse coherence. Kehler argued that in some instances the inferencing processes supporting the establishment of coherence are sensitive to syntactic structure, and in those cases, mismatched ellipses are unacceptable. Arregui et al. (2006)'s Recycling Model, in contrast, starts with a syntactic model and argues that gradient acceptability patterns for mismatched ellipses can be predicted based on the processing costs necessary to repair an ill-formed antecedent.

Both models have their limitations. Predictions of the Coherence account depend crucially on identification of coherence relations, and in cases where it is unclear which coherence relation is operative, predictions are unclear. The Recycling approach, in its turn, is premised on a handful of distinct hypotheses, and while the predictions generated by each of these hypotheses are clear, the manner in which the different proposed mechanisms interact is not. As such, neither of these proposals offers a definitive

account of the mismatch question. They have played an important role, however, in drawing attention to a particularly complex issue and in highlighting those areas where more research is needed.

1.3   Proposal: Information Structure

I present an analysis of antecedent mismatch effects under ellipsis based on information structure, in which effects of antecedent mismatch are explained as a consequence of an information structural constraint requiring topic/comment parallelism for contrastive topics. The analysis reliably distinguishes between cases of acceptable versus unacceptable mismatch as follows: cases of unacceptable mismatch, as in (16), focus a target subject forming a defective contrastive topic structure; cases of acceptable mismatch, by contrast, focus an auxiliary verb (or other non-subject constituent) in the target clause, as in (17).

(16)   #The incident was reported by the driver,
    and THE PEDESTRIAN did too. [report the incident]

(17)   The incident should have been reported by the driver,
    but he DIDN't. [report the incident]

The patterns of acceptability observed for mismatched ellipses are predicted under this account as a consequence of interactions between topic and focus. The analysis appeals to general information structural constraints that are already at work in the grammar, doing away with the need for an ellipsis-specific constraint enforcing syntactic identity. The account makes novel predictions for offline acceptability and online processing of ellipsis and non-ellipsis structures alike.

1.4   Organization of the Thesis

Following a review of the relevant literature in Chapter 2, the proposal is developed over the following three chapters as follows.

- In Chapter 3 I identify an information structural confound overlooked in previous analyses of antecedent mismatch whereby acceptable versus unacceptable cases of antecedent mismatch can be distinguished based on their focus structure. Ellipses which require a syntactically matched antecedent focus the subject of the target

clause. Ellipses which tolerate mismatch instead focus some non-subject element in the target, typically the auxiliary verb. Experiments 1-3 test this proposal against alternative explanations of antecedent mismatch posited in the literature. Systematically dissociating focus structure from syntax, coherence, and the relative markedness of antecedent and target, the results reported in Chapter 3 demonstrate that focus is the best predictor of acceptability for ellipses with mismatched antecedents.

- I begin Chapter 4 with a question raised in the conclusion to Chapter 3, specifically, why the distribution of focus (whether it occurs on a subject or some other element) would matter for ellipsis acceptability. The answer, in brief, is that it doesn't. I show, however, that the subject focus ellipses identified in Chapter 3 are instances of contrastive topics, and that the observed effects can be predicted as a consequence of the interaction between topic and focus in contrastive topic structures. The analysis developed in this chapter applies to contrastive topic structures broadly, not just in ellipsis, and the account thus predicts ellipsis-like effects of antecedent mismatch even in non-ellipsis contexts. Experiments 4-6 test this prediction by extending the design of the experiments in Chapter 3 to include non-ellipsis controls. The results from those experiments confirm the information structural analysis presented here and introduce the novel finding of a repeated verb phrase penalty associated with some matched structures. I argue that this penalty is comparable to the repeated name penalty described in the literature on pronoun interpretation.

- In Chapter 5 I explore the implications of the information structural analysis developed here for an online incremental processing model of ellipsis. Experiment 7 shows that a mismatch between antecedent and target induces increased reading times following an ellipsis for contrastive topic structures but does not lead to a reliable difference in non-contrastive topic (simple focus) structures. In that experiment an effect of mismatch is also detected in regions preceding the ellipsis site, demonstrating that the information structural violation brought about by antecedent mismatch induces a penalty in its own right, independently of the ellipsis. Experiment 8 compares effects of mismatch in contrastive topic structures with and without ellipsis. That study shows that a lack of information structural parallelism leads to increased reading times even in the no-ellipsis context and that discourse connectives influence the relative ease of processing for elided versus repeated verb

phrase structures. The processing results reported in this chapter are consistent with the predictions of the analysis developed in this thesis but raise challenges for traditional licensing models and for recent proposals which attribute mismatch effects to ellipsis-specific mechanisms involving antecedent repair.

I conclude in Chapter 6 with a summary of findings, followed by a discussion of the implications of this work for previous linguistic and processing models of ellipsis. I revisit anomalous findings in the experimental literature, reinterpreting those results in light of the current account, and identify specific questions for future research.

Chapter 2

Antecedent Mismatch under Ellipsis

The question of antecedent mismatch under ellipsis has played a special role in developing theories of ellipsis licensing. The reduced acceptability associated with some cases of antecedent mismatch has been offered as evidence of a syntactic component to ellipsis licensing, and various theories have proposed an identity constraint of one form or another. There is a host of evidence within the semantic literature on ellipsis, however, demonstrating that some cases of antecedent mismatch under ellipsis are in fact acceptable. These conflicting data have posed a consistent challenge, and while many theories have simply not addressed counterevidence, a handful of recent proposals have sought to reconcile disparate findings within a single framework.

2.1 Theories of Ellipsis

The majority of the proposals described in the theoretical literature on ellipsis can be categorized according to one of two broad classes: syntactic theories, which posit linguistic structure associated with the ellipsis site and assume structural identity between the antecedent and the target as a licensing condition, and semantic theories, which model the relationship between antecedent and target as a form of coreference and make no special claims regarding the structure of the antecedent. The syntactic theories can be further subdivided based on whether they posit a deletion or copying mechanism underlying ellipsis.

2.1.1 Deletion

The evolution of the deletion model of verb phrase ellipsis reflects the development of one model of the syntax/semantics interface over a span of some thirty years; it also reflects the changing theoretical commitments of the Chomskyan approach to grammar. (See Schwabe and Winkler 2003 for an historical review.) In general, the deletion analyses described below are not specific to verb phrase ellipsis, but instead have been applied to a broad range of elliptical phenomena, including 'sluicing', 'gapping', and other verbal anaphors.

The earliest analyses of ellipsis modeled it as a deletion phenomenon, one which converted an input string like (18) into an output string like (19).

(18)   The driver [reported the incident], and the pedestrian did [report the incident] too.

(19)   The driver [reported the incident], and the pedestrian did [] too.

Rules proposed to describe the deletion transformation (for example by Akmajian and Wasow 1975 and Bouton 1970, as described in Sag 1976b) posited a licensing condition which involved Deep Structure identity between two verb phrases and marked the deletion transformation as optional. Sag's (1976) thesis pursued the idea that the level at which the identity condition must apply to license deletion is LF (Logical Form). As described in the previous chapter, appealing to LF, a 'covert' level of representation distinct from both Surface Structure and Deep Structure, supported a principled distinction between affix mismatch, which does not block the deletion transformation, and syntactic mismatch, which in some cases does.

The deletion model of ellipsis was subsequently updated to conform to the theoretical assumptions of the Principles and Parameters theory and later the Minimalist Program. The current 'PF Deletion' model of ellipsis, as it is called, shares with Sag's model the assumption that an ellipsis site is associated with syntactic structure at LF. Where Sag's account described a deletion transformation affecting Surface Structure, however, contemporary PF Deletion accounts instead describe a blocking effect which suppresses the Phonological Form (PF) of the ellipsis (Chomsky and Lasnik 1993). That is, under Sag's account, the elided verb phrase is absent at Surface Structure, having been deleted; under the PF deletion account, the verb phrase is never really gone—it just isn't pronounced.[1] Phonological Form is analogous, in this respect, to Surface Structure,

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[1]As Schwabe and Winkler point out, this revised model of ellipsis as absence of phonological form is

in that it is the level at which the ellipsis is detectable. The blocking or deletion process responsible for the ellipsis, however, was not modeled as a syntactic transformation, but was instead treated as an interface phenomenon involving LF and PF. This move offered a potentially unified analysis of both ellipsis and deaccenting, which was explored in further detail by Tancredi (1992) and later Merchant (2001). Merchant's work addressed sluicing primarily, but was also applied to verb phrase ellipsis. In that account, the identity condition licensing deletion (suppression at PF) was formulated as a strictly semantic relationship of 'mutual entailment'.

Because contemporary deletion accounts do not model a simple deletion under identity transformation, but instead posit an identity constraint at one level of representation which licenses suppression/deletion at another level, the predictions of those accounts regarding the possibility of mismatch between antecedent and target are dependent on the details of the implementation of the identity constraint. Under Sag's model, where the identity condition applies at LF, whether syntactic mismatch is permitted depends on the types of representations assumed at that level. Sag describes two possible representations for LF structures (p. 99): one encodes strictly semantic information about a predicate and its arguments. The alternative, which Sag adopts, is a quasi-syntactic structure which also encodes grammatical relations like subjecthood, as a result, encoding basic predicate-argument structure. Sag's choice is informed by previous work which describes ellipsis in terms of identity of predication, and the resulting model licenses ellipsis only in structures with parallel predicate/argument structure. There is some ambiguity in Merchant's model, which adopts a semantic identity condition, as to whether that account admits syntactic mismatches between antecedent and target. The issue was sidestepped in Merchant (2001) (p. 15 n. 4). In subsequent work contrasting verb phrase ellipsis with a related structure called pseudogapping, Merchant (2008) argued that whether a mismatch between antecedent and target is permitted depends on the level at which deletion occurs. If deletion targets a node which is below Voice-P (the case Merchant describes for ellipsis), VP is unmarked for voice, and a mismatch is possible. If, however, deletion targets a node above Voice-P (the analysis argued for pseudogapping), the VP is marked for voice, and a mismatch is not possible.

The relevant point for the current discussion is that in modern deletion accounts, the identity condition licensing ellipsis does not apply to syntactic structure. Rather, it applies either in the semantics or at LF. Depending on the implementation, predictions regarding mismatch may align with 'traditional' syntactic accounts (predicting ungram-

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at once '[close to] unrefutable' but also 'trivially true'.

maticality for ellipses with a mismatched antecedent, as in Sag 1976a); alternatively they may align with semantic accounts (as in Merchant 2008). In either case, predictions are categorical, and some additional explanation is necessary to account for conflicting data. The LF analysis must explain cases of good mismatch. The mutual entailment analysis must explain the bad.

2.1.2 Copying and 'Reconstruction'

Throughout the time that the deletion model of ellipsis was developed, an alternative model based on a copying mechanism was also pursued. An influential version of this proposal was advanced in Williams (1977), building on work by Wasow (1972). The copying proposal, even in its earliest form, resembled in many ways the current PF Deletion account, as it posited a fully-articulated syntactic structure at the ellipsis site. (For later arguments against a deletion account and in favor of copying, see, e.g. Chao 1987 and Lobeck 1995). The structure at the ellipsis site, under the copying account, however, was argued to terminate in phonetically-null lexical heads. That is, the tree structure was fully intact, but the lexical items inserted into the trees went unpronounced. Fully specified lexical material (complete with a phonological form) was, under this model, copied into the ellipsis site at LF via interpretive rules.

Because the copying model of ellipsis does not invoke a deletion operation, no identity condition is required to license deletion. It happens, however, that the copying model of ellipsis indirectly enforces structural identity on antecedent/target pairs via its copying mechanism. This follows as a consequence of the argument that the ellipsis is associated with a fully articulated structure. Presumably the copy operation will only map an antecedent onto a suitably matched target verb phrase at LF. If this is the case, the copying mechanism rules out all mismatched ellipses as ungrammatical.

One possibility for admitting syntactic mismatch under a copying account is to abandon the articulated structure component of the proposal. Hardt (1993), for example, argues for a 'pro-form' analysis of verb phrase ellipsis, which holds that an ellipsis antecedent is stored in a discourse structure for later access while interpreting the verb phrase. This analysis places no constraints on the syntactic form of the antecedent, admitting matched and mismatched interpretations alike. Indeed, Hardt (1993) is the source of a number of the cases of acceptable mismatch cited in the literature today, including (20), presented in the previous chapter.

(20)   This information could have been released by Gorbachev,
        but he chose not to.
        (Hardt 1993 no. 131)

Technically speaking, Hardt's proposal does not invoke an LF copying mechanism, but is instead framed as a discourse-based approach to the interpretation problem (cf. Prüst et al. 1994, Kehler 2000, Asher et al. 2001, inter alia). Hardt's model, while admitting cases of 'good' mismatch like (20), does not, however, rule out cases of 'bad' mismatch.

A variation on the LF analysis which posits articulated structure at the ellipsis site, but which would also admit cases of voice mismatch is developed in Fiengo and May's 'reconstruction' model of ellipsis. While the choice of terminology suggests a process, perhaps the copying/reconstruction of an antecedent at an ellipsis site, Fiengo and May in fact describe reconstruction as a relationship—a structural identity relationship holding across multiple phrase markers at LF (pp. 191-192). Fiengo and May explicitly challenge the need for either a copying or deletion operation (p. 236), relying instead on their notion of reconstruction as an identity relation. (As such Fiengo and May do not in fact propose an LF copy account, though their analysis is often categorized within the group of LF copy approaches.)

Under the reconstruction analysis, ellipsis is licensed by the redundancy which comes about as a consequence of the reconstruction relationship. As with all of the proposals described so far, on the question of antecedent mismatch, predictions of this account depend crucially on the implementation of that identity constraint. Following from various technical details of the proposal (having to do primarily with the status of traces within a reconstruction and whether they are to be treated as arguments, see p. 202), Fiengo and May's analysis predicts that some cases of voice mismatch will be acceptable. For example, an ellipsis like (21) is predicted to be licensed under reconstruction.

(21)   This law restricting free speech should be repealed by Congress, but I can assure
        you that it won't. [repeal this law restricting free speech]
        (Fiengo and May 1994 no. 17)

Fiengo and May describe a handful of specific scenarios like this one in which a mismatched ellipsis can be licensed, but they do not address cases were mismatch is prohibited. A sentence like (22), for example, (which I constructed) conforms to the structural pattern described by Fiengo and May, yet in this case, the mismatched ellipsis is de-

graded.

(22) #The law restricting free speech was reintroduced by the House, and the Senate
did too. [reintroduce the law restricting free speech]

As in the analysis of Merchant (2008) described above, the loophole exploited by Fiengo
and May's proposal reverses categorical predictions regarding antecedent mismatch. The
account as such allows certain cases of 'good' mismatch, but has no method of distin-
guishing them from the bad.

2.1.3   Interpretation

In contrast with analyses which describe the structural conditions licensing ellip-
sis, a number of analyses have instead pursued the question of how ellipsis is interpreted.
These include many of the LF copy approaches and the discourse-based analyses ref-
erenced above, as well as work in OT (Optimality Theory) Semantics (Hendriks and
de Hoop 2001). A particularly influential proposal is the higher order unification analy-
sis of Dalrymple et al. (1991), which describes an algorithm for ellipsis interpretation in
three parts.

The analysis crucially does not address the question of how the antecedent to the
ellipsis is identified, but instead starts with the antecedent clause in hand. The first step
involves identifying parallel elements within the propositions denoted by the antecedent
and target clauses. Next, a property or relation holding of the parallel element in the
antecedent clause is identified by abstracting over that element. Finally, that property is
applied to the parallel element in the second conjunct, yielding an interpretation for the
target clause. This algorithm differs from the 'interpretive rules' invoked by LF-based
analyses of ellipsis (in particular by the LF copy models) in that it permits recovery
of a property or relation evoked by the antecedent clause which may or may not have
been encoded syntactically as a verb phrase. The primary motivation for the unification
analysis was to demonstrate that it can make better predictions for the interpretation of
ellipses involving bound pronominals and quantifiers than strictly syntactic approaches.
The analysis has implications as well, however, for the question of antecedent mismatch.

Because the unification analysis is based on a semantic notion of parallelism, it
leaves open the possibility that parallel elements in an antecedent/target pair may not
be realized in syntactically parallel positions. The authors note specifically cases like
(23) and (24), where the logical subject (an implicit passive agent) in the antecedent

clause is semantically parallel to the surface subject in the target.

(23)   A lot of this material can be presented in a fairly informal and accessible fashion, and often I do.

        (Dalrymple et al. 1991 no. 59a)

(24)   It should be noted, as Dummett does.

        (Dalrymple et al. 1991 no. 59b)

They suggest that cases of acceptable mismatch like these, while commonplace, are fairly restricted in their pragmatics, and they describe other instances where syntactic non-parallelism seems to induce a violation. The unification model thus handles the 'good' cases of antecedent mismatch, offering a framework to describe how they may be interpreted. Their model does not, however, offer any mechanism for identifying or blocking cases of 'bad' mismatch.

    While Dalrymple et al. propose a purely semantic model of ellipsis interpretation, others have argued that syntactic structure plays a role in identifying the parallel relationships supporting the ellipsis. (See, especially, Prüst et al. 1994 for discussion on this point.) Semantic models of this sort constitute a gray area. They typically do not posit syntactic structure at the ellipsis site, distinguishing them from the copy and delete models described above. Insofar, however, as they assume that parallel syntactic structure is necessary for the interpretation of the ellipsis, their predictions regarding the possibility of antecedent mismatch align with those of the syntactic models.

2.2   Accounting for Mismatch

    The various analyses couched within the syntactic and semantic models of ellipsis make categorical predictions regarding the grammatical status of ellipses with syntactically mismatched antecedents. Syntactic models tend to rule them out, while semantic models admit them. As described above, however, predictions hinge crucially on the technical details of implementation. The important point, for this discussion, is that the categorical predictions of these models (whichever way they fall) are insufficient to account for the conflicting acceptability patterns observed for mismatched ellipses.

    In the sections below, I describe two recent proposals for accounting for the contradictory mismatch data. The Coherence analysis developed in Kehler (2000; 2002), like those described above, makes categorical predictions regarding grammaticality. Unlike those, however, the Coherence analysis offers a means for predicting those cases where

syntactic identity is required, distinguishing them from those where it is not. The Recycling model of Arregui et al. (2006) begins with a categorical grammar enforcing syntactic identity, and posits various processing mechanisms which can make some violations less egregious than others.

2.2.1 Discourse Coherence

Kehler (2002) proposed that acceptability for mismatched antecedents in ellipsis is conditioned on the coherence relation which obtains between the antecedent and the target clause (see also Kehler 2000). Cases of unacceptable mismatch, Kehler argued, are characterized by RESEMBLANCE coherence relations, which highlight similarities and contrasts between events and their participants and are bound by semantic parallelism. Cases of acceptable mismatch occur with other types of relations, for example CAUSE-EFFECT relations, which are instead bound by causality. A variety of acceptable mismatches drawn from corpora and spontaneous conversations are presented, and in each case a CAUSE-EFFECT relation is operative. In (25), for example, the coherence relation obtaining between the antecedent and the target is a 'violated expectation' relation, a specific instance of the more general class of CAUSE-EFFECT relations.

(25)   This problem was to have been looked into,   (violated expectation)
        but obviously nobody did.   CAUSE-EFFECT
        (Kehler 2000 no. 24)

Those naturally occurring data are paired with constructed examples exhibiting a RESEMBLANCE relation. The 'parallel' relation in (26), for example, is a member of the class of RESEMBLANCE relations. A drop in acceptability coincides with the change in coherence from (25) to (26).[2]

(26)   # This problem was looked into by John,   (parallel)
        and Bob did too.   RESEMBLANCE
        (Kehler 2000 no. 34)

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[2] Kehler (2000) provides rules for identifying coherence relations. In this case, the natural inference which follows from the asserted content of the antecedent clause in (25) is that the problem was in fact looked into. The asserted content of the target clause is inconsistent with that inference, forming the basis of the 'violated expectation'. The larger class of CAUSE-EFFECT relations includes additional complex relations like 'denial of preventer', as well as simpler relations like 'explanation' and 'result'. The parallel relation in (26) involves a property, here the property of having looked into the problem, which holds of parallel entities, here John and Bob. 'Parallel' and 'contrast' are the two basic sub-types of RESEMBLANCE relations.

Both sentences demonstrate a voice mismatch between antecedent and target, but only the sentence exhibiting RESEMBLANCE coherence shows reduced acceptability.

Kehler attributes the effect to an interaction between the inference processes which support establishment of RESEMBLANCE coherence and the interpretation of the ellipsis. Kehler posits a semantic model of ellipsis interpretation, where the interpretation for the ellipsis is supplied by the anaphoric dependency between antecedent and target. As such, the ellipsis itself does not impose syntactic parallelism. The establishment of RESEMBLANCE coherence, however, requires the identification of parallel arguments (for example, 'John' and 'Bob' in (26) above), necessitating reconstruction of the LF representation of the source (antecedent) clause. (For Kehler, reconstruction describes a process of recovering the syntactic structure of the antecedent.) This reconstruction process is the source of the parallelism constraint. Establishing a CAUSE-EFFECT coherence relation does not require access to syntactic structure in the same way, as the relevant arguments for a CAUSE-EFFECT relation are clause-level, not NP-level, constituents. As such, no reconstruction is attempted for CAUSE-EFFECT relations, and no parallelism constraint is imposed.

Challenges to the Coherence Account

Two challenges for the Coherence analysis have been raised in the literature. The first involves the characterization of RESEMBLANCE coherence relations and the manner in which relations are identified. Hendriks (2004) argued that the cases of RESEMBLANCE coherence identified in Kehler (2002) are also instances of contrastive topics (a point which I also argue in Chapter 4). Hendriks further argues that verbal anaphors can be distinguished based on the way they relate to their topics and that the RESEMBLANCE coherence relations described by Kehler are in fact epiphenomena of topic structure.

The second challenge comes from a study reported in Frazier and Clifton (2006), which tested predictions of the Coherence account in a series of off-line experiments. Of particular interest here are experiments 1 and 2 of that study. (Experiments 3 and 4 tested predictions regarding the availability of strict/sloppy interpretations under ellipsis.) Experiment 1 used mismatched stimuli in two conditions: with a causal connective ('because') and resemblance connective (either 'and ... too' or 'just like').

(27)   The cause of the accident was investigated by the police

    a.   because the insurance company did.   CAUSE-EFFECT

b.   and the insurance company did too.   Resemblance

(Frazier and Clifton 2006: exp. 1, no. 9)

In a 'makes sense' task where participants either accepted or rejected sentences, a reliable effect of connective was found where the mismatched ellipses with causal connectives were rejected more often than the mismatched ellipses with parallel connectives. This result was not consistent with a straightforward syntactic account, which makes a categorical prediction that all mismatches are ungrammatical. Nor was it consistent with the Coherence account, however. The Coherence analysis, recall, holds that ellipses in Resemblance relations require syntactic parallelism, and, as such would have predicted a preference for mismatched ellipses with causal connectives, not the observed preference for parallel connectives. Frazier and Clifton speculated that the connective effect may have been due to a lack of pragmatic support for some of the stimuli featuring causal relations. They identified a subset of stimuli that they thought might be involved and modified them for use in a subsequent experiment. Most often the modifications involved replacing the connective 'because' with 'even though'. (For related findings on this issue, see Kertz 2008.)

In experiment 2 of the Frazier and Clifton study, both matched and mismatched versions of the modified stimuli from experiment 1 were used, retaining the connective manipulation. The resulting crossed design yielded four conditions, as in (28)-(29), and a rating scale task was used.

(28)   The police investigated the cause of the accident   match

    a.   even though the insurance company already did.   Cause-Effect

    b.   just like the insurance company already did.   Resemblance

(29)   The cause of the accident was investigated by the police   mismatch

    a.   even though the insurance company already did.   Cause-Effect

    b.   just like the insurance company already did.   Resemblance

(Frazier and Clifton 2006: exp. 2, no. 9)

Findings from that experiment showed a main effect of antecedent form, where mismatched ellipses were judged less acceptable than matched ellipses. There was no interaction between mismatch and connective, however, indicating that the size of the mismatch effect was not dependent on the coherence relation signaled by the connective. Frazier and Clifton concluded that there was no evidence to support the Coherence

analysis and proposed instead that in cases of acceptable mismatch, processing-induced amelioration can render some ellipses 'ungrammatical but acceptable'.

2.2.2 A Processing Account of Mismatch

As early as Sag (1976a) it was suggested that cases of apparently acceptable antecedent mismatch under ellipsis could be explained by appealing to processing and/or memory effects on linguistic production and comprehension (p. 76). Such an approach was not fully elaborated, however, until recently. The 'Recycling Hypothesis' (Arregui et al. 2006) describes a processing model for verb phrase ellipsis where all mismatched ellipses are ungrammatical, but ungrammatical ellipses vary in acceptability as a function of the processing costs they impose. The Recycling model breaks the problem of ellipsis interpretation down into two processes: identifying the antecedent and then repairing it, if necessary. Two proposals are described for how context might affect these processes, together with a third proposal which describes an effect of memory for surface form.

The Recycling Hypothesis

The first of these proposals, the eponymous Recycling Hypothesis, posits an underlying syntactic licensing model overlaid with an interpretation mechanism, whereby well-formed antecedents are copied at the ellipsis site and ill-formed antecedents are repaired prior to being copied. The repair is syntactic in nature and invokes operations already licensed by the grammar (including syntactic displacements and derivational morphological processes). Processing demands are correlated with the complexity of the syntactic repair; hence a repair requiring multiple operations is predicted to be more costly than one with fewer operations. For example, the Recycling Hypothesis predicts a cline in acceptability from (a) to (d) in (30) below, with (a) imposing only minimal repair (loss of inflection on the verb 'saw' to produce 'see') and showing relatively high acceptability while (d) requires the most costly repair (turning a negative adjective into a verb and retrieving an object from subject position) and is the least acceptable variant.

(30) a. None of the astronomers saw the comet,

  b. Seeing the comet was nearly impossible,

  c. The comet was nearly impossible to see,

  d. The comet was nearly unseeable,

  . . . but John did. [see the comet]

  (Arregui et al. 2006 no. 9)

Results from an offline forced-choice acceptability task showed the predicted pattern.

Antecedent Identification

The Recycling Hypothesis combines the general syntactic processing and repair framework described above with additional mechanisms supporting antecedent identification. These include a preference for antecedents which occur as matrix (as opposed to embedded) verb phrases and a proposed facilitative effect attributed to the presence of adverbs like 'previously' or 'already' and presuppositional triggers like the particle 'too', all of which are argued to imply to the hearer that a matched antecedent is either available or was intended by the speaker. That proposal predicts, for example, that an ellipsis like (31), which contains the presuppositional particle 'too' will be easier to process/more acceptable than an ellipsis like (32), for which the particle is absent.

(31)   The student was praised by the old schoolmaster,
         and the advisor did too.

(32)   #The student was praised by the old schoolmaster
         and the advisor did.
         (Arregui et al. 2006 no. 17)

This prediction was confirmed using a rating scale task, and similar results were observed for temporal adverbs like 'already'.

An additional mechanism supporting antecedent identification was proposed by Frazier (2008). The Non-Actuality Implicature Hypothesis, which falls under the umbrella of the larger Recycling approach, holds that the presence of a lexical item in the antecedent clause which triggers a 'non-actuality implicature' can facilitate identification of the antecedent, in turn improving the acceptability of the ellipsis. For example, in a sentence like (33), Frazier argued, the antecedent introduces an implicature that the information which needed to be released was not in fact released.

(33)   This information needed to be released but Gorbachev didn't.
         (Frazier 2008 no. 21b, cf. (20) above)

This implicature is argued to highlight a contrast between the actual world and reported events, making the antecedent especially salient. Frazier compared (33) with (34), arguing that the latter does not introduce the same pragmatic effect.

(34)   #This information was released but Gorbachev didn't.
         (Frazier 2008 no. 21a)

Reduced acceptability was predicted for sentences like (34) as compared to (33). That prediction was confirmed using an offline judgment task.

Memory and Misremembering

The final component of the larger Recycling approach involves memory for surface syntactic form. Arregui et al. introduced the Systematic Paraphrase Hypothesis, which makes the specific prediction that ellipses which feature a passive antecedent followed by an active target will be easier to process than ellipses which show the reverse pattern. They argued that the difference in acceptability is due to a memory-based effect whereby speakers and hearers are more likely to misremember a marked structure as its unmarked alternate than the reverse. (Here markedness is framed in derivational terms. A base alternate is the less marked one; a derived alternate the more marked.)

For example, the Paraphrase Hypothesis predicts that an ellipsis like (35) will be more acceptable than (36). (The paraphrase manipulation was included in the same experiment as the presupposition particle manipulation, hence the optional 'too' in these examples.)

(35)   The student was praised by the old schoolmaster,
             and the advisor did (too).

(36)   The advisor praised the student,
             and the old schoolmaster was (too).
             (Arregui et al. 2006 no. 17)

The prediction was confirmed using an offline acceptability rating task.

Challenges for the Recycling Account

Despite the experimental evidence offered in support of each of the specific proposals falling under the Recycling approach, the general antecedent recovery/repair model proposed by Arregui et al. does not cover some basic contrasts of the sort addressed in this chapter and the previous one. Further questions raised by the Recycling analysis involve the ellipsis-specific nature of the mechanisms proposed and the manner in which the various effects are predicted to interact.

On the first point, despite its ability to predict gradient acceptability differences for cases like (30) above, the Recycling model is incapable of predicting differences for minimal pairs like (37)-(38), which show an acceptability contrast, despite a mismatch between antecedent and target in both cases. (These are the kind of blatantly contradictory data that make mismatch such an intractable problem.)

(37) #The accident was investigated by the police,
        and the insurance company did too. [investigate the accident]

(38)   The accident was investigated by the police,
        even though they didn't need to. [investigate the accident]

Across (37) and (38), the antecedent clause and the elided verb phrase are held constant. The Recycling Hypothesis, as such, would predict identical repair procedures for these two ellipses and, as a result, comparable acceptability.

The fact that the antecedent clause is identical across both cases furthermore ensures that there is no special feature (for example, a non-actuality implicature) present in the antecedent clause of (38) that makes it more salient than the antecedent in (37), thereby boosting acceptability. Nor is there a difference in markedness: both sentences feature a passive antecedent and active target. The differences between the two clauses involve non-ellipsis regions of the target clause, including the connective, the target subject, negation on the verb in (38), and the presence of a presuppositional particle in (37). The Recycling model does not address effects of connectives (in fact Arregui et al. argue explicitly against a coherence analysis of mismatch), nor are the target subject or auxiliary mentioned in any of the various hypotheses advanced under the Recycling approach. (The Non-Actuality Implicature Hypothesis, recall, addresses the antecedent clause.) The analysis does explicitly predict an effect of presuppositional particles (like 'too'), predicting that they will increase acceptability for a mismatched antecedent. That prediction does not hold in this case, however, as it is the ellipsis in (38), with no presuppositional trigger, that is the more acceptable. As such, the Recycling account, while offering a possible model for the interaction between grammar and processor in the interpretation of ellipsis, is not sufficient to resolve the problem posed by a minimal pair like this one (and the others like it described in the literature).

A further, more specific, critique of the Recycling approach involves the generality of the predicted effects associated with antecedent identification. In each case it is argued that a specific contextual manipulation can improve the acceptability of an ellipsis by

reducing the costs of antecedent identification. In the case of presuppositional triggers, for example, it is argued that the presence of a presuppositional trigger like 'too' can support the identification of an intended antecedent by signaling to the hearer that an appropriate (i.e. syntactically matched) antecedent was intended, even if one was not present in the context. As described above, Arregui et al. (2006) tested this hypothesis in a written acceptability task involving stimuli like (39), where the (a) condition included a presuppositional trigger ('too' in this case) and the (b) condition did not.

(39)   a.   The student was praised by the old schoolmaster,
              and the advisor did too.
        b. #The student was praised by the old schoolmaster,
              and the advisor did.
              (Arregui et al. 2006 no. 17)

Consistent with their proposal, a reliable effect was found where ellipses with mismatched antecedents were judged more acceptable when the presuppositional trigger was present.

Notice, however, that the acceptability difference associated with the presence or absence of 'too' is not unique to ellipsis. Rather, a more general discourse-level constraint requires the occurrence of such a presuppositional particle when the pragmatic effect of conjoining two clauses is to highlight the fact that a common property holds of contrasting entities (Kaplan 1984). In (40), for example, sentence (b), which lacks a presuppositional trigger, is degraded in comparison to (a). The manipulation is identical to that in (39) above, but in (40), there is no ellipsis.

(40)   a.   The student was praised by the old schoolmaster,
              and the advisor praised her too.
        b.   #The student was praised by the old schoolmaster,
              and the advisor praised her.

Thus while Arregui et al. (2006) have identified a number of contextual factors which can improve acceptability for bi-clausal structures, in the absence of comparison data using non-ellipsis controls, it has not been demonstrated that the observed effects are in fact unique to ellipsis. The factors identified may in fact play a role in promoting the coherence of such bi-clausal structures more generally.

Some final questions regarding the Recycling Hypothesis involve interactions among the various proposed effects. It is not described, for example, whether the vari-

ous facilitative effects will also improve acceptability of *matched* ellipses. Nor is it clear whether the effects introduced during antecedent identification and repair are predicted to be cumulative or instead to interact in some meaningful way. Finally, little is said about the manner in which the 'misremembering' effect proposed under the Systematic Paraphrase Hypothesis would affect the other proposals: would the memory effect be greater or smaller in cases where the antecedent is difficult to identify? And in cases where the antecedent is misremembered, does this obviate the need for syntactic repair? These and other questions remain unresolved pending further development of the Recycling model.

2.3   Summary

The linguistics literature on ellipsis is vast. For present purposes, however, the majority of the proposals presented therein can be categorized according to one of two broad classes: syntactic theories, which treat the antecedent to the ellipsis as a syntactic object and assume structural identity between the antecedent and the target as a licensing condition, and semantic theories, which instead treat the antecedent as a semantic object, making no special reference to its syntactic form. Neither of these approaches, however, can account for the conflicting patterns of acceptability associated with antecedent mismatch. Nor have the various refinements introduced into these theories over the years been up to the task.

Recent proposals addressing the question of antecedent mismatch directly have offered valuable insight into the problem, though important issues remain unresolved. The two models described in detail here have pursued the question from different perspectives. Kehler (2000; 2002) proposed a coherence-based analysis to constrain the over-generating semantic model, while the Recycling model developed in Arregui et al. (2006) and Frazier (2008) introduced a processing component to extend coverage of the overly restrictive syntactic account.

Chapter 3

Focus

Previous analyses of antecedent mismatch under ellipsis have pursued two related goals: first, determining whether the underlying licensing mechanism is semantic or syntactic, and next, modifying the theory to account for various inconsistencies associated with the acceptability of antecedent mismatch. The current analysis marks a departure, attributing mismatch effects instead to a general information structural constraint which operates independently of ellipsis. I begin in this chapter by identifying a factor overlooked by prior analyses: acceptable versus unacceptable cases of antecedent mismatch under ellipsis can be reliably distinguished based on their focus structure.

3.1   A Role for Information Structure

Information structure (Halliday 1967), sometimes referred to as information packaging (Chafe 1976), is a level of representation distinct from syntax and semantics which bears on the well-formedness of an utterance with respect to its context. Where syntax addresses the hierarchical structure of constituents within an utterance and semantics deals with meaning and truth values, information structure is largely concerned with how information is partitioned into categories like given/new, topic/comment, focus/ground, and assertion/presupposition. There is a rich literature describing 'functional sentence perspective' within the Prague School tradition, which addresses many of these themes (Daneš 1974, Firbas 1964), but that work has not made significant contact with the generative tradition. A handful of influential works appearing in the 1990's, however, laid out a potential program for the study of information structure, bringing its themes to the attention of the larger linguistics community (Vallduví 1992, Lambrecht 1994, Erteschik-Shir 2007). Research in the area of formal discourse pragmatics covers much

of the same theoretical ground (Roberts 1996, Kadmon 2001).

Despite this growing body of work, information structure remains under-studied in comparison to other sub-fields. And while there is a general consensus regarding the basic phenomena of interest, there is little consensus regarding proper modeling of those phenomena—or even choice of terminology. (See Kruijff-Korbayová and Steedman 2003 for an historical overview and review of terminology.) Among the categories introduced above, focus is the exception: it stands out as an aspect of information structure that has been well studied, particularly within the semantics literature, and for which formal models are available.

3.1.1 Some Background on Focus

Focus is often identified in spoken English based on intonation. Its effect can be observed by comparing sentences like (41)-(42), which differ only in the distribution of focus. (The focused constituent is indicated by small capitals font and the subscript 'foc'.) These two sentences are distinguished when spoken aloud based on the location of a prominent pitch accent associated with the focused constituent: in (41) that pitch accent is realized on the first syllable of 'Alan'; in (42) it is realized on 'coats'.[1]

(41)   ALAN$_{foc}$ took the coats to the cleaners.

(42)   Alan took THE COATS$_{foc}$ to the cleaners.

The two sentences have the same truth-conditional semantics—both are true just in case Alan took the coats to the cleaners, but they are not felicitous in the same contexts. Sentence (41) might be uttered in a context, for example, where *who took the coats to the cleaners* is under question. Alternatively, a speaker might utter the sentence in (41) as a corrective to a prior utterance which asserted that someone else, not Alan, took the coats to the cleaners. Sentence (42), by contrast, is felicitous in a context where *what Alan took to the cleaners* is under question or where a prior utterance has asserted that Alan took something else, not the coats, to the cleaners.

It is common to speak of focus as if it were a feature associated with some constituent. Indeed, such an assumption seems to be implicit in the notation employed

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[1]The rules governing accent placement with focus are not always as straightforward as this overview might suggest. In particular, due to a phenomenon referred to as focus projection, there may, in some cases, be an ambiguity involving the size of the focused constituent. (See Kadmon 2001 for an accessible overview.) In other cases, competing constraints may affect accent placement according to a stochastic model (German et al. 2006). For the data of interest here, however, acoustic prominence is a generally reliable indicator of the distribution of focus. Where possible, I supply additional diagnostics for identifying focus.

here. Properly speaking, however, focus is always defined in relation to its complement—referred to alternately as ground, background, or (focal) presupposition, and the focus/ground partition is crucially determined by context. This is typically represented in formal notation via lambda abstraction, which serves to partition the focused constituent from a backgrounded proposition. Compare, for example, the equation in (43), which represents the simple denotation of the sentence *Alan took the coats to the cleaners*, and the equation in (44), which has been partitioned into a background proposition and the focused subject argument.

(43)   Alan took the coats to the cleaners.
         $take(alan, coats, cleaners)$

(44)   ALAN$_{foc}$ took the coats to the cleaners.
         $\lambda x.take(x, coats, cleaners)alan$

Under the Structured Meaning approach to focus (Krifka 1991 and citations therein) the meaning of a sentence like (44) is modeled as a pair of semantic objects comprising the background proposition and the focused constituent, as shown in (45).

(45)   ALAN$_{foc}$ took the coats to the cleaners.
         $\langle \lambda x.take(x, coats, cleaners), alan \rangle$ structured meaning

Focusing a different argument in the sentence yields a different partition. Compare (46), which focuses the object 'the coats', with (45).

(46)   Alan took THE COATS$_{foc}$ to the cleaners.
         $\langle \lambda y.take(alan, y, cleaners), coats \rangle$ structured meaning

Notice that while focus affects the semantics of an utterance—the pairs in (45) and (46) represent distinct semantic objects—it leaves syntactic structure unaffected: the basic phrase structure in (45) and (46) is identical.[2]

Rooth's influential (1992) proposal models the semantic effect of focus as the introduction of alternatives. A focused constituent, under this approach, is understood to presuppose some set of salient alternatives: other people who might have taken coats to the cleaners in (45) or other things Alan might have taken to the cleaners in (46). Under this theory, a focused utterance has two semantic values: an ordinary semantic value and a focus semantic value. The sentences in (45) and (46) share a common

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[2]This holds generally of English. See Kiss (1998) for qualifications and a cross-linguistic perspective.

ordinary semantic value, which is equivalent to the simple denotation provided in (43). Under Rooth's system that value is marked with a superscript 'o', as in (47).

(47)   ⟦Alan took the coats to the cleaners.⟧^{O}

      $take(alan, coats, cleaners)$ ordinary semantic value

The focus semantic value is obtained, like the structured meaning described above, by abstracting over the focused constituent. The focus semantic value, in this case, however, is modeled as a set of propositions. The focus semantic value of (48), for example, is represented as the set of propositions that some individual x took the coats to the cleaners, where x is a member of some contextually relevant set X (including, for instance, Alan, Alan's neighbor, Alan's housekeeper, etc.). Thus the focus semantic value of (48) is a set of propositions including *Alan took the coats to the cleaners, Alan's neighbor took the coats to the cleaners, Alan's housekeeper took the coats to the cleaners*, etc.

(48)   ⟦[Alan]$_{foc}$ took the coats to the cleaners.⟧^{f}

      $\{\lambda x.take(x, coats, cleaners)|x \in X\}$ focus semantic value

Similarly, the focus semantic value of (49) is the set of propositions that Alan took some item y to the cleaners, where y is a member of some contextually relevant set Y (including, for instance, the coats, the drapes, the duvet).

(49)   ⟦Alan took [the coats]$_{foc}$ to the cleaners.⟧^{f}

      $\{\lambda y.take(alan, y, cleaners)|y \in Y\}$ focus semantic value

Under this approach, the ordinary semantic value of a sentence is necessarily a member of the set of propositions comprising the focus semantic value of that sentence.

Question-Answer Congruence

With this notation, it is possible at this point to formalize the intuitions introduced at the beginning of this section regarding the contextual effects introduced by focus. Put informally, the intuition about questions and focus is that for a felicitous question/answer pair, the focus position of the answer will correspond to the position of the wh-word in the question. This is demonstrated in (50), where (a), but not (b) supplies a felicitous answer to the question *who took the coats to the cleaners?*

(50)   Who took the coats to the cleaners?

    a.   ALAN$_{foc}$ took the coats to the cleaners.

    b. #Alan took THE COATS$_{foc}$ to the cleaners.

Likewise in (51), (b) but not (a) supplies a felicitous answer to the question *what did Alan take to the cleaners?*

(51)   What did Alan take to the cleaners?

    a. #ALAN$_{foc}$ took the coats to the cleaners.

    b.   Alan took THE COATS$_{foc}$ to the cleaners.

As described in Kadmon (2001), this observation dates back to Paul (1880), and effects of question/answer congruence have figured prominently in the development of a theory of focus in the formal semantics literature. Under the alternative semantics theory of focus, question-answer congruence is easily accounted for if an approach to questions is adopted wherein the denotation of a question is a set of propositions (cf. Hamblin 1973): a question-answer pair are considered congruent if the question is equivalent to the focus semantic value of the answer.[3] The relevant constraint is provided in (52).

(52)   **Constraint on Question/Answer Congruence**
        An answer A supplies a congruent response to a question Q if Q is equivalent to the focus semantic value of A.
        (cf. Rooth 1992)

Building on the alternative semantics approach to focus and questions, Roberts (1996) models the pragmatic effect of focus as the presupposition of a relevant Question Under Discussion (QUD). That question may be either explicit or implicit in the discourse, and it is equivalent to the focus semantic value of the utterance. In cases where the question is implicit, hearers must accommodate the implicit question. In this way Roberts models a variety of pragmatic effects associated with focus, arguing that focus serves as a discourse regulating device.

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[3]Under the Structured Meaning approach to focus, questions are modeled as functions, which, when applied to an answer, supply a truth value. Under that approach question-answer congruence can be modeled via background matching. See Ginzburg (1992) for extensive discussion and a review of alternative approaches.

Contrast

The second intuition introduced at the beginning of this section—that focus plays a role in evoking contrast—can also be modeled using focus semantic values. Just as focus identified corresponding constituents in question/answer pairs above, focus can also identify contrasting constituents in sentence pairs. As described already, (a) but not (b) would serve as a felicitous reply to the utterance in (53), and (b), but not (a) would serve as a felicitous reply to the utterance in (54).

(53) Alan's housekeeper took the coats to the cleaners.

   a.   No, ALAN$_{foc}$ took the coats to the cleaners.
   b. #No, Alan took THE COATS$_{foc}$ to the cleaners.

(54) Alan took the duvet to the cleaners.

   a. #No, ALAN$_{foc}$ took the coats to the cleaners.
   b.   No, Alan took THE COATS$_{foc}$ to the cleaners.

The relevant constraint is formalized as in (55) and holds that a pair of utterances are felicitously contrasted when the first utterance falls within the focus semantic value of the second.

(55) **Constraint on Felicitous Contrast**
      A proposition B is felicitously contrasted with a preceding proposition A if the ordinary semantic value of A falls within the focus semantic value of B.
      (cf. Rooth 1992)

Note that the constraint in (55) does not enforce focus parallelism across the contrastive pairs—that is, the contrastive argument in the preceding clause need not be focused. Note also, however, that when 'anticipatory' focus *does* occur within the first of a pair of contrastive utterances, as in (56), the result is still a felicitous contrast per the constraint in (55).

(56) ALAN'S HOUSEKEEPER$_{foc}$ took the coats to the cleaners.
      No, ALAN$_{foc}$ took the coats to the cleaners.

This constraint is similar, though not identical to the constraint describing question/answer congruence. Both become relevant for the current discussion, as they can be used as diagnostics for determining the focus structure of an utterance based on preceding context.

3.1.2   Focus and Ellipsis Mismatch

A closer look at the types of data used to support syntactic and semantic models of ellipsis reveals that they are characterized by distinct focus structures. In cases where a voice mismatch is judged to be unacceptable, the target subject is in focus and is interpreted contrastively with the passive agent of the antecedent clause. For example, in (57) and (58) below, 'an onlooker' is in focus and is interpreted contrastively with 'the driver'.

(57)   The driver reported the incident,
       and AN ONLOOKER$_{foc}$ did too.

(58)   #The incident was reported by the driver,
       and AN ONLOOKER$_{foc}$ did too.

When the antecedent is matched in voice to the target (57), the ellipsis is acceptable. When there is a mismatch (58), the ellipsis is degraded.

When (57) and (58) are spoken aloud, accent on 'an onlooker' suggests that it is in focus. Intuitively 'an onlooker' is understood to form a contrast with 'the driver'. We can demonstrate that the contrast is in fact supported by context by applying Rooth's Constraint on Felicitous Contrast as a diagnostic. To do so we test whether the ordinary semantic value of the antecedent falls within the focus semantic value of the target, given the focus assignment in (57)-(58). (Alternative focus assignments can be tested in the same way.)

(59)   ⟦The driver reported the incident.⟧$^{\text{o}}$
       $reported(driver, incident)$ ordinary semantic value of antecedent

(60)   ⟦[An onlooker]$_{foc}$ reported the incident.⟧$^{\text{f}}$
       $\{\lambda x.reported(x, incident)|x \in X\}$ focus semantic value of target

The ordinary semantic value of the antecedent (59) falls within the focus semantic value of the target (60), satisfying the Constraint on Felicitous Contrast. This confirms that while various focus assignments are *a priori* possible for the target clause, it is focus on the target subject that supports a felicitous contrast with the antecedent. One feature of these calculations (and the focus analysis they reflect) which is of particular relevance given the current discussion is that they are unaffected by passivization: the values shown in (59)-(60) and are common to both the matched ellipsis in (57) and the mismatched

ellipsis in (58).

This pattern of focusing a target subject in cases of unacceptable mismatch was observed for each of the cases described in Chapters 1 and 2. Subject focus is observed, for example, in (61) through (63).

(61)   #This material is usually presented informally by the instructors,
and THE TA'S$_{foc}$ do too.

(62)   #This problem was looked into by John,
and BOB$_{foc}$ did too.

(63)   #The student was praised by the old schoolmaster,
and THE ADVISOR$_{foc}$ did too.

In each case, the target subject is in focus and is interpreted as contrastive with the passive agent of the antecedent clause. Note, moreover, that for the pair in (64)-(65), varying the connective does not improve the acceptability of the ellipsis (as was demonstrated by Frazier and Clifton 2006).

(64)   #The cause of the accident was investigated by the police
and THE INSURANCE COMPANY$_{foc}$ did too.

(65)   #The cause of the accident was investigated by the police
because THE INSURANCE COMPANY$_{foc}$ did.

As long as focus on the target subject remains constant, a mismatch between antecedent and target leads to reduced acceptability.

In cases of acceptable mismatch, focus in the target clause instead falls on an auxiliary verb, evoking a contrast in tense, aspect, mood, polarity—or some combination thereof—between the antecedent and the target. This is demonstrated in examples (66) and (67), where the target auxiliary marks a contrast in both modality (what could or should have been) and polarity (what was or wasn't).

(66)   The incident should have been reported by the driver,
but he DIDN'T$_{foc}$.

(67)   This information could have been released by Gorbachev,
but he chose NOT$_{foc}$ to.

When spoken aloud, the most prominent pitch accent on the target clause is on the first syllable of 'didn't' in (66) and on 'not' in (67), consistent with an analysis of focus on the auxiliary verb. (See Kertz 2008 for additional tests.)[4]

In contrast with cases of unacceptable mismatch, where the target subject is contrastive with a passive agent, the target subject in both (66) and (67) is coreferent with the passive agent in the antecedent. In other cases of acceptable mismatch, the passive agent of the antecedent clause goes unexpressed. The target subject, in such cases, may be given in the discourse, as in (68); it may be non-referential, as in (69); or it may introduce a new but non-contrastive argument, as in (70).

(68)   This material can be introduced in a fairly informal fashion,
        and often I DO_{foc}.

(69)   The problem was to have been looked into,
        but obviously nobody DID_{foc}.

(70)   Four fireworks manufacturers asked that the decision be reversed, and on Monday the ICC DID_{foc}.

Despite this variety in the formulation of acceptable mismatches, they are unified as a class by the occurrence of non-subject focus.

3.1.3   Summary and Implications

The standard syntactic and semantic licensing models of ellipsis have been unable to account for the patterns of acceptability observed for antecedent mismatch. Syntactic models predict ungrammaticality for ellipses with mismatched antecedents, while semantic models predict they are grammatical. In fact, however, mismatched ellipses are sometimes acceptable and sometimes not.

The generalization identified here holds that acceptability for antecedent mismatch is dependent on the focus structure of the target clause: when the subject of the target clause in an ellipsis is focused and contrasts with the passive agent in the antecedent clause, a mismatched antecedent is unacceptable; when an auxiliary verb (or

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[4]Applying the contrast constraint to these data is complicated by the intensional semantics associated with the modal verb in the antecedent clause. Specifically at issue is the question of whether the ordinary semantic value of the antecedent proposition under the scope of this modal can be considered to be among the set of alternatives evoked by focusing a negation marker. Strictly speaking, the focus alternative set of a negation marker has two members: the affirmative and the negative of the propositions under its scope. It has been suggested, however, that this set might be larger and might in fact include various alternative modalities as well. (See, e.g. Romero and Han 2004 for related discussion.)

other non-subject element) is focused, mismatch is acceptable. This view of the data suggests that the syntax/semantics debate which has pervaded the literature on ellipsis is premised on a sampling error. It happens that the constructed data which suggest a syntactic identity constraint conform to a common pattern, focusing the subject of the target clause, as in (61)-(65). Meanwhile the instances of acceptable mismatches culled from corpora and other sources as evidence in support of the semantic account have conformed to a different pattern, focusing instead an auxiliary verb or some other non-subject element in the target clause, as in (66)-(70).

Highlighting that difference, the focus-based analysis proposed here offers a different characterization of the mismatch data than the analyses described in the previous chapter. Recall that the Coherence analysis (Kehler 2000; 2002) holds that acceptability for ellipses with mismatched antecedents is conditioned on the coherence relation obtaining between the antecedent and the target clause. The Recycling Hypothesis (Arregui et al. 2006), by contrast, argues that acceptability for mismatched ellipses varies as a function of the processing costs associated with identifying and repairing an antecedent. The experiments reported in this chapter test the focus analysis against these alternative approaches by systematically dissociating focus structure from syntactic structure and from discourse coherence.

3.2   Experiments

I introduce in Experiment 1 a basic design for testing the focus-based analysis developed here against the standard syntactic and semantic accounts. That design crosses antecedent form (match versus mismatch) with target focus (subject versus non-subject) in an offline acceptability task. Experiments 2 and 3 introduce additional controls to rule out possible alternative explanations based on discourse coherence (Kehler 2000; 2002) or the relative markedness of antecedent and target (Arregui et al. 2006).

3.2.1   Experiment 1: Focus

To test the current focus-based analysis against previous syntactic and semantic analyses of ellipsis, Experiment 1 used stimulus sets which manipulated antecedent form (match versus mismatch) independently of the focus structure of the target clause (subject versus non-subject focus). Where much of the previous literature on ellipsis has relied on voice manipulations to generate matched versus mismatched antecedent/target

pairs, the current experiment uses 'tough' movement.[5] Like passivization, 'tough' movement results in the promotion of a logical object to subject position. To demonstrate, in (71), the logical object 'venomous snakes' appears *in situ* as a direct object complement to the verb 'identify'. In (72), however, 'venomous snakes' has been promoted to subject position.

(71)   It's easy to identify venomous snakes.   object *in-situ*

(72)   Venomous snakes are easy to identify.   raised object

In contrast with passivization, which also involves demotion of the logical subject (optionally realized as an object of the preposition 'by'), 'tough' movement only involves displacement of the object. (The subject position is filled by pleonastic 'it' in the *in-situ* variant.)

For the stimuli used in Experiment 1, tough alternations like (71)-(72) served as antecedents to follow-on clauses containing an ellipsis. A complete stimulus set is shown in (73)-(74), where pairing a raised object antecedent with a raised object target yielded a matched antecedent condition, as did pairing an object *in-situ* antecedent with an *in-situ* target (a). Alternate pairings formed the mismatched conditions (b).

(73)   Venomous snakes are easy to identify, and

    a.   poisonous plants are as well.   [match, subject focus]

    b.   most experienced hikers can.   [mismatch, non-subject focus]

(74)   It's easy to identify venomous snakes, and

    a.   most experienced hikers can.   [match, non-subject focus]

    b.   poisonous plants are as well.   [mismatch, subject focus]

In the subject focus condition a contrastive argument (e.g. 'poisonous plants') was introduced in subject position in the target clause; in the non-subject focus condition the target subject introduced a new but non-contrastive argument (e.g. 'most experienced hikers').

The syntactic licensing model of ellipsis predicts a main effect of antecedent form where mismatched ellipses show reduced acceptability as compared to matched ellipses (with no effect of focus). The semantic licensing model predicts no effect of antecedent form (nor of focus). The current proposal predicts an interaction between antecedent

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[5]The name 'tough movement' refers to the class of adjectives implicated in the alternation, including 'tough' and its synonyms and antonyms.

form and target focus, where the penalty associated with antecedent mismatch is larger in the subject focus condition as compared to the non-subject focus condition, i.e. (74b) is predicted to be the least acceptable condition.

Materials

Twenty-four stimulus sets were constructed as in (73)-(74). A norming trial (n=30) tested acceptability via magnitude estimation (described below) for the matched antecedent conditions to ensure that the matched conditions formed a comparable baseline. (No mismatch conditions were tested in the norming trial.) The twelve stimulus sets showing the greatest variation between the two matched alternates were discarded, leaving twelve experimental stimulus sets.

Method

Twenty-four undergraduates from the University of California, San Diego, all monolingual English speakers, received course credit for participation.

In a magnitude estimation task, participants were asked to provide acceptability ratings for stimulus sentences as compared to a fixed 'modulus' (Bard et al. 1996). The modulus was a grammatical sentence with conjoined clauses and no ellipsis, with a rating fixed at 100. The dependent measure used for statistical analysis was the ratio of the stimulus rating compared to the modulus rating, normalized via log-transformation.

A within-participants design was used with stimuli balanced across lists in a Latin square. For each list, experimental stimuli were presented in pseudo-random order with experimental stimuli from additional experiments (a mix of ellipsis and non-ellipsis sentences, predicted to be of variable levels of acceptability) and 'filler' stimuli (no ellipses, usually containing grammatical object relatives).

Methods were identical for Experiments 1 through 6, although the number of items and participants varied, as noted for each experiment.

Results and Discussion

Means and standard error for each condition are reported in Table 3.1, together with the mean difference between match and mismatch for each focus condition. Reliable differences ($p < .05$) are indicated with an asterisk. Positive means indicate the condition was rated more acceptable than the modulus; negative means were less acceptable. The mean for the filler condition exceeded all experimental means and is included for comparison.

Table 3.1: Exp. 1 Condition Means and Standard Error

	match	mismatch	difference
subject focus	-.02 (.02)	-.34 (.08)	.33 (.03)*
non-subject focus	.02 (.05)	-.13 (.04)	.16 (.03)
fillers	.03 (.03)		
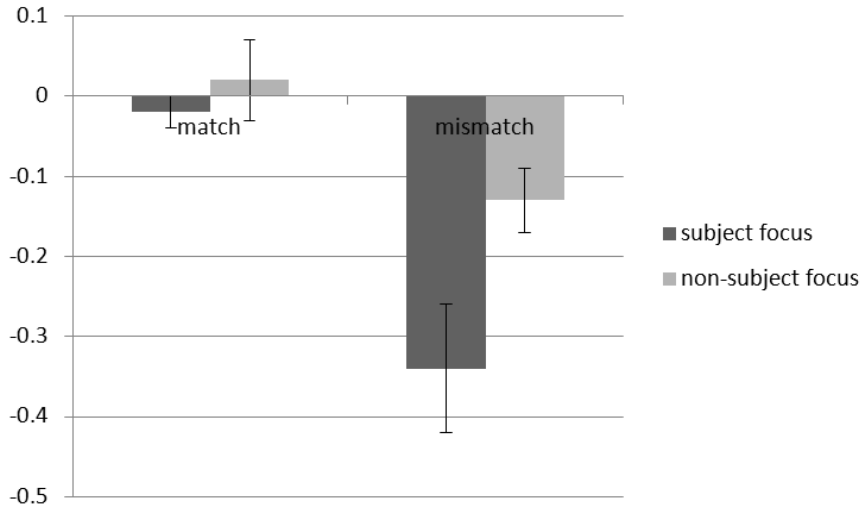
Figure 3.1: Exp. 1 Condition Means and Standard Error

Confirming the success of the norming phase, there was no reliable difference between the two matched antecedent conditions. Pairwise comparisons of all other condition means were significant ($p < .05$). Means for the matched antecedent conditions were not significantly different from the filler mean; both mismatch conditions were significantly different from the filler mean ($p < .05$). Condition means are graphed in Figure 3.1.

A two-factor ANOVA was computed, revealing a main effect of antecedent form, where the mismatched antecedent condition was judged less acceptable than the matched antecedent condition ($F_1(1, 23) = 20.93, p < .0001; F_2(1, 11) = 31.28, p < .0005$). A main effect of focus was also found, where the subject focus condition was judged less acceptable than the non-subject focus condition ($F_1(1, 23) = 10.73, p < .005; F_2(1, 11) = 5.35, p < .05$). The focus effect was driven by the mismatch condition, however, and a reliable interaction was observed where the effect of mismatch was greater in the subject focus condition than in the non-subject focus condition ($F_1(1, 23) = 4.93, p < .05; F_2(1, 11) = 5.78, p < .05$).

These results are consistent with the predictions of the focus analysis presented here, but are incompatible with the categorical predictions of both the syntactic and

semantic licensing models.

These results are also, however, consistent with the predictions of the Coherence analysis. Recall that the Coherence analysis predicts a reconstruction effect for ellipses occurring in RESEMBLANCE relations. This reconstruction effect leads to reduced acceptability for mismatches occurring in RESEMBLANCE relations, but not those occurring in other types of relations. For the stimuli used in Experiment 1, focus and coherence covaried: subject focus conditions exhibited parallel relations, which fall within the RESEMBLANCE class, while auxiliary focus conditions exhibited result relations, or other members of the CAUSE-EFFECT class. Mismatch conditions from Experiment 1 are repeated in (75)-(76) with coherence relations labeled.

(75)   It's easy to identify venomous snakes, and
         poisonous plants are as well.   RESEMBLANCE (subject focus)

(76)   Venomous snakes are easy to identify, and
         most experienced hikers can.   CAUSE-EFFECT (non-subject focus)

For these stimuli, the focus analysis and the Coherence analysis make the same prediction: (75) is predicted to be less acceptable than (76).

3.2.2   Experiment 2: Coherence

To rule out a possible interpretation of the results from Experiment 1 based on discourse coherence, Experiment 2 replicated the design from Experiment 1, again crossing antecedent form (match versus mismatch) with focus structure (subject versus non-subject focus) while also controlling for discourse coherence. Where focus and coherence co-varied across conditions in Experiment 1, Experiment 2 maintained RESEMBLANCE coherence relations for all conditions by using equative structures like (77), which set up an explicit comparison between two events.

(77)   The technicians didn't install the line as quickly as the engineers did.

For the stimuli used in Experiment 2, the ellipsis appeared in an embedded adverbial clause, as in (77); the matrix clause served as the antecedent. Passivization was used to generate matched versus mismatched antecedents, and the passive agent was always expressed. A complete stimulus set is provided in (78)-(79), where the (a) alternates form the matched antecedent condition, and the (b) alternates form the mismatched

condition.

(78)   The technicians didn't install the line as quickly as

    a.   the engineers did.   [match, subject focus]

    b.   it could have been.   [mismatch, non-subject focus]

(79)   The line wasn't installed by the technicians as quickly as

    a.   it could have been.   [match, non-subject focus]

    b.   the engineers did.   [mismatch, subject focus]

A contrastive argument ('the engineers') was introduced in the subject position of the target clause in the subject focus condition; the target subject was coreferent with the logical object/patient of the antecedent clause in the non-subject focus condition (i.e., 'it' refers to 'the line').

    The focus analysis predicts a replication of the pattern observed for Experiment 1, where antecedent form interacts with target focus such that the penalty associated with mismatch is larger in the subject focus condition. Under an interpretation where the results from Experiment 1 were driven by coherence, a main effect of mismatch is also predicted, but no difference is predicted for the two mismatch conditions.

Materials

    Eighteen item sets were constructed as in (78)-(79).

Method

    Methods were identical to those in Experiment 1. (Participant n=36; Item n=18.)

Results

    Means and standard error for each condition are reported in Table 3.2, together with the mean difference between match and mismatch for each focus condition. (Reliable differences are indicated with an asterisk.) As in Experiment 1, a positive mean indicates the condition was rated more acceptable than the modulus, a negative mean less acceptable. Filler means fell between the matched and mismatched condition means and are included for comparison.

    A two-factor ANOVA identified a main effect of antecedent form, where the mismatched antecedent condition was rated less acceptable than the matched antecedent

Table 3.2: Exp. 2 Condition Means and Standard Error

	match	mismatch	difference
subject focus	.09 (.04)	-.21 (.04)	.30 (.03)*
non-subject focus	.08 (.04)	-.12 (.03)	.20 (.03)
fillers	.02 (.03)		
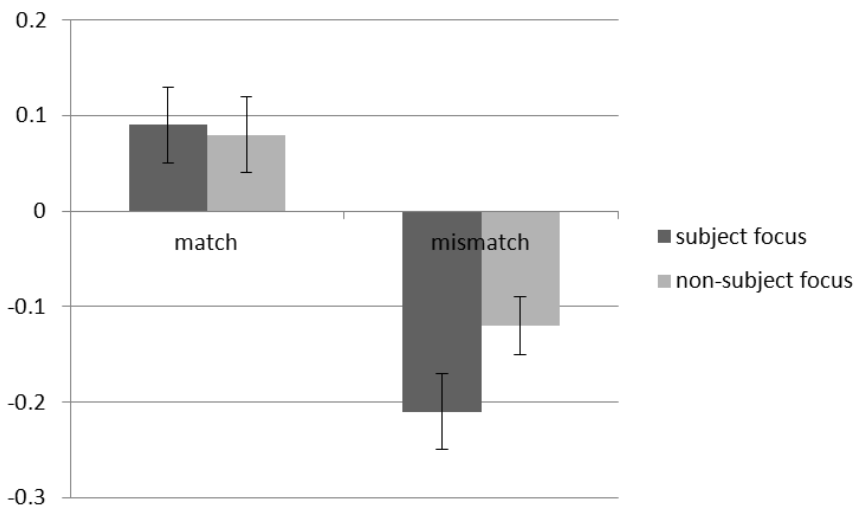
Figure 3.2: Exp. 2 Condition Means and Standard Error

condition ($F_1(1, 35) = 25.66, p < .0001; F_2(1, 17) = 55.78, p < .0001$). There was no main effect of focus by participants, but there was a reliable main effect of focus by items, where the subject focus condition was rated less acceptable than the non-subject focus condition ($F_1(1, 35) = 2.58, p = .12; F_2(1, 17) = 6.20, p < .05$). A numerical pattern was observed whereby the effect of mismatch was greater in the subject focus condition than in the non-subject focus condition; the interaction was marginal, however, by subjects and by items ($F_1(1, 35) = 3.60, p = .07; F_2(1, 17) = 3.01, p = .10$).

As in Experiment 1, there was no reliable difference between means for the matched conditions, although the difference between the mismatch conditions was reliable ($p < .05$). All condition means were reliably different from the filler mean ($p < .05$). Condition means are graphed in Figure 3.2.

Although the interaction in this experiment was not statistically reliable, pairwise comparisons—in particular the finding of a reliable difference in acceptability between the mismatched conditions—replicate the pattern of overall results observed for Experiment 1 and are consistent with the predictions of the focus analysis. This data pattern is not predicted by the Coherence analysis, as coherence was controlled across all conditions.

3.2.3 Experiment 3: Markedness

Experiment 3 offers a final manipulation to rule out a potential alternative explanation of the mismatch effects observed here based on the 'Systematic Paraphrase Hypothesis' of Arregui et al. (2006). That account holds that hearers may not always accurately remember the structure of the antecedent to an ellipsis and that in some cases they may misremember a mismatched antecedent as a match. When this occurs, the ellipsis is treated as acceptable by the speaker, although it is technically ungrammatical. (Arregui et al. liken the production of a mismatched ellipsis to a speech error on the speaker's part.) The authors further argue for an asymmetry involved in this memory effect, where hearers are more likely to misremember a marked structure as an unmarked one than the reverse.[6]

The notion of markedness adopted by Arregui et al. (2006) is one based on syntactic complexity, where the base or underived alternate of a grammatically related pair is less marked than the derived alternate. (See Haspelmath 2006 for alternative formulations of markedness and a critical review.) When markedness is defined in this way, the raised object version of a tough alternation is more marked than the object *in-situ* version, and the passive version of a voice alternation is more marked than the active. Applying the Systematic Paraphrase Hypothesis to the design used in Experiment 1, the predictions of that analysis align with those of the current proposal.

Consider the two mismatched conditions from that experiment. As shown in (80)-(81), the subject focus condition, predicted under the current account to be more sensitive to mismatch than the non-subject focus condition, pairs an 'unmarked' antecedent with a 'marked' target. The non-subject focus condition, predicted under the current account to be less sensitive to mismatch, instead pairs a 'marked' antecedent with an 'unmarked' target. The Paraphrase account thus predicts that (80) will be less acceptable than (81), on the grounds that the hearer is more likely to misremember the antecedent as a matched alternate in the latter case.

(80)   It's easy to identify venomous snakes, and   ['unmarked' antecedent]
        poisonous plants are as well.   ['marked' target, (subject focus)]

(81)   Venomous snakes are easy to identify, and   ['marked' antecedent]
        most experienced hikers can.   ['unmarked' target (non-subject focus)]

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[6]Arregui et al. (2006) do not address whether this effect might disrupt processing in cases where the marked version of an antecedent is also the matched version, though this is theoretically possible, given their proposal as framed.

The predictions of these two accounts overlap in this case, and the findings from Experiment 1 are consistent with both proposals.

Predictions diverge, however, for Experiment 2. The mismatch conditions for that experiment are shown in (82)-(83). As indicated, the subject focus condition in this case features an 'unmarked' target, while the non-subject focus condition features a 'marked' target. The current focus-based analysis predicts reduced acceptability for (82), while the Systematic Paraphrase Hypothesis predicts reduced acceptability for (83).

(82)   The line wasn't installed by the technicians as quickly as ['marked' antecedent]
        the engineers did.   ['unmarked' target (subject focus)]

(83)   The technicians didn't install the line as quickly as   ['unmarked' antecedent]
        it could have been.   ['marked' target, (non-subject focus)]

The results from Experiment 2 showed that (82) was reliably judged less acceptable than than (83), consistent with the focus analysis. It is the case, however, that the interaction predicted under the focus analysis was stronger in Experiment 1 than in Experiment 2. As such, it is possible that some effect of relative markedness as described under the Systematic Paraphrase Hypothesis enhanced the result in Experiment 1 while dampening it in Experiment 2.

Experiment 3 was designed to rule out any potentially confounding effects of markedness by testing the Systematic Paraphrase Hypothesis directly. The stimuli used for Experiment 3 were adapted from Experiment 2. The markedness manipulation from Experiment 2 was retained, but the focus manipulation was eliminated. Equative structures, as in (84)-(85) were used. In each case the subject of the target clause was coreferent with an argument from the antecedent clause, and focus fell on the auxiliary verb 'could' (i.e. non-subject focus was maintained across all conditions).

(84)   The technicians didn't install the line as quickly as   ['unmarked' antecedent]
        a. they could have.   [match, 'unmarked' (active) target]
        b. it could have been.   [mismatch, 'marked' (passive) target]

(85)   The line wasn't installed by the technicians as quickly as ['marked' antecedent]
        a. it could have been.   [match, 'marked' (passive) target]
        b. they could have.   [mismatch, 'unmarked' (active) target]

Pairing an active voice target with an active voice antecedent formed a matched condition

(a), as did pairing a passive target with a passive antecedent. Alternate pairings formed the mismatch conditions (b). Targets ending in 'have', which selects for an active verb phrase complement, formed the 'unmarked' target condition; targets ending in 'been', which selects for a passive verb phrase complement, formed the 'marked' target condition.

Both the Systematic Paraphrase Hypothesis and the current proposal predict a main effect of mismatch. The Systematic Paraphrase Hypothesis also predicts an interaction, where the effect of mismatch is greater in the 'marked' target condition (because the facilitative effect of misremembering is predicted to occur only in the 'unmarked' target condition). Whereas focus is controlled across all conditions, however, the current proposal predicts no interaction.

Materials

Sixteen stimulus sets were constructed as in (84)-(85).

Method

Methods were identical to those in Experiments 1 and 2. (Participant n=40; Item n=16.)

Results

Means and standard error for each condition are reported in Table 3.3, together with the mean difference between the unmarked (active) and marked (passive) target conditions for each level of antecedent form. Filler means fell between the means for the matched and mismatched conditions and are included for comparison.

Table 3.3: Exp. 3 Condition Means and Standard Error

	active target	passive target	difference
match	.06 (.04)	.05 (.03)	.01
mismatch	-.16 (.04)	-.15 (.04)	.01
fillers	.03 (.01)		

A two-factor ANOVA revealed a main effect of antecedent form, where the mismatch condition was rated lower than the match condition ($F_1(1, 40) = 34.85, p < .0001; F_2(1, 15) = 157.89, p < .0001$). There was no main effect of target form (unmarked versus marked) ($F_1(1, 40) = .002, p = .97; F_2(1, 15) = .24, p = .63$). There was no interaction ($F_1(1, 40) = .19, p = .66; F_2(1, 15) = .04, p = .84$). Condition means are graphed in Figure 3.3.
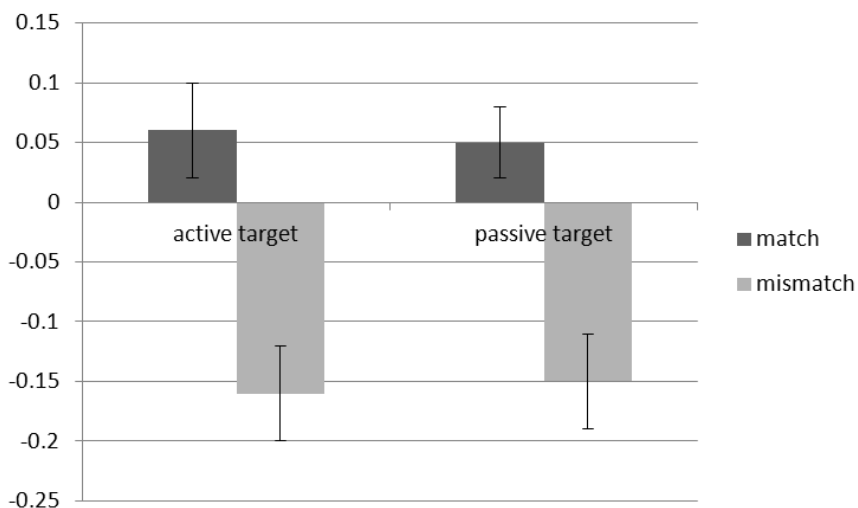
Figure 3.3: Exp. 3 Condition Means and Standard Error

Pairwise comparisons across conditions showed a reliable difference between the matched and mismatched conditions for each level of target form ($p < .05$). There was no reliable difference between the marked and unmarked target conditions, however, in either the matched or mismatched antecedent condition. The absence of an interaction and the lack of a reliable difference between the mismatch conditions go against the markedness predictions of the Systematic Paraphrase Hypothesis. These null results, more importantly, rule out any potentially confounding effects of markedness for the findings reported for Experiments 1 and 2.

3.3   General Discussion

Consistent with the hypothesis presented here, the results from Experiments 1-3 demonstrate that acceptability for mismatched antecedents in ellipsis is conditioned on the focus structure of the target clause: mismatched ellipses which focus the target subject are reliably judged to be less acceptable than mismatched ellipses which focus a target auxiliary. This focus effect, moreover, is not dependent on coherence, as demonstrated in Experiment 2, where coherence was controlled across all conditions; nor can it be explained by appealing to the relative markedness of antecedent and target, as confirmed in Experiments 2 and 3.

3.3.1 Focus and Coherence

I argued above that the data used to support the syntactic and semantic licensing models of ellipsis mask a confound based on focus. Information structure is similarly confounded in the Coherence analysis of Kehler (2000; 2002). There discourse structures identified as forming RESEMBLANCE coherence relations, as in (86), focus the target subject, while other types of coherence relation (e.g. CAUSE-EFFECT), as in (87), do not. (See Hendriks 2004 for related discussion.)

(86) #The problem was looked into by John,
and BOB$_{foc}$ did too.   RESEMBLANCE

(87) The problem was to have been looked into,
but obviously nobody DID$_{foc}$.   CAUSE-EFFECT

In Experiment 2 of the current study, focus and coherence were dissociated: RESEMBLANCE coherence was maintained across all conditions, while information structure was varied. That manipulation showed that mismatched ellipses which focused a target auxiliary were reliably judged more acceptable than mismatched ellipses which focused a target subject, arguing against a coherence-based explanation.

Coherence and focus can also be dissociated by holding information structure constant while manipulating coherence. While not stated as an explicit goal of their manipulations, this was achieved in the experiments described in the previous chapter from Frazier and Clifton (2006). Minimal pairs like (88) were used to compare acceptability for ellipses with mismatched antecedents occurring in CAUSE-EFFECT (a) versus RESEMBLANCE (b) coherence relations.

(88) The cause of the accident was investigated by the police

    a. #because THE INSURANCE COMPANY$_{foc}$ did.
    b. #and THE INSURANCE COMPANY$_{foc}$ did too.

The Coherence analysis predicts reduced acceptability for the RESEMBLANCE condition, but the focus analysis presented here predicts reduced acceptability for both structures, consistent with the null result reported by Frazier and Clifton. As such, the focus account not only offers a better explanation for the data presented here, but also accounts for the findings reported by Frazier and Clifton 2006.

In favoring the focus analysis over the Coherence analysis, however, we leave behind an explanatory framework which can account for the differences observed between the two classes of data. As described in the previous chapter, Kehler's larger theory of coherence relations and discourse predicts that syntactic structure plays a special role in supporting the inferences which establish a RESEMBLANCE coherence relation. Without appealing to coherence to explain the effects observed here, we are left with the question of why focus would matter for ellipsis.

3.3.2   Why Focus?

There is a line of inquiry in the literature dating at least to Rooth (1993) and Tancredi (1992), which explores the mediating role of focus in licensing ellipsis. (See also Merchant 2001, Winkler 2005.) Like the bulk of the syntactic literature on ellipsis, the literature on focus and ellipsis has primarily addressed cases of subject-focus ellipsis and has not addressed the question of acceptability for mismatched antecedents. Before turning to possible explanations of the focus effect described here, I offer a brief review of previous work on focus and ellipsis.

The primary contribution of that work has been to highlight the similarities between two focus-induced effects: deaccenting and ellipsis. Deaccenting refers to a non-default intonational pattern which occurs in narrow focus constructions. For example, in (89), focus on 'the insurance company' is characterized by an intonational shift which realizes a pitch accent on the focused constituent and leaves the verb phrase 'deaccented'.

(89)   The police investigated the cause of the accident,

and THE INSURANCE COMPANY$_{foc}$ looked into it too.

In general, a deaccented verb phrase can substitute for an ellipsis in most contexts. That is, the ellipsis in (90) could also be expressed using an overt (non-elided) verb phrase which has been deaccented (91).

(90)   The police investigated the cause of the accident,

and THE INSURANCE COMPANY$_{foc}$ did too. [investigate it]

(91)   The police investigated the cause of the accident,

and THE INSURANCE COMPANY$_{foc}$ investigated it too.

Ellipsis, however, cannot occur in all contexts where deaccenting is licensed. That is, in contrast to the felicitous deaccenting in (89) the ellipsis in (92) cannot have the

interpretation indicated.

(92)   #The police investigated the cause of the accident,
        and THE INSURANCE COMPANY$_{foc}$ did too. [look into it]

Framed under the analysis of contrastiveness presented above, the descriptive generaliza-
tion is as follows: for a contrastive ellipsis to be well-formed, the ordinary semantic value
of the antecedent must fall within the focus semantic value of the target. A consequence
of this is that the target verb phrase and its antecedent must be denotational equivalents
(semantically identical).

For deaccenting, the conditions are somewhat different. In order for a verb
phrase to be deaccented, it must be 'given'—in a sense made precise, for example, by
Schwarzschild (1999). The givenness condition licensing deaccenting is met when the
deaccented verb phrase is denotationally equivalent to its antecedent (i.e. when the
verb phrase is repeated); it can also, however, be met when antecedent and target enter
into an entailment relation. The entailment relation may be a lexical one, as in (89),
where 'looking into' can be construed as a form of 'investigating', and this lexical overlap
licenses deaccenting in the second conjunct. In other cases, however, as Lakoff (1971)
famously demonstrated, deaccenting may implicate an entailment relation which must
be accommodated by the hearer.[7]

Under a theory which would unify deaccenting and ellipsis, an explanation is
needed for why the licensing conditions differ in this way. Rooth and Tancredi both
explore solutions that would derive the difference 'for free' from a syntactic identity
condition on ellipsis. Rooth, for example, adapts an early version of Fiengo and May
(1994)'s notion of syntactic reconstruction as a secondary licensing constraint which must
be met to license ellipsis, though not deaccenting. Tancredi instead posits a discourse-
level 'focus-based topic' (modeled as a syntactic object), which licenses both ellipsis
and deaccenting. The difference under Tancredi's model is that where deaccenting may
entail a focus-based topic, ellipsis must *instantiate* it (where instantiation involves a
denotational equivalent). The unifying theme for these analyses is that in each case,
semantic identity under ellipsis is piggy-backed on syntactic identity. A consequence of
this approach is that both analyses align with the basic syntactic model of ellipsis in
assuming syntactic identity between antecedent and target is required to license ellipsis.

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[7]Lakoff described the following case: *John called Mary a whore / a Republican / a virgin / a lexicalist,
and then* SHE *insulted* HIM. The punch-line here is that in order for the utterance to be felicitous, the
reader must accommodate that calling someone *a whore / a Republican / a virgin / a lexicalist* is a form
of insult.

As such they make the same categorical prediction regarding acceptability of antecedent mismatch as the basic syntactic model.

Merchant (2001) offers an alternative, modeling the additional constraint governing ellipsis as a purely semantic one. Under Merchant's account, deaccenting may be licensed in cases where the deaccented verb phrase enters into a one-way entailment relation with the antecedent (i.e. where the antecedent entails the F-closure of the target, per a Schwarzschildian notion of 'given'). Ellipsis, however, is licensed only in cases of mutual entailment (i.e. where the antecedent entails the F-closure of the target and vice versa). This move captures the difference between the contexts in which ellipsis and deaccenting are permitted and does so without invoking an additional syntactic constraint on ellipsis. As described in Chapter 2, however, there is some ambiguity under Merchant's account as to the status of syntactically mismatched ellipses. Depending on how the semantic licensing condition interacts with the syntactic mechanism licensing deletion, predictions may align either with the syntactic or the semantic account.

The foregoing is by no means an exhaustive review of the literature on ellipsis and focus. For example, López and Winkler (2000) (building on work from Winkler 1997) offer various counterpoints to previous analyses of ellipsis and deaccenting while exploring from a typological perspective how different types of focus may license different types of ellipsis. Of particular interest in that work is a consideration of ellipses which mark both an argument and a polarity focus. The central claim of the analysis, however, is that contrastive focus should be modeled as a syntactic feature which can trigger movement of another constituent with a matching feature—the question of antecedent mismatch is not addressed. Similarly Tomioka (1997) considers how a theory of focus interpretation might account for binding and scope relations under ellipsis without appealing to a syntactic identity condition. There once more, the question of antecedent mismatch is peripheral.

In short, while there are a variety of analyses in the literature exploring the role focus plays in licensing ellipsis, the effects reported here, which demonstrate that sensitivity to syntactic structure of the antecedent is dependent on the distribution of focus in the target clause, do not follow directly from any of them.

3.3.3   A Pragmatic Effect?

One possible alternative to a formal semantic account of the data presented here is advanced in the Non-Actuality Implicature (NAI) Hypothesis of Frazier (2008), which posits a pragmatic effect for a sub-class of data evoking a modality contrast between

antecedent and target. The NAI Hypothesis is one of a handful of hypotheses (including the Recycling Hypothesis and the Systematic Paraphrase Hypothesis), which fall under the umbrella of a processing-based explanation for mismatch effects, as set out in Arregui et al. (2006). Each of the hypotheses assumes a different kind of processing effect. The NAI Hypothesis posits a pragmatic inference about the linguistic structure of the antecedent; the Recycling Hypothesis assumes syntactic repair of an antecedent; and the Systematic Paraphrase Hypothesis proposes a memory-based effect. As a group, however, they fit within a theory that treats mismatched ellipses as ungrammatical. Under that approach, any one of these effects might facilitate processing of the mismatched structure, such that, while not permitted by the grammar, it nonetheless crosses the threshold into acceptability.

The NAI Hypothesis in particular picks out a subset of the data demonstrated in these studies to be less sensitive to mismatch. Specifically, it addresses ellipses which evoke a modality contrast between antecedent and target, as in (93).

(93)   This information could have been released by Gorbachev,
        but he chose not to.
        (Hardt 1999 no. 131, Frazier 2008 no. 5)

Frazier (2008) argues that the presence of a 'non-actuality implicature' in the antecedent clause 'focuses' (in a generic sense—not according to the formal semantic notion of focus, as used here) a contrast between asserted information and actual circumstances in the real world. Diagnostics for identifying a non-actuality implicature are not provided, but based on the data in Frazier (2008), the relevant parameter seems to be the presence or absence of a lexical item (usually an auxiliary) introducing deontic modality. The modal auxiliary 'could' in (93), for example, introduces deontic modality (Gorbachev was free to release the information), as does 'should' in (94) (hiring a private firm is a desired state of affairs).[8]

(94)   A private firm should be hired,
        but the Chancellor can't.
        (Frazier 2008 no. 23)

The NAI Hypothesis captures the acceptability for an ellipsis like (94), appealing to

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[8]Frazier (2008) describes a control condition with no NAI, however, which contains the modal 'may', so my characterization of the hypothesis based on modality may not be precisely what Frazier had in mind.

the pragmatic effect triggered by the modal in the antecedent clause.[9] Notice, however, that the auxiliary in (93)-(94) is in focus. This is in fact the case for all the examples argued to exhibit a non-actuality implicature. The NAI Hypothesis, as such, picks out a subset of cases of auxiliary-focus ellipsis, offering a potential explanation for the increased acceptability of those cases.

The NAI Hypothesis however, fails to generalize to the broader class of auxiliary-focus ellipses as identified here. It fails, for example, to account for the acceptability of (95), where there is no lexical item in the antecedent which could trigger the implicature. The embedding verb 'ask' is not a modal and is neutral with respect to factivity (it neither entails its complement nor entails its negation).

(95)   Four fireworks manufacturers asked that the decision be reversed,
         and on Monday the ICC DID_{foc}.

Similarly, the NAI Hypothesis fails to account for examples like (96) and (97), where the lexical items triggering the proposed implicature ('could' in (96) and 'would' in (97)) occur in the target clause, not the antecedent.

(96)   This information was never released by Gorbachev,
         although he COULD_{foc} have chosen to at any point.

(97)   The accident was investigated by the police,
         even though no one believed they WOULD_{foc}.

As such, while an analysis based on non-actuality implicatures might be applicable to a subset of the data described here (given some set of explicit diagnostics), that analysis as stated does not extend to the full range of data covered by the focus analysis. Rather, the relevant generalization seems to be the one advanced in this thesis: ellipses which focus a target auxiliary, encoding a contrast in tense, aspect, mood, or polarity between antecedent and target, are less sensitive to mismatch than subject focus ellipses which encode an argument contrast.

Returning to our main question of *why* focus would matter, I argue in the following chapter that the two types of ellipsis identified here differ not only in their focus structure, but also in their topic structure, and that the demonstrated patterns of acceptability can be predicted based on an interaction between topic and focus.

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[9]Presumably, the NAI analysis also extends to (93), but that datum is modified by Frazier (2008) to use the auxiliary 'need to' later in the paper.

3.4   Summary

In this chapter I proposed an analysis of ellipsis which predicts acceptability for mismatched antecedents based on the focus structure of the target clause. Cases of unacceptable mismatch focus a target subject, while cases of acceptable mismatch focus an auxiliary verb in the target clause, evoking a clause-level contrast in tense, aspect, mood, or polarity. The proposal was tested in Experiments 1-3, which demonstrated that focus is a better predictor of acceptability for antecedent mismatch than syntactic structure, discourse coherence, or the relative markedness of antecedent and target. I compared the results of these experiments to previous findings in the literature and argued against alternative explanations.

Chapter 3 includes data that have been previously published and data that have been submitted for publication. Data reported for Experiment 1 have appeared in *Proceedings of the 27th West Coast Conference on Formal Linguistics*, eds. Natasha Abner and Jason Bishop. Kertz, Laura, Cascadilla Proceedings Project (2008). The dissertation author was the primary investigator and sole author of this material. Data reported for Experiments 1 and 2 have been submitted for publication. The dissertation author was the primary investigator and sole author of this material.

Chapter 4

Topic

The previous chapter exposed a confound in prior analyses of antecedent mismatch under ellipsis, demonstrating that ellipses which focus a target subject show a greater sensitivity to antecedent mismatch than ellipses which focus an auxiliary verb or some other non-subject element in the target. In this chapter I further elaborate the information structural analysis of these two sets of data, showing that subject focus ellipses form contrastive topics. I argue that the observed sensitivity to antecedent mismatch stems from a discourse-level constraint imposing topic/comment parallelism for contrastive topic pairs. The proposed constraint is not limited to ellipsis contexts, and the experiments in this chapter demonstrate that ellipsis-like effects of antecedent mismatch are observed even in the absence of ellipsis.

4.1   The Topic/Comment Partition

Topic and focus introduce independent partitions within a discourse: topic is distinguished from comment, focus from presupposition. These two partitions, moreover, serve distinct functions. Focus introduces alternatives (Rooth 1992), while topic identifies what an utterance is about (Strawson 1964, Reinhart 1982). Focus can be identified using diagnostics like question-answer parallelism (Rooth 1992, Roberts 1996, and citations therein); meanwhile topic is correlated with a cluster of properties including definiteness and syntactic prominence (Chafe 1976, inter alia).

Perhaps most relevant to the current discussion, where focus is not sensitive to syntactic structure, topic is. To demonstrate, passivizing a sentence like (98), as in (99), does not affect its focus structure. Both sentences provide a felicitous answer to the question *who reported the incident?*

(98)   THE DRIVER$_{foc}$ reported the incident.

(99)   The incident was reported by THE DRIVER$_{foc}$.

This change, however, does affect the topic structure of the sentence. Subjecthood and topichood are closely correlated in English, and displacement operations which promote an argument to subject position are often used to mark that argument as topic. (See, e.g., Siewierska 1984 for related discussion and cross-linguistic perspective.) All else being equal, passivization of a sentence like (100) serves to topicalize the logical object, as shown in (101). At the same time, the logical subject is demoted from its subject/topic position to a low-prominence position as object of a preposition (Reinhart 1982).

(100)   [The driver]$_{top}$ reported the incident.

(101)   [The incident]$_{top}$ was reported by the driver.

A similar topicalizing function is observed for tough movement (Comrie and Matthews 1990). In this case, however, displacement of the logical object introduces a topic/comment partition, as in (103), where there was none before (102). Unlike passivization, tough movement does not involve the simultaneous demotion of a logical subject.

(102)   It's easy to identify venomous snakes.

(103)   [Venomous snakes]$_{top}$ are easy to identify.

Thus for all of the data described in the previous chapters, the syntactic manipulations used to generate matched versus mismatched minimal pairs have affected not only the syntactic structure of the antecedent to the ellipsis, but also its topic structure. The topic-disrupting effects of displacements like passivization are well-documented in the literature on pronominal reference (Garvey et al. 1975, Gordon and Chan 1995, inter alia). There has been comparatively little exploration, however, of a possible role for topic structure in licensing verbal anaphors (but see Hendriks 2004, Johnson 2001, Tancredi 1992 for related discussion).

4.1.1   When Topic Meets Focus

The two information structural partitions introduced by topic and focus can align in different ways. When topic and focus intersect, the result is contrastive topic focus, formally distinguishable from the 'simple' focus that occurs in the comment portion of

an utterance (Krifka 2008, Kadmon 2001, Steedman 2000, inter alia).[1] The difference between contrastive topic focus and simple focus is demonstrated in (104)-(105). The two sentences share a common topic structure—'Philip' is the subject/topic in both cases—but they show distinct focus structures.

(104)   [Philip]$_{top}$ ordered A MARTINI$_{foc}$.   simple focus

(105)   [PHILIP]$_{top/foc}$ ordered a martini.   contrastive topic focus

In (104), 'a martini' is in focus and supplies a felicitous answer to the question *what did Philip order?* Topic and focus here are disjoint, and focus on 'a martini' is simple focus. By contrast, in (105), 'Philip', the topic, is focused, supplying a felicitous answer to the question *who ordered a martini?* Here topic and focus intersect, and as such, focus on 'Philip' is an instance of contrastive topic focus.

Much of the previous literature on contrastive topic has addressed dual focus structures which include both a contrastive topic focus and simple focus, paying particular attention to the intonational contour associated with each type of focus (Büring 2003, Roberts 1996, Jackendoff 1972, inter alia). An example of such a dual-focus structure is given in (106).

(106)   [PHILIP]$_{top/foc}$ ordered A MARTINI$_{foc}$.

Krifka (1999) argued that structures like (107), which contain only a single focus, are also instances of contrastive topics. (Krifka argues that the additive particle 'too' is licensed by contrastive topic focus.) Note that the repeated verb phrase 'ordered a martini' in (107) is deaccented: it carries no secondary focus marking a contrast in the comment portion of the clause.

(107)   Leslie ordered a martini, and
          [PHILIP]$_{top/foc}$ ordered a martini too.

Although Krifka argues that the contrastive topic in (107) bears the characteristic 'B accent' associated with contrastive topics, it is not clear that intonation is a reliable diagnostic of contrastive topic in single focus utterances such as these.[2] An alternative

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[1]Kadmon (2001) refers to contrastive topic focus and simple focus as 'topic-focus' and 'focus-focus' respectively; Steedman (2000) uses the terms 'theme' and 'rheme' to refer to topic and comment and describes focus as occurring in either the theme or rheme.

[2]Theoretical predictions regarding the accent type associated with single-focus contrastive topic structures vary: Krifka argues that a B accent occurs in sentences like (107); predictions under Jackendoff's account depend on whether a polarity contrast is also present. It seems clear that the presence or absence

test from Jackendoff (1972), however, confirms that the subject in repeated verb phrase sentences like (107) can be explicitly marked as topic using 'as for'. In this way, dual-focus and single-focus contrastive topic structures pattern together, as shown in (108)-(109).

(108)   Leslie ordered a martini, and as for Philip,
         [PHILIP]$_{top/foc}$ ordered [SCOTCH]$_{foc}$.

(109)   Leslie ordered a martini, and as for Philip,
         [PHILIP]$_{top/foc}$ ordered a martini too.

Notice that single focus, repeated verb phrase structures like (109) differ only minimally from the subject focus ellipses of interest here. For example, in (110), the would-be repeated verb phrase is instead elided. (The intended interpretation for the ellipsis is indicated in brackets.)

(110)   Leslie ordered a martini, and
         [PHILIP]$_{foc}$ did too. [order a martini]

Hendriks (2004), citing parallels between ellipsis cases like (110) and their repeated verb phrase counterparts, argued that ellipses which introduce a contrastive argument in the target subject position are also instances of contrastive topics. That analysis is supported by application of the 'as for' test, which shows that the target subject can be explicitly marked as topic, as demonstrated in (111).

(111)   Leslie ordered a martini, and as for Philip,
         [PHILIP]$_{top/foc}$ did too. [order a martini]

Thus canonical dual-focus constructions like (106), single-focus deaccented structures like (107), and subject focus ellipses like (111) receive a unified treatment as contrastive topics under an information structural analysis of contrastive topic as the intersection of topic and focus.

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of a second focus-related accent and the related issue of the presence or absence of an intonational break following the first focus-related accent can affect the phonological realization of a so-called 'contrastive topic accent'. For this reason (among others), a number of authors have cautioned that the idealized accent patterns described in the theoretical semantics/pragmatics literature do not map easily onto actual acoustic data. See, e.g. Hedberg (2006), Cutler et al. (1997) for detailed discussion.

4.1.2 Contrastive Topics and Ellipsis

Recall that in Chapter 3 ellipses were categorized based on a syntactic analysis of the distribution of focus, specifically whether focus fell on a subject or non-subject constituent. Adopting the view from information structure, we can instead categorize ellipses based on whether focus in the target clause intersects with topic (forming a contrastive topic) or with the comment portion of the sentence (as an instance of simple focus). On this analysis, the subject focus ellipses identified in Chapter 3 are all instances of contrastive topics, as indicated in (112)-(114)

(112) The driver reported the incident,
and [THE PEDESTRIAN]$_{top/foc}$ did too.

(113) John looked into the problem,
and [BOB]$_{top/foc}$ did too.

(114) The police investigated the cause of the accident,
and [THE INSURANCE COMPANY]$_{top/foc}$ did too.

When focus falls on an auxiliary, by contrast, it falls in the comment portion of the sentence. The result, as indicated in (115)-(117), is simple (non-contrastive topic) focus.

(115) The incident should have been reported by the driver,
but he DIDN'T$_{foc}$.

(116) The problem was to have been looked into,
but obviously nobody DID$_{foc}$.

(117) The cause of the accident was investigated by the police,
even though they didn't NEED$_{foc}$ to.

With this fuller information structural analysis of the data in hand, we can re-frame the descriptive generalization identified in Chapter 3: the penalty associated with antecedent mismatch is larger in contrastive topic ellipses as compared to ellipses which exhibit simple focus (for example, on an auxiliary verb). I turn now to our central theoretical concern: why?

4.1.3 An Independent Information Structural Constraint

Krifka (2008) explains that in a contrastive topic structure, topic and focus each serve their usual functions: topic identifies what the utterance is about while focus intro-

duces alternatives—in this case, *alternative topics*. As Erteschik-Shir (2007) describes, in a well-formed contrastive topic discourse, the set of alternative topics, hereafter the 'topic set' (*cf.* Daneš 1974's 'hypertheme') identifies a set of referents as a discourse-level topic. The members of the topic set that are explicitly referenced in the discourse are realized as sentence-level topics, each one commented on in turn. In (118), for example, the sentence-level topics 'my mother', 'my father', and 'my sister' comprise a discourse-level topic set restricted to the members of the speaker's family.

(118)   As for my family,
          [my mother]$_{top}$ is a teacher,[3]
          [my father]$_{top/foc}$ works in an office, and
          [my sister]$_{top/foc}$ is a student.
          (cf. Erteschik-Shir 2007 no. 5b)

In this way, sentence-level topic/comment structure supports organization at the discourse level.

          Notice that the well-formed contrastive topic ellipses identified in the previous section follow this pattern: the subject/topic of the antecedent clause and the subject/topic of the target clause together comprise a discourse-level topic set. In (119), for example, the topic set is restricted to 'individuals that reported the incident'; alternatively the topic set might be defined by the union of 'the driver' and 'the pedestrian'.

(119)   [The driver]$_{top}$ reported the incident,
          and [THE PEDESTRIAN]$_{top/foc}$ did too.

Likewise in (120), the topic set is restricted to 'individuals that looked into the problem' or simply the union of 'John' and 'Bob', and in (121) to 'entitites that investigated the cause of the accident' or 'the police' and 'the insurance company'.

(120)   [John]$_{top}$ looked into the problem,
          and [BOB]$_{top/foc}$ did too.

(121)   [The police]$_{top}$ investigated the cause of the accident,
          and [THE INSURANCE COMPANY]$_{top/foc}$ did too.

Compare the well-formed contrastive topic ellipses in (119)-(121) above with their mismatched counterparts in (122)-(124) below. There, passivization of the antecedent clause

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[3]Note that the first reference to a member of the topic set need not be in focus.

topicalizes the logical object, displacing the logical subject to a low-prominence position as the object of a preposition. The ellipsis in each case is degraded.

(122)   #[The incident]$_{top}$ was reported by the driver,
         and [THE PEDESTRIAN]$_{top/foc}$ did too.

(123)   #[The problem]$_{top}$ was looked into by John,
         and [BOB]$_{top/foc}$ did too.

(124)   #[The cause of the accident]$_{top}$ was investigated by the police
         and [THE INSURANCE COMPANY]$_{top/foc}$ did too.

On this view of the data it becomes apparent that the problem with ellipses like (122)-(124) is not the structural mismatch between antecedent and target *per se*, but rather the non-topical status of a member of the intended topic set; that is, 'the driver' is not a topic in (122), 'John' is not a topic in (123), and 'the police' is not a topic in (124).

   This in turn suggests that the violation observed in each case is not a violation of the licensing conditions on ellipsis but rather a violation of a well-formedness constraint on contrastive topics. That constraint emerges naturally as a result of the interplay between topic and focus and holds simply that for a contrastive topic to be well-formed, members of the topic set must be realized as sentence-level topics, a stated in (125).

(125)   **Well-formedness Constraint on Contrastive Topics**
         A contrastive topic is well formed when members of the discourse-level topic set are realized as sentence-level topics.

This analysis of the source of the mismatch effect is confirmed by comparing the mismatched contrastive topic ellipses in (122)-(124) to their simple focus counterparts in (126)-(128).

(126)   The incident should have been reported by the driver,
         but he DIDN'T$_{foc}$.

(127)   The problem was to have been looked into,
         but obviously nobody DID$_{foc}$.

(128)   The cause of the accident was investigated by the police,
         even though they didn't NEED$_{foc}$ to.

These simple focus ellipses exhibit a syntactic mismatch between antecedent and target but do not show the reduced acceptability associated with a mismatched contrastive topic.

4.1.4   Implications and Predictions

Under the analysis developed here, the penalty associated with antecedent mismatch is not the result of a violation of syntactic licensing conditions on ellipsis; rather, the preference for matched antecedents arises as a consequence of a discourse-level constraint governing contrastive topics. That constraint holds that in a well-formed contrastive topic structure members of the topic set that are referenced explicitly in the discourse must be realized as sentence level topics. The constraint, as such, makes no special reference to the syntactic structure of the antecedent clause. It enforces, nonetheless, *de facto* syntactic parallelism by ensuring that the intended contrastive argument evoked in the antecedent clause is realized as a subject/topic. Two predictions follow directly from this account. The first involves the dissociability of syntactic parallelism and information structural (topic/comment) parallelism. The second involves the generality of the mismatch effect.

First, if it is the case, as I have argued here, that the problem with a mismatched contrastive topic is not the lack of syntactic parallelism between related discourse segments, but the lack of topic/comment parallelism, it should be possible to construct a well-formed contrastive topic in which the related discourse segments are not syntactically matched. An example of this sort shown in (129). The original context for the utterance is a *Newsweek* interview with a Congressman who is discussing communication with White House staff. This context supports identification of Ron Ziegler and Al Haig, both advisors to then-President Nixon, as members of a discourse-level topic set.

(129)   We have nothing to say to Ron Ziegler,
            and Al Haig's never been in politics.
            (Hobbs 1976; 1990)[4]

Under the current analysis, for this sentence to be a well-formed contrastive topic, the noun phrase 'Ron Ziegler', which occurs in a low-prominence position as the object of a preposition, must be analyzable as the topic of the first segment, as demonstrated in (130).

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[4]Hobbs (1976), the source of this example, does not argue for a contrastive topic analysis, but cites it as an instance of a parallel discourse coherence relation which does not depend on parallel syntax.

(130)   We have nothing to say to [Ron Ziegler]$_{top}$,

and [Al Haig]$_{top}$'s never been in politics.

Although the object of a preposition is an unlikely position for topics in general, notice that 'Ron Ziegler' is not a displaced noun phrase, that is, it has not been demoted from a high prominence position in the way, for example, a passive agent has. Furthermore, while third person pronouns, especially those in subject position, generally make good topics, first person pronouns (like 'we') are always discourse given and not necessarily topical. In this case, for example, the speaker (and his colleagues) are not what the utterance is *about*; that is, while the pronoun 'we' appears in subject position, it is not the sentence topic. Note that despite this lack of syntactic parallelism, it is possible to introduce a discourse-level topic set (Nixon's men) comprising both Ziegler and Haig and to mark that topic set with 'as for'.

(131)   As for Nixon's men,

we have nothing to say to [Ron Ziegler]$_{top}$,

and [Al Haig]$_{top}$'s never been in politics.

A similar example is given in (132), where a contrast holds between the subject argument in the first discourse segment and the object argument in the second.

(132)   [The gorillas]$_{top}$ seem to be everyone's favorite, but

nobody likes [the snakes]$_{top}$.

The non-subject argument in the second conjunct can be explicitly marked as topic, as shown in (133), confirming an analysis of (132) as a contrastive topic structure.

(133)   [The gorillas]$_{top}$ seem to be everyone's favorite,

but as for [the snakes]$_{top}$,

nobody likes [the snakes]$_{top}$.

Sentences of this sort demonstrate that a well-formed contrastive topic imposes information structural—not syntactic—parallelism.

The second prediction stemming from the current account brings us back to the question of antecedent mismatch under ellipsis. Notice that the explanation offered here for the reduced acceptability associated with mismatched contrastive topics assumes a general constraint on well-formed discourse. This is in contrast with other analyses

which have attributed the mismatch effect to an ellipsis-specific licensing mechanism. The current analysis thus predicts that mismatch effects for contrastive topics should be observable even in non-ellipsis contexts. That prediction is tested in Experiments 4-6.

4.2 Experiments

The analysis of antecedent mismatch developed in this chapter holds that mismatched contrastive topic ellipses violate a discourse-level constraint that applies independently of ellipsis. The experiments presented in this section test this proposal in two ways. First, Experiments 4 and 5 test whether the increased sensitivity to mismatch observed for contrastive topic ellipses (as compared to ellipses with simple focus) is also observed in non-ellipsis controls. Next, Experiment 6 makes use of contrastive topic structures only, testing whether the acceptability difference observed for matched versus mismatched contrastive topics under ellipsis persists in the absence of ellipsis.

4.2.1 Experiment 4: Tough Constructions

In order to test the generality of the proposed constraint on contrastive topics, specifically whether the penalty associated with mismatched contrastive topics is limited to ellipsis contexts, Experiment 4 pairs mismatched ellipses in contrastive topic and simple focus structures with non-ellipsis controls. If, as predicted under the current account, the mismatch penalty is due to a general (not ellipsis-specific) information structural constraint, a difference in acceptability for mismatched contrastive topic versus simple focus structures will be observed for both ellipses and non-ellipsis controls.

Materials

Mismatched ellipses featuring either a contrastive topic focus or a simple focus in the target clause were compared against structures that repeated, instead of eliding, the target verb phrase. The resulting design crossed two levels of information structure (contrastive topic/simple focus) with two levels of ellipsis (ellipsis/no ellipsis). Tough alternations, as in Experiment 1, were used to generate the stimuli. The subject focus condition from Experiment 1 is identified here as a contrastive topic; the non-subject focus condition from Experiment 1 is identified as simple focus. All stimuli exhibit a

mismatch between antecedent and target.

(134)   It's really easy to forget PIN numbers, and

    a.   user names are too.   [contrastive topic, ellipsis]

    b.   user names are easy to forget too.   [contrastive topic, no ellipsis]

(135)   PIN numbers are really easy to forget, and

    a.   many bank customers do.   [simple focus, ellipsis]

    b.   many bank customers do forget them.   [simple focus, no ellipsis]

Experiment 1 showed a reliable difference between the ellipsis (a) versions of stimuli like these, where mismatched contrastive topic ellipses (134) were less acceptable than mismatched simple focus ellipses (135). The prediction for Experiment 4 is that an acceptability difference will also be observed in the non-ellipsis (b) conditions.

Method

Methods were identical to those in Experiments 1-3. (Participant n=38; Item n=10.) Ten item sets were included in the experiment, but one was excluded from analysis due to a randomization error.

Results and Discussion

Means and standard error for each condition are reported in Table 4.1, together with the mean difference between the contrastive topic and simple focus conditions for each level of ellipsis. Reliable differences ($p < .05$) are indicated with an asterisk. Filler means exceeded all condition means and are included for comparison.

Table 4.1: Exp. 4 Condition Means and Standard Error

	contrastive topic	simple focus	difference
ellipsis	-.27 (.05)	-.13 (.03)	.14 (.04)*
no ellipsis	-.05 (.02)	0.00 (.03)	.05 (.04)
fillers	.07 (.03)		

A two-factor ANOVA showed a main effect of information structure where the contrastive topic condition was rated less acceptable than the simple focus condition ($F_1(1, 37) = 15.10, p < .0005; F_2(1, 8) = 15.32, p < .005$). A main effect of ellipsis was also found, where the ellipsis condition was rated less acceptable than the no ellipsis condition ($F_1(1, 37) = 39.40, p < .0001; F_2(1, 8) = 32.22, p < .0005$). There was no
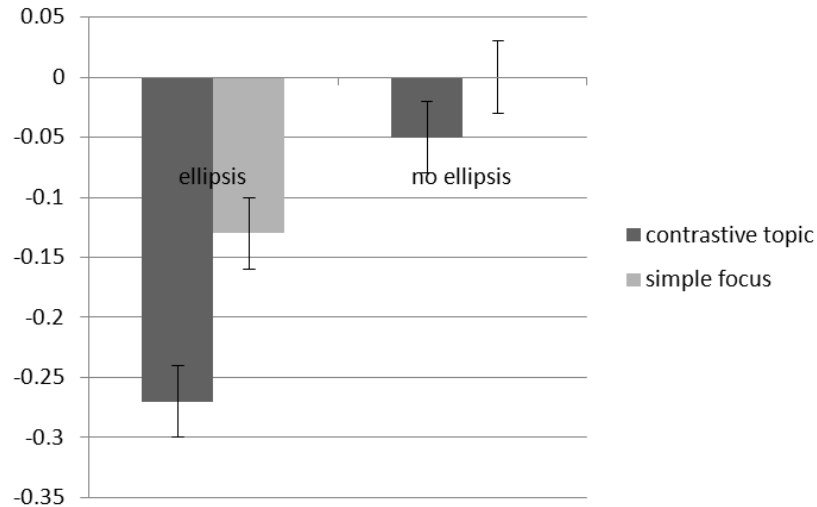
Figure 4.1: Exp. 4 Condition Means and Standard Error

interaction $(F_1(1, 37) = 2.55, p = .12; F_2(1, 8) = 2.29, p = .17)$.

Pairwise comparisons of the various condition means showed no reliable difference between the no ellipsis conditions. All other comparisons for condition means were reliable $(p < .05)$. All condition means were rated lower than the filler mean, and all differences between condition means and the filler mean were reliable. Condition means are graphed in Figure 4.1.

The results from this experiment offer qualified support for the hypothesis that mismatched contrastive topics show reduced acceptability (as compared to mismatched simple focus structures) even in non-ellipsis contexts. The ANOVA results, which show an additive effect of information structure and ellipsis with no interaction, indicate that the mismatch effect is not dependent on ellipsis. The difference between the contrastive topic and simple focus conditions is nearly tripled in the ellipsis condition, however, and the difference between the two non-ellipsis conditions is not statistically reliable. To confirm that the two effects are indeed additive, a replication was undertaken in Experiment 5.

4.2.2 Experiment 5: Equatives

Given the inconclusive results from Experiment 4, Experiment 5 was undertaken as a replication to test once more the hypothesis that defective contrastive topics induce an observable penalty even in the absence of ellipsis. Experiment 5 replicated the design of Experiment 4, pairing mismatched ellipses with non-ellipsis controls, this time using

the mismatched stimuli from Experiment 2.

Materials

Mismatched ellipses featuring either a contrastive topic focus or a simple focus in the target clause were compared against structures that repeated, instead of eliding, the target verb phrase. The resulting design crossed two levels of information structure (contrastive topic/simple focus) with two levels of ellipsis (ellipsis/no ellipsis). Passive alternations, as in Experiment 2, were used to generate the stimuli. The subject focus condition from Experiment 2 is identified here as a contrastive topic; the non-subject focus condition from Experiment 2 is identified as simple focus. All stimuli exhibited a mismatch between antecedent and target.

(136)   The accident wasn't reported by the networks as accurately as

      a.   the newspapers did.   [contrastive topic, ellipsis]

      b.   the newspapers reported it.   [contrastive topic, no ellipsis]

(137)   The networks didn't report the accident as accurately as

      a.   it could have been.   [simple focus, ellipsis]

      b.   it could have been reported.   [simple focus, no ellipsis]

Experiment 2 showed a reliable difference between the ellipsis (a) versions of stimuli like these, where the mismatched contrastive topic in (136) was less acceptable than the mismatched simple focus structure in (137). The prediction for Experiment 5 (as in Experiment 4) is that an acceptability difference will also be observed in the non-ellipsis (b) conditions.

Method

Methods were identical to those in Experiments 1-4 (Participant n=36; Item n=18.) The manipulation described here was run together with the manipulation reported in Experiment 2. As such, the ellipsis means and filler means for Experiments 2 and 5 are identical.

Results and Discussion

Means and standard error for each condition are reported in Table 4.2, together with the mean difference between the contrastive topic and simple focus conditions for each level of ellipsis. Reliable differences ($p < .05$) are indicated with an asterisk.

Table 4.2: Exp. 5 Condition Means and Standard Error

	contrastive topic	simple focus	difference
ellipsis	-.21 (.04)	-.12 (.03)	.09 (.03)*
no ellipsis	-.07 (.03)	.03 (.04)	.10 (.03)*
fillers	.02 (0.3)		
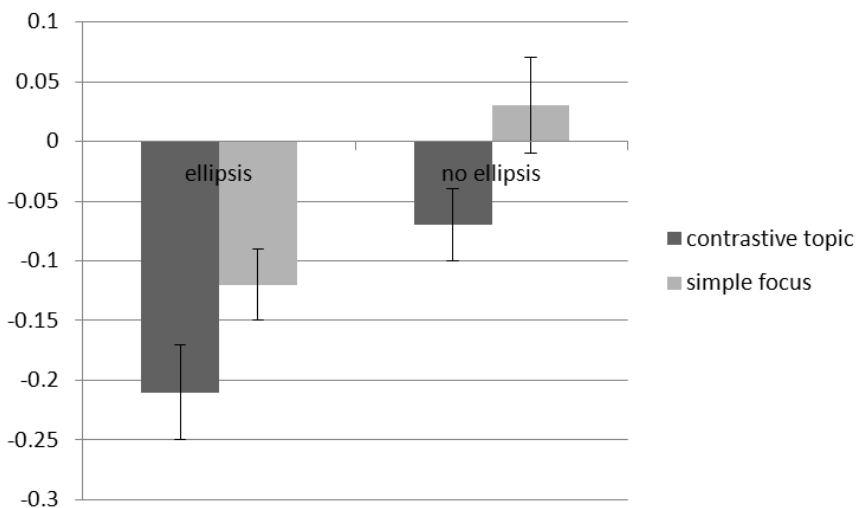
Figure 4.2: Exp. 5 Condition Means and Standard Error

A two-factor ANOVA revealed a main effect of information structure where the contrastive topic condition was rated lower than the simple focus condition ($F_1(1, 35) = 8.13, p < .01; F_2(1, 17) = 15.75, p < .001$). A main effect of ellipsis was also found, where the ellipsis condition was rated lower than the no ellipsis condition ($F_1(1, 35) = 20.10, p < .0001; F_2(1, 17) = 9.86, p < .01$). There was no interaction ($F_1(1, 35) = .01, p = .91; F_2(1, 17) = .09, p = .76$).

Pairwise comparisons across condition means showed no reliable difference between the simple focus, ellipsis condition and the contrastive topic, no ellipsis condition. All other comparisons between experimental means were reliable. The simple focus, no ellipsis condition was not reliably different from the filler condition. All other comparisons between experimental means and the filler condition mean showed reliable differences. Condition means are graphed in Figure 4.2.

The ANOVA results from Experiment 5 replicate the pattern observed in Experiment 4, where the penalties associated with ellipsis and contrastive topic were additive. Here the difference between the no ellipsis conditions was reliable, offering positive evidence in support of the claim that mismatched contrastive topic structures induce a

penalty even in the absence of ellipsis.

4.2.3   Experiment 6: Passives

Experiments 4 and 5 tested the generality of the effect of mismatch on contrastive topics by comparing mismatched contrastive topics and mismatched simple focus structures in both ellipsis and non-ellipsis (repeated verb phrase) conditions. Experiment 6 tests contrastive topic structures only, comparing matched and mismatched antecedent/target pairs with and without ellipsis. If it is the case, as proposed here, that the penalty associated with mismatched contrastive topics is due to an independent information structural constraint (i.e. it is not limited to ellipsis contexts), a mismatch penalty should be detectable not only for mismatched contrastive topic ellipses, but also for mismatched contrastive topics which repeat, as opposed to elide, a target verb phrase.

Materials

A two-by-two design crossed antecedent form (match versus mismatch) with target form (ellipsis versus repeated verb phrase). Stimulus sentences were bi-clausal. A contrastive noun phrase always filled the subject position of the target clause, and the target clause was always realized in active voice. Pairing an active antecedent with an active target formed the matched condition (138); pairing a passive antecedent with an active target formed the mismatch condition (139). In the ellipsis condition (a), the target clause contained an ellipsis; in the no ellipsis condition (b), the target clause contained a repeated verb phrase.

(138)   The local media covered the debate just like

    a.   the national outlets did.   [match, ellipsis]

    b.   the national outlets covered it.   [match, no ellipsis]

(139)   The debate was covered by the local media just like

    a.   the national outlets did.   [mismatch, ellipsis]

    b.   the national outlets covered it.   [mismatch, no ellipsis]

The choice of connective introducing the subordinate clause was also manipulated, as previous studies (Kertz 2008, Frazier and Clifton 2006) have shown an effect of connective on acceptability for ellipses in subordinate clauses. In those studies connective was manipulated within item sets, and it was hypothesized that a lack of pragmatic support for some causal relationships may have been the source of the connective effect. To guard

against this and to ensure that the connective was pragmatically supported in all cases, connective type was manipulated between sets in the current study: half of the stimuli used the parallel connective 'just like' as in (138)-(139) above; the remaining half used the causal connective 'because' as in (140)-(141) below.

(140)   The fire fighters endorsed the strike because

       a.   the police force did.   [match, ellipsis]

       b.   the police force endorsed it.   [match, no ellipsis]

(141)   The strike was endorsed by the fire fighters because

       a.   the police force did.   [mismatch, ellipsis]

       b.   the police force endorsed it.   [mismatch, no ellipsis]

The results from Experiments 1 and 2, as well as 4 and 5, have already shown that for contrastive topic ellipses, a mismatched antecedent causes a reduction in acceptability. The prediction for Experiment 6 is that a similar loss of acceptability will also be observed for contrastive topics which repeat an elided verb phrase—that is, for both items sets described above, a difference between match and mismatch is predicted for both the ellipsis (a) and non-ellipsis (b) conditions.

As described already, where Experiments 4 and 5 made use of all mismatched stimuli, Experiment 6 included both matched and mismatched conditions. This difference becomes important when we consider predictions regarding a possible interaction between antecedent form and ellipsis (i.e. whether the mismatch effect is larger under ellipsis). For Experiments 4 and 5, additive effects of antecedent form and ellipsis were observed, where mismatched contrastive topics were always rated lower than mismatched simple focus structures, and ellipses were always rated lower than non-ellipses. For Experiment 6, however, which contains both matched and mismatched conditions, it seems reasonable to expect that in the matched conditions ellipses and non-ellipses will show comparable acceptability. It may even be the case that ellipses are preferred over non-ellipses. As such, an interaction between antecedent form and ellipsis is expected, and that interaction in and of itself may not be particularly informative on our question of whether a mismatch effect can be observed in the absence of ellipsis. Instead, pairwise comparisons of matched and mismatched non-ellipsis conditions will be the more informative measure.

Method

Methods were identical to those described for Experiments 1-5. (Participant n=38; Item n=12.)

Results

Means and standard error for each condition are provided in Table 4.3, together with differences between the match and mismatch condition for each level of ellipsis. Significant differences ($p < .05$) are indicated with an asterisk. Condition means and standard error are graphed in Figure 4.3.

Table 4.3: Exp. 6 Condition Means and Standard Error

	match	mismatch	difference
because			
ellipsis	-.06 (.03)	-.23 (.04)	.17 (.05) *
no ellipsis	.01 (.04)	-.03 (.04)	.02 (.05)
just like			
ellipsis	.05 (.03)	-.17 (.04)	.22 (.05) *
no ellipsis	-.03 (.03)	-.07 (.03)	.05 (.05)

A three-factor ANOVA showed a main effect of antecedent form, where the matched antecedent condition was rated higher than the mismatch condition ($F_1(1, 37) = 33.51, p < .0001; F_2(1, 10) = 10.44, p < .01$) and a main effect of ellipsis, where the no ellipsis condition was rated higher than the ellipsis condition ($F_1(1, 37) = 15.80, p < .0005; F_2(1, 10) = 13.53, p < .005$). There was no main effect of connective ($F_1(1, 37) = 1.17, p = .29; F_2(1, 10) = 1.22, p = .29$).

There was an interaction between antecedent form and ellipsis (reliable by subjects, marginal by items), where the effect of mismatch was greater in the ellipsis condition than in the no ellipsis condition ($F_1(1, 37) = 13.94, p < .001; F_2(1, 10) = 3.95, p = .07$). Pairwise comparisons (averaging over connective) showed a reliable difference ($p < .05$) between the mismatched ellipsis condition and each of the matched ellipsis, matched no ellipsis, and mismatched no ellipsis conditions. No other comparisons were reliable.

There was a reliable interaction between ellipsis and connective, where ellipses with causal connectives were rated lower than ellipses with parallel connectives ($F_1(1, 37) = 8.59, p < .01; F_2(1, 10) = 17.97, p < .005$). Pairwise comparisons (averaging over antecedent form) showed a reliable difference ($p < .05$) between the 'because' ellipsis condition and each of the 'because' no ellipsis, 'just like' ellipsis, and 'just like' no ellipsis
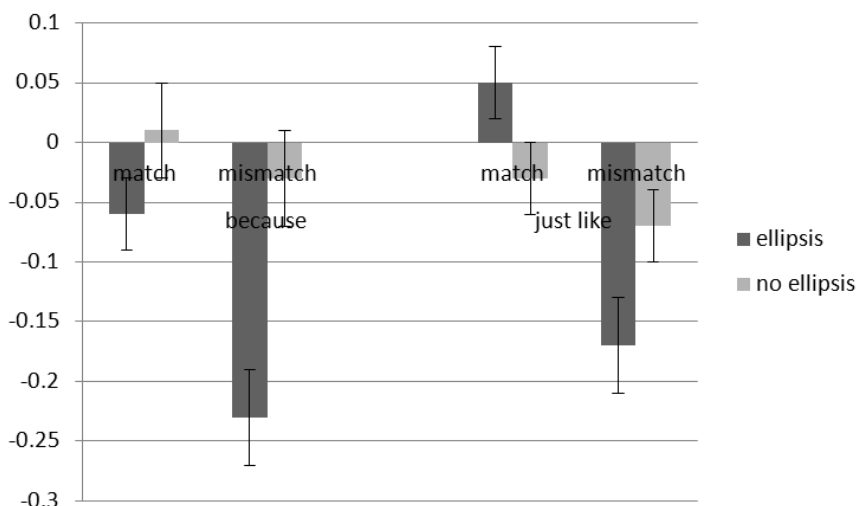
Figure 4.3: Exp. 6 Condition Means and Standard Error (bar chart)

conditions. No other comparisons were reliable.

There was no interaction between antecedent form and connective ($F_1(1, 37) = 0.32, p = .58; F_2(1, 10) = 0.28, p = .61$), and there was no three-way interaction among antecedent form, ellipsis, and connective ($F_1(1, 37) = 0.27, p = .61; F_2(1, 10) = 0.0042, p = .95$).

Discussion

The finding of a main effect of antecedent form in Experiment 6 is consistent with the findings from Experiments 1-5, which showed that mismatched ellipses were rated lower than matched ellipses. Similarly the finding that a repeated verb phrase was preferred over an ellipsis when there was a mismatch between antecedent and target (i.e. when a contrastive topic was not well-formed) is consistent with findings from Experiments 4 and 5. The interactions observed in Experiment 6, however, mark novel findings.

On the question of whether a mismatched contrastive topic incurs a penalty even in the absence of ellipsis, the data from Experiment 6 offer only qualified support for the current proposal. While the mismatched structures were rated lower than matched structures in all cases, the difference between match and mismatch was reliable only in the ellipsis conditions.

As shown in Figure 4.4, for the subset of the stimuli with the connective 'just like', the interaction between antecedent form and ellipsis led to a crossover pattern where
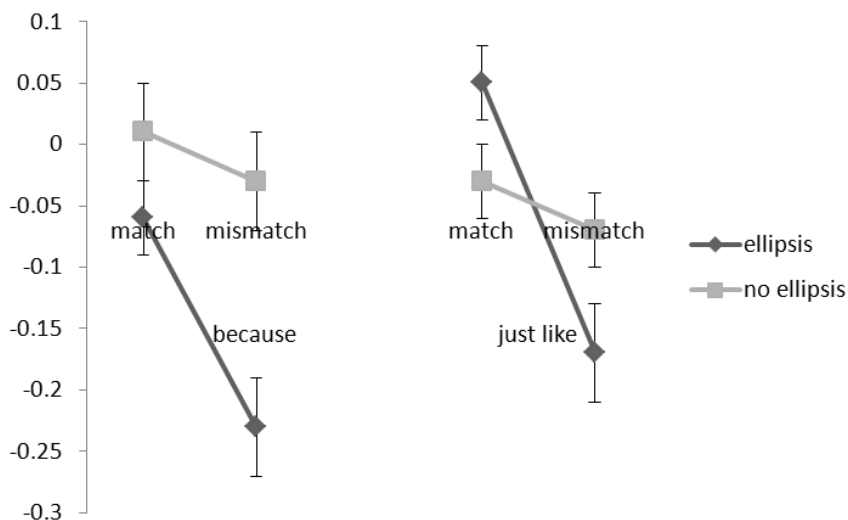
Figure 4.4: Exp. 6 Condition Means and Standard Error (line chart)

ellipsis was preferred over no ellipsis in matched conditions, but no ellipsis was preferred in the mismatched conditions. (Figure 4.4 plots the same information as the bar graph in Figure 4.3. The relationships among the various effects are more visible, however, in line graph form.) This pattern suggests a 'repeated verb phrase penalty' comparable to the repeated name penalty described in the literature on pronoun interpretation. In that domain, when prior context supports the use of a pronominal referent, but a name (or other more explicit form of reference) is repeated instead, the failure to pronominalize incurs a penalty. (See Camblin et al. 2007 for a recent review of that literature.)

No such penalty was observed, however, for the 'because' stimuli. While the same interaction between antecedent form and ellipsis was observed for those stimuli (where the effect of mismatch was greater under ellipsis), ellipses introduced by the connective 'because' were dispreferred *generally* compared to the no ellipsis conditions— whether the antecedent to the ellipsis was matched or not. This pattern follows from the interaction between connective and ellipsis, which was not predicted by the current account. Where acceptability levels for the no-ellipsis conditions were comparable across both connective types, ellipses introduced by 'because' were dispreferred as compared to ellipses introduced by 'just like'.

Taken as a whole, the results from this experiment demonstrate that multiple factors influence the acceptability of ellipsis, among these antecedent form (match versus mismatch), choice of connective (parallel versus causal), and the availability of competing forms (ellipsis versus repeated verb phrase). Considering any one of these factors in

isolation, moreover, offers only limited insight into the question of ellipsis licensing. With respect to the prediction of mismatch effects in the absence of ellipsis, numerical data support the claim: means for mismatched conditions consistently rated lower than means for matched conditions—with or without ellipsis. That difference, however, was statistically reliable only under ellipsis.

4.3 General Discussion

The experiments reported in this chapter tested the claim that the penalty associated with antecedent mismatch under ellipsis is due not to the violation of an ellipsis licensing constraint imposing syntactic parallelism, but to violation of an independent information structural constraint imposing topic/comment parallelism for contrastive topic structures. This account offers an explanation for the results observed in experiments 1-2, where subject focus ellipses, which form contrastive topics, were shown to be more sensitive to mismatch than ellipses which exhibit simple focus on a non-subject element. Because the analysis addresses contrastive topic structures broadly, not just in ellipsis, it predicts a penalty associated with mismatched contrastive topics with or without ellipsis.

Experiments 4 and 5 compared mismatched contrastive topic and simple focus structures in both ellipsis and no ellipsis conditions. The findings from those two experiments showed that the lowest rated condition, the mismatched contrastive topic ellipsis, suffered additive effects of penalties associated with ellipsis and with contrastive topic. The lack of an interaction in those two experiments confirmed that the mismatch effect is not dependent on ellipsis, though in the absence of ellipsis the penalty associated with mismatch may not be large enough to produce a reliable difference between contrastive topics and simple focus structures. (Experiment 5 showed a reliable difference; Experiment 4 did not.)

Experiment 6 compared matched and mismatched contrastive topic ellipses with non-ellipsis controls. That experiment showed evidence of a 'repeated verb phrase penalty', comparable to the repeated name penalty reported in the pronominal literature (Gordon et al. 1993, inter alia). The repeated verb phrase penalty was observed for matched antecedent/target pairs joined by a parallel connective. No such penalty was observed for pairs joined by a causal connective, however; in that case, a repeated verb phrase was preferred over an ellipsis regardless of antecedent form.

These findings offer support for the current proposal, at the same time identifying

additional factors which influence ellipsis acceptability. Moreover, as I describe below, these results offer insight into findings of mismatch effects outside of ellipsis, as reported elsewhere in the literature.

4.3.1 Surface/Deep Revisited

Much of the psycholinguistic work on ellipsis has addressed a proposal from Sag and Hankamer (1984) (see also Hankamer and Sag 1976), which posits two types of anaphors based on the proposed mechanisms supporting antecedent retrieval. The model holds that while 'deep anaphors' are interpreted by accessing a mental model of the antecedent context, the interpretation of 'surface anaphors', including verb phrase ellipsis, crucially requires access to the linguistic form of the antecedent. One prediction which follows from this account is that the absence of a syntactically matched antecedent will impede processing of surface, but not deep, anaphors. Findings on this question have been mixed, however. Besides conflicting data which show the two anaphor types sometimes pattern together and other times do not, there have been various studies which report positive findings of mismatch effects for deep anaphors.

One such finding is reported in Murphy (1985), experiment 3. The materials used in that experiment included contrastive topic structures with an active voice target containing either an ellipsis (the surface anaphor condition) or the main verb 'do' plus the pronoun 'it' (the deep anaphor condition). The target was paired with either an active (matched) antecedent or a passive (mismatched) one.

(142)   Jimmy swept the floor.

    a.   Later his uncle did too.   [match, surface]

    b.   Later his uncle did it too.   [match, deep]

(143)   The floor was swept by Jimmy.

    a.   Later his uncle did too.   [mismatch, surface]

    b.   Later his uncle did it too.   [mismatch, deep]

    (Murphy 1985, experiment 3)

The experiment also included a near/far antecedent condition, and in the near condition, increased reading times were observed for mismatched structures in both the surface and deep anaphor conditions. That result is not consistent with the predictions of the Surface/Deep Hypothesis.

The finding of an effect of mismatch for both the surface and deep conditions is

consistent with the current proposal, however, as both featured contrastive topic structures.[5] Subsequent studies (e.g. Tanenhaus and Carlson 1990) have shown mixed results on the question of whether deep anaphors are also sensitive to antecedent mismatch, but in those experiments, information structure was not tightly controlled across sets. Indeed Tanenhaus and Carlson suggest that some unspecified discourse-level effects of the syntactic manipulations they used could account for some of their findings.

4.3.2 Processing Parallel Structure

Findings elsewhere in the sentence processing literature suggest that structural parallelism supports processing of conjoined structures not involving ellipsis. Specifically, it was found that processing of the second conjunct in a biclausal structure is facilitated when the second conjunct is structurally matched to the first (Frazier et al. 1984). Frazier et al. (2000) subsequently showed that the facilitation effect is limited to coordinate structures (e.g. processing of an object noun phrase is not facilitated by a preceding structurally matched subject noun phrase). Frazier and colleagues argued that coordination sets up an expectation for parallel structure, which, when unmet, can slow processing.

Some recent findings indicate, however, that the facilitation effect is dependent on the choice of connective. Knoeferle (2007) showed, for example, that a structural match facilitates processing of clauses introduced by 'and' or 'while' but not 'but'. This latter finding suggests that when prior context is consistent with a parallel discourse continuation, parallel structure can facilitate processing, but there is no facilitation when the expected discourse continuation is not parallel. If it is the case that structural parallelism interacts with discourse connective to facilitate processing, that interplay between sentence level structure and discourse structure could offer a fuller picture of the connective effects reported here, especially with respect to the observed repeated verb phrase penalty.

4.3.3 Coherence, Connectives, and Repeated Verb Phrases

To recapitulate the findings so far, I have shown here that parallel syntax is not required to license ellipsis (Experiment 1-2). For contrastive topic structures, however, topic/comment parallelism is required, and passivization and other displacements which disrupt topic structure also diminish acceptability (Experiments 4-5). However, I have also shown that for contrastive topic ellipses, the choice of referring expression (whether

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[5]I am assuming here that the example stimuli Murphy reported were representative.

to elide or repeat an antecedent verb phrase) is dependent on connective (Experiment 6). When two contrastive topic discourse segments are joined with 'just like', there is a penalty incurred for failing to elide when topic structure supports the intended contrast. When two contrastive topic discourse segments are conjoined with 'because', however, repeating the verb phrase is preferred over ellipsis regardless of structure.

Kehler (2000) identified a class of problematic data that bear a strong resemblance to the data of interest here. Kehler identified sentences like (144) which appear to exhibit dual coherence relations. The presence of the presuppositional particle 'too' for example, indicates a PARALLEL relation, while the connective indicates a relation of the type DENIAL OF PREVENTER (a member of the class of CAUSE-EFFECT relations).

(144)   #This problem was looked into by John, even though Bob did too.

Kehler noted that this ellipsis seems degraded with a mismatched antecedent and suggested that this is due to the availability of a PARALLEL reading. Mismatches of this sort were tested by Frazier and Clifton (2006) and Kertz (2008), and indeed the ellipses were degraded: they rated even lower than simple PARALLEL (contrastive topic) mismatches, i.e. those with a parallel connective. The findings from the current study indicate that even when matched, as in (145), ellipses of this sort are degraded when compared to a non-ellipsis version.

(145)   John looked into this problem, even though Bob did too.

The overall pattern of results from Experiment 6 suggest that the low acceptability of a sentence like (144) follows from two sources: a lack of topic/comment parallelism to support the intended contrastive topic relationship between 'John' and 'Bob' and the preference for a repeated verb phrase, as opposed to an ellipsis, following a causal connective. One question not addressed by Experiment 6 is whether the preference for a repeated verb phrase arises generally for coordinate structures joined by a causal connective or if the preference arises only for contrastive topics.

4.4   Summary

In this chapter I showed that the penalty associated with mismatched contrastive topics is observable in some non-ellipsis contexts, though it is more reliably observed under ellipsis. Experiment 6 reported the novel finding of a repeated verb phrase penalty, an effect that is mediated by choice of connective. I reviewed contradictory findings in

the psycholinguistics literature regarding the proposed surface/deep anaphor distinction, offering an alternative interpretation based on the current proposal, and I related the current findings regarding connectives and ellipsis to similar previous results.

Chapter 4 includes data that have been submitted for publication and data that are currently being prepared for submission for publication. Data reported for Experiments 4 and 5 have been submitted for publication. The dissertation author was the primary investigator and sole author of this material. Data reported for Experiment 6 are currently being prepared for submission for publication. The dissertation author was the primary investigator and sole author of this material.

Chapter 5

Processing

In this chapter I explore the processing implications of the analysis developed in the previous chapter. Using a self-paced reading time methodology I examine the effects of information structural well-formedness on real-time processing for ellipsis. I show that processing of an ellipsis is slowed following a defective contrastive topic transition. I also show, however, that defective transitions disrupt processing early in the clause—before the reader has encountered the ellipsis. In a separate study I show that there is no added cost associated with processing an ellipsis when the ellipsis is properly supported by prior discourse structure; rather, the ellipsis facilitates processing of subsequent regions. I show that support for an upcoming ellipsis comes not only from a well-formed topic transition, but also from a discourse connective signaling an upcoming parallel coherence relation.

5.1   Ellipsis and Discourse Structure

Much of the processing literature on ellipsis has taken its cue from the linguistics literature, testing specific proposals regarding the relationship between antecedent and target (specifically whether a syntactically matched antecedent is required) and the mechanism that supports integration of the antecedent at the ellipsis site (e.g. copying versus reactivation). (For a review of the literature on parallelism effects, see, e.g., Bélanger 2004; for recent work on integration, see Martin and McElree 2008.) With attention so narrowly trained on the features associated with antecedent and target, there has been very little work exploring other aspects of the context surrounding the ellipsis. The results presented here so far, however, indicate that discourse structure—including topic structure and discourse relations as signaled by connectives—play an important

role in supporting ellipsis.

5.1.1 Looking Beyond Syntax

One illustration of the effect of discourse structure on ellipsis comes from Malt (1985), where it was shown that comprehension of an ellipsis was facilitated when the antecedent to the ellipsis took the form of a question, as opposed to a statement. Facilitation was also observed when information intervening between antecedent and ellipsis elaborated on the current discourse topic, as opposed to introducing a new one. In these experiments, the antecedents and targets themselves were not manipulated—nor was the distance between them; rather the manipulation involved discourse-level relationships between segments. Malt proposed that the reported effects follow if the comprehender is able to evaluate online which information will be needed later in the discourse and to selectively retain that information.

Additional findings testing extra-syntactic effects on ellipsis come from a disambiguation task reported in Garnham and Oakhill (1987). The goal of that study was to determine the extent to which plausibility and real-world knowledge affect ellipsis interpretation. In particular, the authors questioned whether such cues could induce a preference for a mismatched interpretation. Stimulus sets like (146) were constructed where the auxiliary verb 'had' in the target clause was compatible with either an active or passive target (i.e. 'had examined' or 'had been examined').

(146)   It had been a busy morning in the hospital.
          The elderly patient had been examined by the doctor.

     a.   The child had too.   matched = plausible

     b.   The nurse had too.   matched = implausible

As the antecedent appeared in passive voice, a 'matched' interpretation for the ellipsis was one where the target was also passive, i.e. the target clause was interpreted as 'the child/nurse had been examined by the doctor too'. The 'mismatched' interpretation was one where the target was active, i.e. 'the child/nurse had examined the elderly patient'.

In the (a) condition, the matched interpretation is also the more plausible interpretation: it is more plausible that the child was examined by the doctor than that the child examined the elderly patient. In the (b) condition, however, the matched interpretation is the less plausible one, and knowledge of stereotypical events favors a mismatched antecedent: the nurse is a more likely examiner than examinee. Responses

to comprehension questions (e.g. did the nurse examine the elderly patient?) show that participants favored the matched interpretation at a rate of ninety-one per cent when the matched interpretation was also plausible, but that the rate dropped to sixty-eight per cent when the matched interpretation was implausible. Increased reading times (whole clause reading times for the target) were also observed for conditions where the matched interpretation was implausible. In their interpretation of these results, the authors assume a syntactic licensing model of ellipsis, and their discussion addresses the question of how contextual cues can lead readers to the 'wrong' (i.e. mismatched) interpretation.

5.1.2 Information Structural Effects on Ellipsis Processing

The analysis developed in the preceding chapters holds that the offline penalty associated with some cases of antecedent mismatch is due to the violation of an information structural constraint imposing topic/comment parallelism on contrastive topic structures. That analysis was supported by offline findings which demonstrated the dissociability of syntactic and topic structural effects on acceptability (Experiments 1 and 2) and which demonstrated penalties associated with contrastive topic structures outside of ellipsis (Experiments 4 and 5). These findings generate novel predictions regarding the real-time processing of mismatched ellipses, and in this chapter, I construct three tests to demonstrate that the source of the antecedent mismatch effect in ellipsis is a lack of information structural support for an intended contrastive topic.

In the first, I compare the effect of mismatch in contrastive topic and simple focus structures, using the two-by-two design crossing syntax and information structure that was introduced in Chapter 3. The current proposal predicts that antecedent mismatch will disproportionately affect processing of ellipses occurring in contrastive topic, as compared to simple focus, structures. That hypothesis is tested by comparing post-ellipsis reading times for sentences with mismatched ellipses occurring in contrastive topic and simple focus structures.

Because the analysis attributes this processing difficulty to a defective contrastive topic transition, and not the syntactic mismatch *per se*, it should, in principle, be possible to construct a context where a defective contrastive topic disrupts processing early in the target clause—before the reader has even encountered the ellipsis. As a second test of the current proposal, I construct such a context, capitalizing on the discourse effects of 'thetic' or topic-less sentences, which are incompatible with a contrastive-topic follow-on but can felicitously introduce a subsequent simple focus structure. I compare reading times for subject noun phrases following well-formed and defective contrastive

topic transitions, predicting increased reading times for the latter.

For the final test, I compare post-VP reading times for matched and mismatched contrastive topics with and without ellipsis, predicting an effect of mismatch following both ellipses and repeated verb phrases. In light of the results reported for Experiment 6 in the previous chapter, I also examine the effects of discourse connectives on the relative ease of processing for ellipses as compared to repeated verb phrases.

5.2 Experiments

Experiments 7 and 8 adapt stimuli used in previously reported offline experiments to an online reading time task. The online methodology allows for tracking of processing in real time, testing the specific predictions described above.

5.2.1 Experiment 7: Processing Mismatched Ellipses

Experiment 7 adapted the tough construction manipulation used in Experiment 1 for an online methodology. As in Experiment 1, two levels of antecedent form (match versus mismatch) were crossed with two levels of information structure (contrastive topic versus simple focus). In line with the offline results from Experiment 1, increased reading times are predicted for regions following a mismatched ellipsis, with a larger increase predicted for contrastive topics.

The tough construction manipulation places particular constraints on the discourse context, moreover, which make it possible to detect effects of antecedent mismatch *prior to* the ellipsis. As described in Chapter 3, the object *in situ* alternates of tough constructions, e.g. (147) below, form thetic or 'topic-less' structures.

(147)   It's easy to identify venomous snakes.

Because a contrastive topic structure is well-formed when two discourse segments each introduce a topic that is a member of a discourse-level set, thetic structures (which lack a topic) do not support a contrastive topic discourse transition. This lack of support for a contrastive topic relationship in an ellipsis like (148), for example, was argued to be the cause of the reduced acceptability for the ellipsis.

(148)   #It's easy to identify venomous snakes,
            and poisonous plants are as well.

The target auxiliary forces the matched interpretation, where 'venomous snakes' and 'poisonous plants' are contrastive, but that interpretation is not supported by information structure. Indeed, at the point where the reader has encountered only the subject of the target clause, as in (149), where the remainder of the target clause, including the ellipsis, is masked, there is no basis for positing a contrastive topic structure. Nor is a change of topic well-suited at this point, given the thetic structure of the prior utterance.[1]

(149)   It's easy to identify venomous snakes,
          and poisonous plants ————.

Compare (149) with the structure in (150), where the topicalized variant of the antecedent clause supports positing a contrastive topic relationship as early as the target subject.

(150)   Venomous snakes are easy to identify,
          and poisonous plants ————.

This analysis predicts that it will be easier to integrate the target subject into the discourse in the latter case, an effect that is detectable by comparing reading times at the target subject. A finding of such an effect would lend further support to the current proposal, demonstrating that the penalties associated with mismatched contrastive topics, though they may influence ellipsis processing downstream, are in fact independent of ellipsis.

Materials

Stimuli from Experiment 1 were adapted to include a five-word spill-over region following the ellipsis, e.g. 'as far as I know', as shown in (151)-(152). As in Experiment 1, two levels of antecedent form (match versus mismatch) were crossed with two levels of information structure. The subject focus condition from Experiment 1 is identified here as the contrastive topic condition; the non-subject focus condition from Experiment 1 is

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[1]See e.g. Reinhart (1982), Erteschik-Shir (2007) for a discussion of the 'stage-setting' function of thetic utterances.

identified here as the simple focus condition.

(151)   Venomous snakes are fairly easy to identify, and

    a.   poisonous plants are also,   [match, contrastive topic]

    b.   most experienced hikers can,   [mismatch, simple focus]

    as far as I know.

(152)   It's fairly easy to identify venomous snakes, and

    a.   most experienced hikers can,   [match, simple focus]

    b.   poisonous plants are also,   [mismatch, contrastive topic]

    as far as I know.

Mismatched structures were predicted to induce longer reading times, and the difference between reading times in the matched versus mismatched conditions was predicted to be larger for contrastive topic as opposed to simple focus structures. (Direct comparisons of reading times in the contrastive topic and simple focus conditions are not informative, as different words are used to formulate the target clause in each case; instead a comparison of the difference between the match and mismatch condition for each level of information structure was used.) Increased reading times for mismatched contrastive topics were predicted for the subject region (pre-ellipsis) as well as the spill-over region following the ellipsis.

Method

In a self-paced reading task with a moving window display (cf. Just et al. 1982) participants pressed the space bar to advance through stimuli one word at a time. A yes/no question testing comprehension was asked after each stimulus, and participants received immediate feedback indicating whether they had answered the question correctly. Participants were instructed to read as naturally as possible, making sure that they understood what was read. Participants were instructed to pay attention to feedback on answers to comprehension questions and to treat negative feedback as a cue to read more carefully.

A within-participants design was used. Stimuli from Experiment 7 were presented in pseudo-random order with stimuli from Experiment 8, together with filler stimuli (grammatical object relatives with no ellipsis).

A set of practice items and questions was presented prior to the experiment. The

experiment took roughly 30 minutes to complete. (Participant n=48; Item n=12.)

Statistical Analysis

Statistical analyses were computed for comprehension accuracy and for reading times. For comprehension accuracy, a two-factor ANOVA crossing antecedent form (match versus mismatch) and information structure (contrastive topic versus simple focus) was computed. Stimuli for which participants provided an incorrect answer to the comprehension question were excluded from the reading time analysis.

For the reading time analysis, measurements above 2,000 ms. were discarded. Means and standard deviations were computed for each condition, and measurements falling more than 3 standard deviations from the condition mean were discarded. This procedure resulted in a loss of 1.8 per cent of the analyzable data.

Reading times reported in tables and figures reflect raw reading times in milliseconds. Error bars in figures indicate standard error for by-subject means. To adjust for differences in word length across conditions, statistical analysis was conducted on residual reading times, which were obtained by computing a regression equation predicting reading time based on word length for each participant and then subtracting the reading time predicted by the participant's regression equation from the recorded reading time (cf. Ferreira and Clifton 1986, Trueswell et al. 1994).

Residual reading times were averaged across words in critical regions as follows: the antecedent clause region spanned the entire first clause of the sentence (from the first word up until the comma); the target subject region contained an adjective and noun (e.g. 'poisonous plants') in the contrastive topic condition and a quantifier, adjective, and noun in the non-contrastive topic condition (e.g. 'most experienced hikers'); the post-ellipsis region contained the first two words following the ellipsis site (e.g. 'as far').

A two-factor ANOVA crossing antecedent form (match versus mismatch) and information structure (contrastive topic versus simple focus) was computed for each region. Although the experimental factors are only applicable to the target clause, the full ANOVA was computed for the antecedent to rule out the possibility of spurious effects in the antecedent influencing the pre-ellipsis region of interest.

Results: Comprehension Accuracy

Overall question-answering accuracy for experimental items was 88%. Accuracy was generally high across items and across conditions, with the exception of one item set for

which accuracy was extremely low (8%). That item set was excluded from analysis.[2] Means and standard error for each condition are reported in Table 5.1.

Table 5.1: Exp. 7 Comprehension Accuracy Means and Standard Error

	match	mismatch
contrastive topic	.91 (.02)	.94 (.02)
simple focus	.83 (.03)	.86 (.03)

A two-factor ANOVA revealed a main effect of information structure, reliable by participants, where comprehension was higher in the contrastive topic condition as compared to the simple focus condition. A numerical difference was also observed by items, but it was not statistically reliable ($F_1(1, 47) = 13.44, p < .001; F_2(1, 10) = 2.89, p = .12$). There was no effect of antecedent form (match versus mismatch) and no interaction.

Results: Reading Times

Average reading times and standard error for each region in each condition are reported in Table 5.2.

Table 5.2: Exp. 7 Average Reading Times (ms) by region

	antecedent clause	target subject	post-ellipsis
contrastive topic			
match	371 (11)	347 (12)	343 (11)
mismatch	377 (14)	384 (14)	380 (10)
simple focus			
match	375 (13)	368 (13)	368 (13)
mismatch	373 (12)	367 (13)	379 (12)

Figure 5.1 shows word-by-word reading times for the target clause; error bars indicate standard error for by-subject means.

The data graphed in Figure 5.1 conform to the the predicted interactive pattern in the post-ellipsis region, with reading times for the simple focus condition tracking closely, while reading times for the matched and mismatched contrastive topic conditions diverge. This pattern is not limited to post-ellipsis regions, however, and is observed throughout the target clause.

ANOVA results for the **antecedent clause region** showed no effect of antecedent form, no effect of information structure, and no interaction. The absence of an effect of antecedent form indicates that the object in-situ and raised object variants of the

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[2]This seems to be due to a poorly formed comprehension question and not due to any defect of the stimulus itself. Because it is impossible to determine in which cases the participants comprehended the stimulus sentence, however, the set was excluded from analysis.
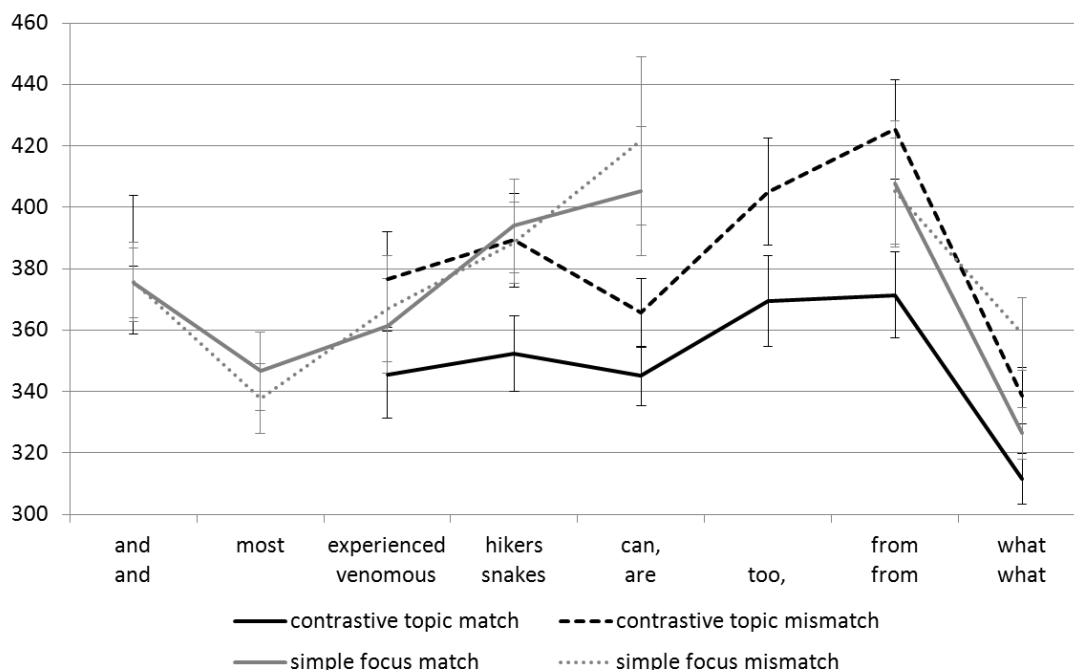
Figure 5.1: Exp. 7 Reading Times (ms) for Target Clause

antecedent clause formed a comparable baseline going into the target clause. Pairwise comparisons for means in the antecedent clause region showed no reliable differences.

ANOVA results for the **target subject region** showed a main effect of antecedent form by participants (marginal by items) $(F_1(1, 47) = 10.14, p < .005; F_2(1, 10) = 4.30, p < .06)$ and no effect of information structure $(F_1(1, 47) = .21, p < .65; F_2(1, 10) = .08, p < .78)$. There was a reliable interaction where the effect of mismatch was greater in the contrastive topic condition as compared to the simple focus condition $(F_1(1, 47) = 5.50, p < .05; F_2(1, 10) = 6.58, p < .01)$. Condition means and standard error for the target subject region are graphed in Figure 5.2.

Pairwise comparisons for the target subject region showed no reliable difference between the matched and mismatched simple focus conditions. The difference between the matched and mismatched contrastive topic conditions was reliable $(p < .05)$ by participants and by items.

ANOVA results for the **post-ellipsis region** showed a main effect of antecedent form, where the mismatched condition showed higher reading times than the matched condition $(F_1(1, 47) = 12.80, p < .001; F_2(1, 10) = 6.20, p < .05)$, as well as a main effect of information structure, where the non-contrastive topic condition showed increased reading times compared to the contrastive topic condition $(F_1(1, 47) = 5.55, p <$
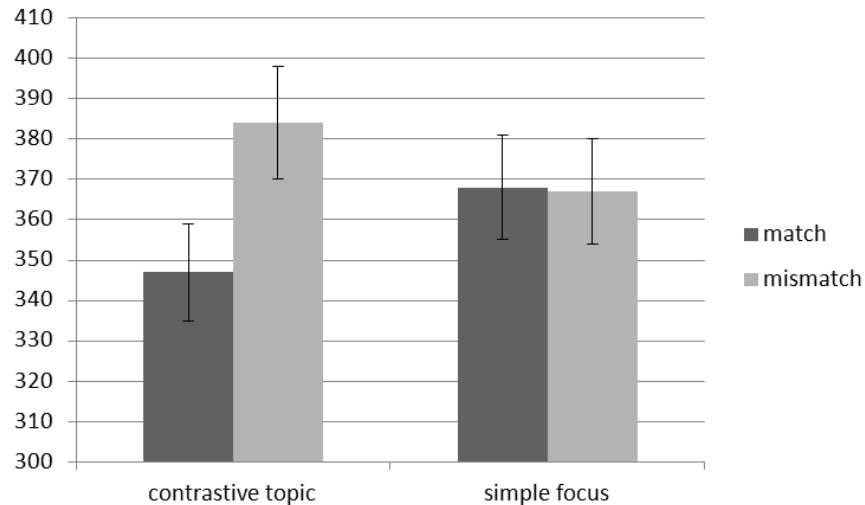
Figure 5.2: Exp. 7 Reading Times (ms) for Target Subject Region

.05; $F_2(1, 10) = 5.04, p < .05$). (Recall, however, that direct comparisons of reading times in the contrastive topic and simple focus conditions are not valid, as different words are used to formulate the target clause in each case.) There was no interaction ($F_1(1, 47) = .37, p < .81; F_2(1, 10) = 2.08, p < .15$). Condition means and standard error for the post-ellipsis region are graphed in Figure 5.3.

Pairwise comparisons of condition means in the post-ellipsis region show a reliable difference (by participants and by items) based on antecedent form for the contrastive topic condition ($p < .05$). Differences based on antecedent form for the simple focus condition were not reliable.

Discussion

Reading times for the post-ellipsis region showed the interactive pattern predicted under the current account, where a mismatched antecedent disproportionately increases reading time for contrastive topic structures. Although the interaction did not reach statistical significance, the difference between the matched and mismatched conditions for contrastive topic structures was reliable ($p < .05$), whereas there was no reliable difference between means for the simple focus condition. These results support the claim that mismatch induces an added processing cost for ellipses in contrastive topic, but not simple focus, structures.

As predicted, this pattern of results was also observed at the target subject. There the interaction was statistically reliable, and pairwise comparisons again showed a
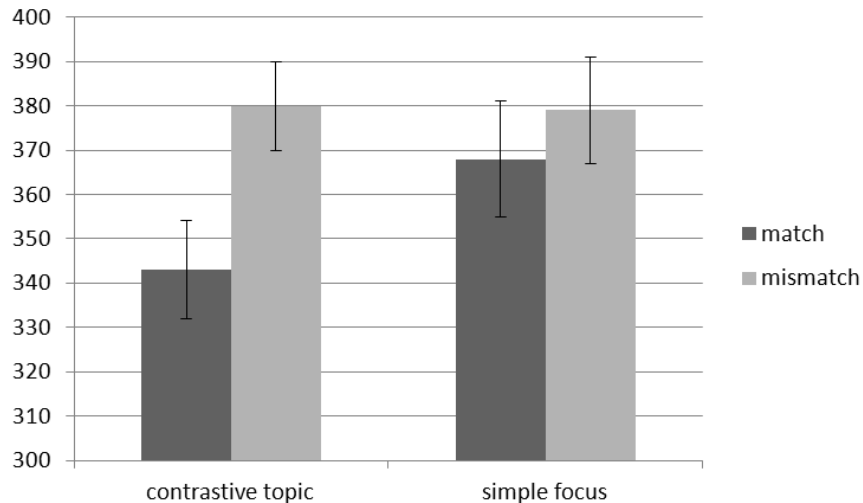
Figure 5.3: Exp. 7 Reading Times (ms) for Post-Ellipsis Region

difference between the two contrastive topic conditions but no reliable difference between the simple focus conditions. As this effect was detected at a point where the reader had not yet encountered the ellipsis, the result demonstrates that defective information structure induces a penalty in its own right. These combined findings support the claim that the mismatch effect in ellipsis is due to an independent information structural constraint—independent of syntax (the effect is mediated by topic structure) and of ellipsis (the effect is detectable before the reader has encountered the ellipsis).

5.2.2   Experiment 8: Processing Repeated Verb Phrases

The results from Experiment 7 showed that mismatched contrastive topic ellipses are not only less acceptable (as evaluated offline) than their matched counterparts, but also take longer to process online. Because mismatched ellipses which exhibited a simple focus, as opposed to a contrastive topic focus, in the target clause did not show a comparable increase in reading times, the results from Experiment 7 support the main claim of this thesis, that mismatch effects under ellipsis follow from an independent information structural constraint.

Experiment 8 builds on those results in two ways. First, by using voice alternations to generate matched and mismatched ellipsis pairs, we confirm that the post-ellipsis mismatch effects observed for tough alternations in Experiment 7 generalize to other types of syntactic alternations. In line with the results from Experiment 7, increased reading times are predicted following a mismatched (passive/active) contrastive topic

ellipsis, as in (153), as compared to its matched (active/active) alternate in (154).

(153)   The debate was covered by the local media just like the national outlets did, but the reporting was better.

(154)   The local media covered the debate just like the national outlets did, but the reporting was better.

Second, Experiment 8 extends the results from Experiment 7 by pairing matched and mismatched ellipsis examples like (153)-(154) with structures that contain a repeated verb phrase in the target clause, as in (155)-(156).

(155)   The debate was covered by the local media just like the national outlets covered it, but the reporting was better.

(156)   The local media covered the debate just like the national outlets covered it, but the reporting was better.

The current proposal holds that the same information structural violation observed in (153)—namely a defective contrastive topic—is also observed in (155). As such, any processing difficulty following from this violation is predicted to occur not only in the ellipsis case, but also in the no ellipsis case. Independent support for this prediction comes from findings elsewhere in the literature of parallelism effects for non-ellipsis coordinate clauses (as discussed in the previous chapter).

Note that while effects of contrastive topic mismatch were detectable in Experiment 7 as early as the target subject, no effects prior to the ellipsis site are predicted for Experiment 8. While the tough manipulation used in the previous study made it possible to test for mismatch effects prior to the ellipsis site, the passive manipulation used here does not constrain subsequent discourse in the same way. Following a passive, a new referent introduced in subject position could potentially be interpreted as a contrastive topic or as a new but non-contrastive topic.

Design

Experiment 8 adopts the three-level design used in Experiment 6, where antecedent form (match/mismatch), target form (ellipsis/no ellipsis), and connective (parallel/causal) were each manipulated independently. (A complete stimulus set is shown in (157)-(160) below.) Given the findings from that study, we can further refine our

predictions for Experiment 8 to describe possible interactions among these factors.

First, given the offline finding of an interaction between antecedent form and ellipsis (whereby the effect of mismatch was greater under ellipsis), an interaction is likewise predicted online, whereby processing difficulties associated with the mismatch are amplified under ellipsis. Such a finding would be consistent with an interpretation where defective information structure introduces a penalty in its own right, and the information structural violation in turn disrupts ellipsis processing.

Next, the offline findings from Experiment 6 showed an unexpected interaction between ellipsis and discourse connective. Those data showed that while acceptability ratings were roughly comparable across connective conditions for structures which repeated a target verb phrase, choice of connective crucially determined acceptability under ellipsis: ellipses introduced by a parallel connective were more acceptable than ellipses introduced by a causal connective (matched or not). Retaining the connective manipulation in Experiment 8 makes it possible to ask whether the relative preferences for these competing forms observed offline correlate with ease of processing online. Under the assumption that offline acceptability patterns do in fact correlate with ease of processing, a similar disparity is predicted for post-ellipsis reading times based on connective, where reading times following an ellipsis introduced by a parallel connective are faster than reading times for ellipses following a causal connective.

Finally, by comparing matched and mismatched ellipses and non-elided structures in the same experiment, we are able to ask an additional question not addressed by Experiment 7, specifically whether ellipsis can be shown to facilitate, rather than impede processing. Under the assumption that ellipsis, like other forms of anaphora, supports discourse cohesion, we predict that when an ellipsis is well-supported by its context, the ellipsis is easier to process than a repeated verb phrase. The results from Experiment 6 indicate that if such a facilitative effect is to be found, it will be found by comparing a matched ellipsis introduced by parallel connective to its repeated verb phrase counterpart.

Materials

Stimuli from Experiment 6 were adapted to include a five-word spill-over region following the target clause, e.g. 'but the reporting was better', as shown in (157)-(158). As in Experiment 6, two levels of antecedent form (match versus mismatch) were crossed with two levels of ellipsis (ellipsis versus no ellipsis) within sets.

(157)   The local media covered the debate just like

    a.   the national outlets did,   [match, ellipsis]

    b.   the national outlets covered it,   [match, no ellipsis]

    but the reporting was better.

(158)   The debate was covered by the local media just like

    a.   the national outlets did,   [mismatch, ellipsis]

    b.   the national outlets covered it,   [mismatch, no ellipsis]

    but the reporting was better.

Connectives were manipulated between sets: in half of the stimuli the target clause was introduced by 'just like', and in the other half of the stimuli the target clause was introduced by 'because', as in (159)-(160).

(159)   The fire fighters endorsed the strike because

    a.   the police force did,   [match, ellipsis]
    b.   the police force endorsed it,   [match, no ellipsis]

    but the mayor was opposed.

(160)   The strike was endorsed by the fire fighters because

    a.   the police force did,   [mismatch, ellipsis]
    b.   the police force endorsed it,   [mismatch, no ellipsis]

    but the mayor was opposed.

The contrastive topic analysis of mismatch developed in Chapter 4 predicts increased reading times for mismatches in both the ellipsis and no ellipsis conditions. Increased reading times are predicted for the region following the target verb phrase, with a larger increase predicted for the ellipsis conditions (an interaction between antecedent form and ellipsis).

An interaction between connective and ellipsis, comparable to the interaction observed for Experiment 6, is likewise predicted for the region following the target verb phrase. Under the predicted pattern, non-ellipsis structures show comparable readings across connective conditions, but ellipses introduced by 'just like' are read more quickly than ellipses introduced by 'because'.

Method

Methods were identical to those described for Experiment 7. (Participant n=48; Item n=16.)

Statistical Analysis

Statistical analyses were computed for comprehension accuracy and for reading times. For comprehension accuracy, a three-factor ANOVA crossing antecedent form (match versus mismatch), target form (ellipsis versus no ellipsis) and connective ('just like' versus 'because') was computed. Stimuli for which participants provided an incorrect answer to the comprehension question were excluded from the reading time analysis.

For the reading time analysis, measurements above 2,000 ms. were discarded. Means and standard deviations were computed for each condition, and measurements falling more than 3 standard deviations from the condition mean were discarded. This procedure resulted in a loss of 1.9 per cent of the analyzable data.

Reading times reported in tables and figures reflect raw reading times in milliseconds. Error bars in figures indicate standard error for by-subject means. Statistical analysis was conducted on raw reading times,[3] which were averaged across words in critical regions as follows: the antecedent clause region spanned the entire first clause of the sentence (from the first word up until—but not including—the connective); the target subject region contained a three-word noun phrase (e.g. 'the national outlets'); the verb phrase region contained an auxiliary verb ('did') in ellipsis conditions and a verb plus pronoun ('covered it') in non-ellipsis conditions; the post-VP region contained the first two words following the target verb phrase (e.g. 'but the').

A three-factor ANOVA was computed for each critical region. Where pairwise comparisons are reported, the Tukey Honestly Significant Difference (HSD) test was used to simultaneously test all pairwise comparisons for the word/region.

Results: Comprehension Accuracy

Overall question answering accuracy for experimental items was 83 per cent and was generally high across items and across conditions.

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[3]In Experiment 7, the target clause was varied within sets (i.e. different lexical items appeared in the target clause depending on the level of information structure). Residual reading times were used for statistical analysis there to minimize differences associated with word length. In Experiment 8, however, the target clause was held constant within sets (the same lexical items appeared in the target clause across conditions, with the exception of the target verb phrase region) making it possible to use raw reading times for the analysis.

Table 5.3: Exp. 8 Comprehension Accuracy Means and Standard Error

	match	mismatch
because		
ellipsis	.86 (.03)	.82 (.04)
no ellipsis	.88 (.03)	.92 (.03)
just like		
ellipsis	.82 (.03)	.77 (.04)
no ellipsis	.77 (.04)	.78 (.04)

A 3-factor ANOVA analyzing comprehension accuracy revealed a main effect of connective, where comprehension scores were higher for causal connective conditions as compared to parallel connective conditions (averaging over all other factors) ($F_1(1, 47) = 11.84, p < .005; F_2(1, 14) = 12.83, p < .0005$). Pairwise comparisons across all condition means, however, showed no reliable differences for any pair.

Results: Reading Times

Average reading times for each region in each condition are reported in Table 5.4. Figures 5.4-5.5 show word-by-word reading times for the target clause; error bars indicate standard error for by-subject means.

Table 5.4: Exp. 8 Average Reading Times (ms) by region

	antecedent clause	target subject	VP	post-VP
because				
match ellipsis	370 (13)	383 (15)	431 (30)	399 (12)
mismatch ellipsis	355 (12)	390 (13)	428 (20)	426 (19)
match no ellipsis	365 (13)	367 (12)	464 (35)	368 (10)
mismatch no ellipsis	364 (13)	389 (14)	430 (21)	383 (17)
just like				
match ellipsis	378 (13)	377 (17)	483 (36)	344 (11)
mismatch ellipsis	370 (13)	375 (15)	412 (18)	394 (14)
match no ellipsis	367 (16)	354 (12)	510 (47)	364 (12)
mismatch no ellipsis	363 (12)	372 (15)	430 (21)	394 (14)

For the 'just like' subset, shown in Figure 5.4, reading times for all four conditions tracked closely for the first two words of the target subject ('the national'), diverging at the head noun ('outlets').[4] Pairwise comparisons were conducted for each region. No reliable differences were found at the target subject. At the target verb phrase ('did'/covered it), reading times were elevated for both mismatch conditions, a pattern

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[4]Closer inspection of reading times for the head noun ('outlets') in isolation showed no reliable effects or interaction (in a two-level subset ANOVA crossing antecedent form and ellipsis); multiple comparisons across conditions, adjusted using the Tukey HSD method, showed no reliable differences.
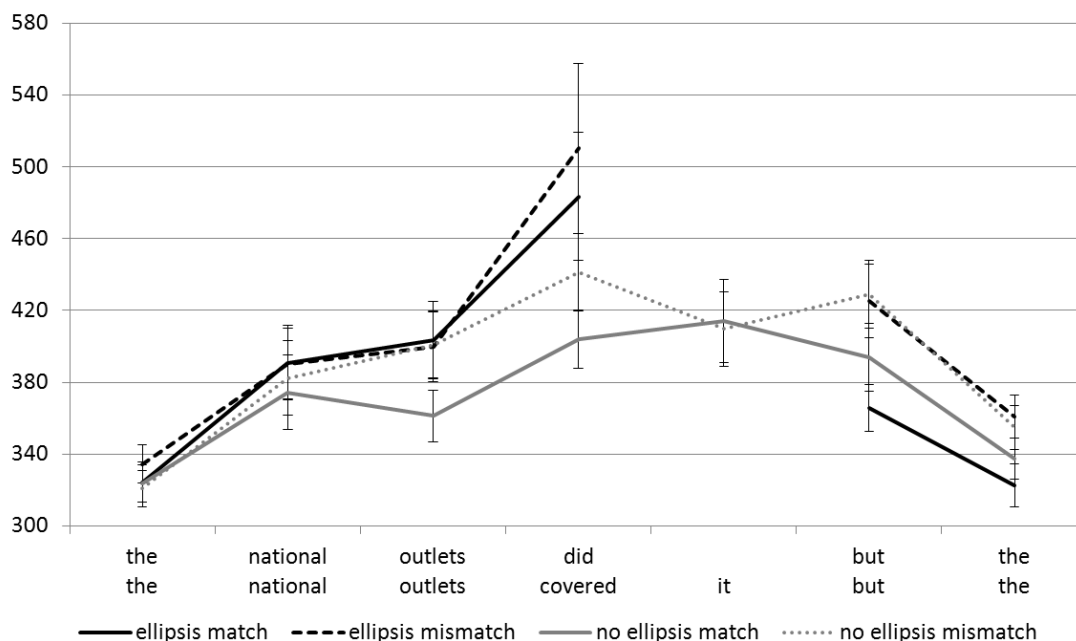
Figure 5.4: Exp. 8 Reading Times (ms) for Target Clause ('just like')

which continued through the post-VP region ('but the'). In both regions (target VP and post-VP), a reliable difference was observed between the highest and lowest reading times (mismatched ellipsis and matched no ellipsis conditions, respectively). No other differences were reliable.

For the 'because' subset, shown in Figure 5.5, greater variability was observed across conditions for the target subject region (as compared to the same region in the 'just like' subset). As in the 'just like' subset, however, there were no reliable differences in reading times for the target subject region. At the target verb phrase and the post-VP regions, reading times were elevated for both ellipsis conditions. No reliable differences were observed for the target verb phrase region. In the post-VP region, a reliable difference was observed for the highest and lowest reading times only (the mismatch ellipsis and match no ellipsis conditions, respectively).

ANOVA Results by Region

A three-factor ANOVA crossing two levels of antecedent form (match versus mismatch), two levels of ellipsis (ellipsis versus no ellipsis), and two levels of connective ('because' versus 'just like') was computed for each of the critical regions described above.

No effects were observed for the **antecedent clause region**.
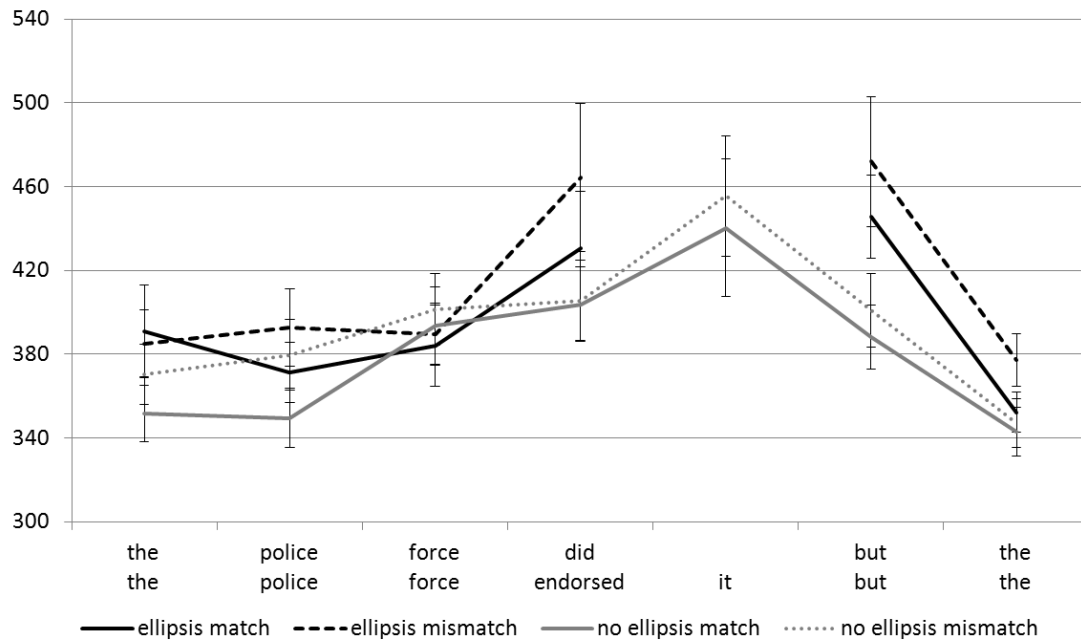
Figure 5.5: Exp. 8 Reading Times (ms) for Target Clause ('because')

In the **target subject region**, a main effect of connective was observed, where reading times were increased for target subjects following 'because' as compared to 'just like'; the effect was not reliable, however, by items ($F_1(1, 47) = 4.41, p < .05; F_2(1, 14) = 1.70, p = .2$). This pattern of increased reading times for target subjects following 'because' was observed across all pairings of antecedent form (match/mismatch) and ellipsis (ellipsis/no ellipsis); differences for each pair, however, were not statistically reliable.

In the **target verb phrase region**, a main effect of ellipsis was observed, where reading times were elevated in ellipsis conditions ($F_1(1, 47) = 8.65, p < .01; F_2(1, 14) = 8.01, p < .05$). This pattern of increased reading rates for the ellipsis condition was observed across all pairings of antecedent form (match/mismatch) and connective ('just like'/'because'); differences for each pair, however, were not statistically reliable. A marginal effect of antecedent form was observed by items, where reading times were elevated in mismatch conditions ($F_1(1, 47) = 1.72, p = .20; F_2(1, 14) = 3.52, p = .08$). This pattern was observed across all pairings of connective ('because'/'just like') and ellipsis (ellipsis/no ellipsis), but differences were not reliable, and there was no effect in the by-subjects analysis.

In the **post verb phrase** region, a main effect of antecedent form was observed, where reading times were increased in mismatch conditions ($F_1(1, 47) = 9.90, p <$
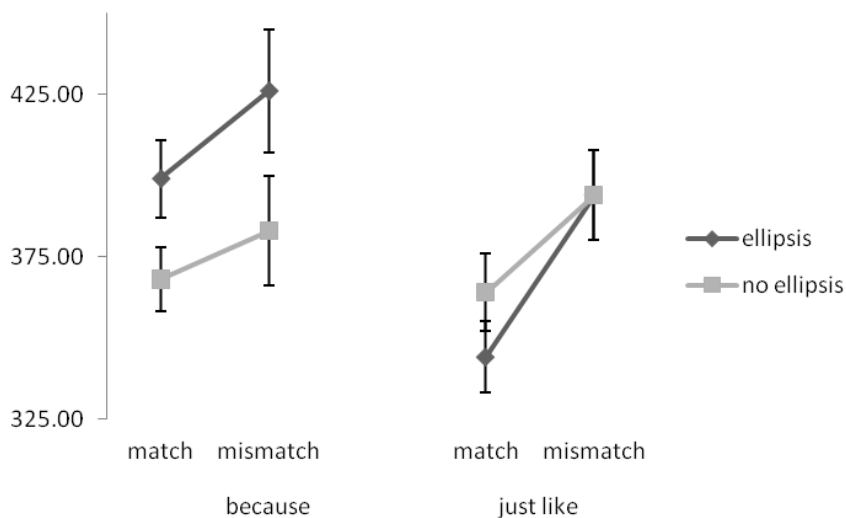
Figure 5.6: Exp. 8 Reading Times (ms) for Post-VP Region

.005; $F_2(1, 14) = 12.39, p < .005$). This pattern was observed across all pairings of connective ('because'/'just like') and ellipsis (ellipsis/no ellipsis), but differences were not reliable. A main effect of ellipsis, reliable by subjects only, was also observed, where reading times were elevated following ellipses ($F_1(1, 47) = 4.42, p < .05; F_2(1, 14) = 2.41, p = .14$). This pattern of increased reading times for ellipses was observed for all pairings of antecedent form (match/mismatch) and connective ('just like'/'because') with one exception: in the 'just like', match condition, reading times were longer for the no-ellipsis condition. Pairwise differences between ellipsis and no ellipsis conditions were not reliable. A main effect of connective, reliable by subjects only, was observed, where increased reading times were recorded for 'because' conditions ($F_1(1, 47) = 8.22, p < .01; F_2(1, 14) = 1.37, p = .26$). This pattern of increased reading times for 'because' conditions was observed across all pairings of antecedent form and ellipsis, with one exception: in the mismatched no ellipsis condition, reading times were longer with 'just like'. An interaction between ellipsis and connective was observed where the difference between connective conditions was greater under ellipsis ($F_1(1, 47) = 9.57, p < .005; F_2(1, 14) = 5.86, p < .05$). The effect of this interaction is demonstrated in Figure 5.6, which shows that in no-ellipsis conditions, reading times are comparable for both connectives types, but under ellipsis, reading times are elevated for the 'because' conditions. There was no interaction between antecedent form and ellipsis, and there was no three-way interaction.
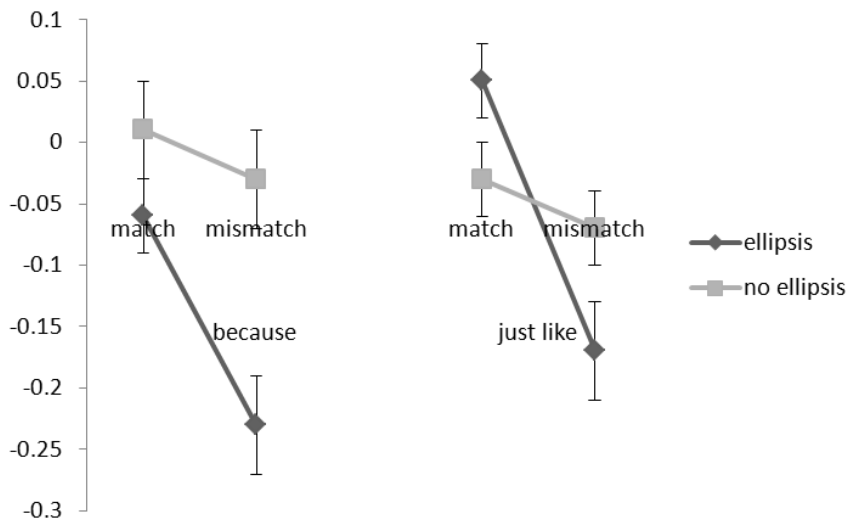
Figure 5.7: Exp. 6 Acceptability Ratings (means and standard error)

Discussion

Online reading time results for post-VP regions recorded in Experiment 8 are consistent in several respects with the offline acceptability data obtained for Experiment 6. These similarities are observed by comparing the processing data from Experiment 8 in Figure 5.6 with the acceptability data from Experiment 6, repeated here in Figure 5.7. (Note, however, that for the reading time data in Figure 5.6 greater means reflect increased processing difficulty, whereas for the acceptability data in Figure 5.7, greater means reflect increased acceptability—that is, for the vertical axis down is good online, but up is good offline.)

Where the offline data showed a loss of acceptability associated with mismatched structure for ellipses and non-ellipses alike, the online data likewise show an increase in post-VP reading times for ellipses and non-ellipses alike. Similarly, where the relative acceptability of ellipses versus non-elided repeated verb phrases offline is conditioned on the choice of connective, the relative ease of processing following an ellipsis versus a repeated verb phrase is likewise conditioned on choice of connective.

Findings from the two experiments diverge, however in two ways. First, where the acceptability data from Experiment 6 showed an interaction between antecedent form and ellipsis (the mismatch effect was greater under ellipsis), there was no such interaction in the reading time results. This indicates that while the offline acceptability difference between matched and mismatched contrastive topics is amplified under el-

lipses, the increased processing difficulty associated with a mismatched contrastive topic is comparable across ellipsis and non-ellipsis contexts. Next, in the offline data from Experiment 6, the 'just like' subset show a crossover pattern where relative acceptability for the ellipsis and no-ellipsis conditions are reversed depending on whether the antecedent and target are matched in structure. For the online data, no crossover is observed; rather, reading times are comparable for the mismatched condition, while facilitation is observed for the ellipsis in the matched condition.

Thus, on the question of whether a mismatched antecedent can induce processing difficulty even in the absence of ellipsis, the data from Experiment 8 support that conclusion. The statistical model shows a main effect of antecedent form with no interaction between antecedent form and ellipsis. Moreover, increased reading times were observed for all matched/mismatched pairs, whether the target verb phrase was elided or repeated. On the question of whether discourse connectives influence online processing of ellipsis, the data again are affirmative: where reading times are comparable across both connective types for non-ellipsis structures, ellipses introduced by 'because' show increased reading times over ellipses introduced by 'just like'. Moreover, when a target clause that is structurally matched to its antecedent is introduced by 'just like' a facilitation effect is observed where the ellipsis is read more quickly than a repeated verb phrase. Some caution is in order, however, in interpreting this pairwise difference. As described already, while the ANOVA results support each of the claims made here, pairwise differences in many cases were not large enough to result in reliable differences.

5.3   General Discussion

The experiments in this chapter offered processing evidence of three kinds in support of the analysis of antecedent mismatch developed in Chapter 4. A comparison of the effects of mismatch on contrastive topic ellipsis versus simple focus ellipses in Experiment 7 showed the predicted interactive pattern where reading times increased following a mismatched contrastive topic, but not following a mismatched simple focus ellipsis. This finding demonstrates that the processing penalty associated with mismatch is not due to the absence of a syntactically matched antecedent, but rather to a lack of contextual support for an intended contrastive topic relation. The same interactive pattern was observed at the target subject, confirming the hypothesis that a mismatched contrastive topic can disrupt processing before a reader has encountered an ellipsis. This finding is not predicted by models which attribute mismatch effects to an ellipsis-specific

mechanism like antecedent identification (Frazier 2008) or repair (Arregui et al. 2006), both of which are triggered only later, at the ellipsis site.

Finally, Experiment 8 demonstrated that the relative ease of processing for ellipses versus repeated verb phrases is conditioned on a combination of antecedent form and discourse connective. That finding raises two implications for the current discussion. First, a matched antecedent on its own will not always provide sufficient contextual support for an ellipsis. This was demonstrated in contexts where the target clause was introduced by a causal connective, and increased processing times were observed for ellipses whether the antecedent was matched or not. Second, the pattern of results obtained with parallel connectives demonstrated that when an ellipsis is well supported by its context, that ellipsis can be easier to process than a repeated verb phrase.

5.3.1 Pre-ellipsis Processing

The finding from Experiment 7 that processing of pre-ellipsis regions differs across well-formed and defective contrastive topic transitions indicates that as early as the target subject the reader is already attempting to integrate the target clause into the larger discourse structure. Faster reading times are observed at the target subject when the antecedent context supports positing a contrastive topic structure, and faster reading times are observed further downstream at the ellipsis. Reading times at the subject region, as such, appear to index the ease with which the referent evoked by that argument is integrated into the discourse context. Effects of this sort are not predicted by antecedent recovery/repair models of mismatch, but follow naturally from the account developed here.

A similar 'early' effect in ellipsis processing comes from an ERP study reported in Callahan et al. (2007). (See also Callahan 2009.) The primary goal of that study was to compare processing of deep and surface anaphors. To that end, stimulus sets like (161) were constructed which compared processing of a target clause containing an ellipsis (the surface verbal anaphor condition), main verb 'do' plus the pronoun 'it' (the deep verbal anaphor condition), or a lexical verb plus the pronoun 'it' (the deep nominal anaphor condition).

(161)   The dealer shuffled the deck at the beginning of the game,

      a.   and the player did too.   surface verbal anaphor

      b.   and the player did it too.   deep verbal anaphor

      c.   and the player shuffled it too.   deep nominal anaphor

Results from that manipulation showed very little difference between the surface verbal anaphor and the deep verbal anaphor, leading the authors to conclude that processing of both anaphors is supported by a single mechanism (contra Sag and Hankamer 1984). However, comparison of the deep verbal and deep nominal anaphors showed considerable differences, and waveforms associated with the processing of 'did' in the deep verbal anaphor condition suggest it is processed like a closed-class function word in such contexts. (This latter finding is of interest because 'do', when followed by a pronoun, serves as a main verb, not an auxiliary.)

Callahan and colleagues' study included a second manipulation of particular interest here, where the noun filling the target subject position was manipulated to yield a plausible versus implausible interpretation. Example (161) above demonstrates the plausible condition; (162) demonstrates the implausible condition, where 'the fortune' is not a plausible agent for a shuffling event.

(162)   The player shuffled the deck at the beginning of the game,

    a.   and the fortune did too.   surface verbal anaphor

    b.   and the fortune did it too.   deep verbal anaphor

    c.   and the fortune shuffled it too.   deep nominal anaphor

An enhanced N400/P600 complex was observed in response to the implausible subject, and surprisingly, the response was detected *at the target subject*, before the reader had encountered the verb and before the reader had enough information to evaluate plausibility. Callahan et al. (2007) suggested that the effect might indicate violation of an expectation for an animate subject (an interpretation consistent with the observed N400 response) and suggested possible additional explanations for the associated P600 response. Callahan (2009), however, suggested that the connective 'and' might bias readers toward a parallel discourse continuation and that the response evoked at the target subject reflects violation of that expectation (cf. Callahan 2010).

One problem with the latter interpretation is that 'and' is in fact underspecified as a discourse connective and can introduce a variety of possible relations, including temporal and causal relations, in addition to parallel relations. An alternative interpretation of this early effect at the target subject is that it reflects the difference between establishing a contrastive topic transition (in the plausible condition), where the target subject is integrated into the discourse by positing a topic set, and a topic change transition (in the implausible condition), where the reader instantiates a representation of a

new referent, but does not yet have a means of integrating it into the discourse. This alternative account is, of course, speculative, but it is nonetheless striking that the early subject effect described by Callahan and colleagues, like the one described here, appears in a structure which does not (at the point where the effect is detected) exhibit any syntactic or semantic violation.

5.3.2 Downstream Effects of Mismatch

In interpreting the post-ellipsis effect of mismatch observed in Experiment 7, I argued that the increased reading times reflect a conflict between the interpretation for the ellipsis signaled by the target auxiliary and the information structure of the preceding context. The finding of an effect of mismatch prior to the ellipsis site confirms that the defective contrastive topic transition induces a penalty in its own right. It also suggests, however, a potential alternative explanation for the post-ellipsis finding. Under that interpretation, topic structure is not interacting in any meaningful way with the interpretation of the ellipsis; rather, the post-ellipsis effect is a carry-over from the violation detected early in the clause.

There are, however, two pieces of evidence arguing against that view. First, for the contrastive topic structures tested in Experiment 7, the effect of mismatch is greatest at the target subject; it then diminishes at the subsequent verb phrase region, and then emerges again post ellipsis. A pattern of this sort is not consistent with a simple carryover effect, which would be expected to diminish over time, instead of peaking again later in the clause. Next, a similar increase in processing times for mismatched ellipses was observed in Experiment 8, but in that case no effects were detected at the target subject. In that case, a carry-over interpretation is untenable. Taken as a whole, these findings support the claim that a failure to identify an intended contrastive topic relation early in the target clause disrupts processing of the ellipsis further downstream.

5.3.3 A General Discourse Problem

The results from Experiment 8, moreover, demonstrate that a failure to identify an intended contrastive topic relation early in the target clause can disrupt processing even in the absence of ellipsis. The results from that experiment showed that a mismatch between antecedent and target led to increased reading times for contrastive topics whether the target verb phrase was elided or repeated. Effects were not large enough to lead to reliable differences for pairwise comparisons, but the ANOVA model showed a main effect of antecedent form and no interaction between antecedent and ellip-

sis. These results further support the central claim of this thesis that mismatch is not an ellipsis-specific problem, but instead reflects the manner in which sentence-level structure (specifically the topic/comment partition) supports discourse-level relationships.

The second finding from that experiment—that discourse connectives can influence the relative ease of processing for structures which elide or repeat a verb phrase—further demonstrates that ellipsis is sensitive not only to sentence-level structure but to higher-level discourse relationships. That finding suggests that the expectation for a parallel discourse relationship signaled early in the target clause by a connective like 'just like' can facilitate processing following an ellipsis site later in the clause. However, when that early cue is not available, for example, when the target clause is introduced by 'because', the ellipsis induces processing difficulty—whether the antecedent is structurally matched or not. This effect, while not directly predicted by the current account, is nonetheless consistent with a model of ellipsis licensing that is sensitive to discourse context. By contrast, findings of this sort cannot be accommodated by, and indeed will never be anticipated by, models of ellipsis which are instead trained narrowly on the structure of the ellipsis target and its antecedent.

5.4   Summary

In this chapter I offered processing evidence in support of the primary proposal developed here, which holds that effects of mismatch under ellipsis are driven by information structure. Evidence was also presented to show that discourse connectives not only affect the relative preference for ellipses versus repeated verb phrases offline, but also affect the relative ease of processing for these structures in real time. The results described in this chapter are not compatible with models which address only the syntactic features of the antecedent and target. Rather, the findings presented here crucially implicate both information structure and discourse structure in the processing of ellipsis.

Chapter 5 includes data that have been submitted for publication and data that are currently being prepared for submission for publication. Data reported for Experiment 7 have been submitted for publication. The dissertation author was the primary investigator and sole author of this material. Data reported for Experiment 8 are currently being prepared for submission for publication. The dissertation author was the primary investigator and sole author of this material.

Chapter 6

A Revised Model of Ellipsis

For many years the literature on ellipsis licensing has been polarized by a debate over the nature of the underlying mechanism. The competing syntactic and semantic licensing models make conflicting categorical predictions regarding the acceptability of antecedent mismatch, yet neither set of predictions is consistent with the observed data. The analysis developed here demonstrates that effects of antecedent mismatch are mediated by information structure and as such prompts a reevaluation of those former approaches. The current account also raises implications for models of ellipsis processing, as those models have typically been informed by linguistic analyses which assume a syntactic licensing account. In this chapter I review the contributions of this thesis to our understanding of ellipsis and identify opportunities for future research.

6.1   Summary of Findings

Findings from three studies were presented in support of the claim that reduced acceptability associated with some forms of antecedent mismatch under ellipsis is attributable not to syntactic mismatch *per se*, but to a lack of topic/comment parallelism in a contrastive topic structure.

In Chapter 3 I identified a confound inherent in previous analyses of antecedent mismatch, where cases of unacceptable mismatch are characterized by focus on the target subject, and cases of acceptable mismatch instead focus a non-subject element in the target clause, usually an auxiliary verb. I hypothesized that the focus structure of the target clause is the best predictor for acceptability of antecedent mismatch under ellipsis. In Experiments 1-3, focus structure was systematically dissociated from syntactic structure, from discourse coherence, and from the relative markedness of antecedent-

target pairs. Those studies showed that mismatched ellipses which focus a target subject are consistently rated less acceptable than mismatched ellipsis which focus a target auxiliary. Those results are incompatible with the categorical predictions of the basic syntactic and semantic models; nor can the effects be accounted for under either the Coherence analysis of Kehler (2000; 2002) or the Recycling Hypothesis of Arregui et al. (2006).

In Chapter 4, I introduced an information structural analysis of the subject-focus ellipses identified in the previous chapter and demonstrated that they form contrastive topics. I described the role sentence-level topic structure plays in supporting a discourse-level contrastive topic relationship and hypothesized that the mismatch effect observed for contrastive topic ellipses was due to a lack of sentence-level support for an intended contrastive topic. In particular, I argued that when one member of an intended contrastive topic pair is not realized as a sentence-level topic, the larger discourse structure is degraded. I argued that this constraint operates independently of ellipsis, and hypothesized that mismatch effects of the sort observed in Chapter 3—where contrastive topic structures were shown to be more sensitive than other types of structures to mismatch across clauses—would not be limited to ellipsis contexts. That prediction was tested in two ways.

First, mismatched ellipses occurring in contrastive topic and 'simple focus' structures were paired with comparable structures that repeated, instead of eliding, the target verb phrase. The ellipses were judged less acceptable than the non-ellipses across the board, demonstrating that mismatch effects are amplified under ellipsis. There was no interaction between ellipsis and information structure, however, indicating that the difference between contrastive topic and simple focus structure does not emerge as a function of ellipsis. It was shown in Experiment 5, moreover, that the difference in acceptability for the two types of structures can lead to reliable differences in the absence of ellipsis. The second test involved contrastive topic structures only, comparing matched and mismatched structures with and without ellipsis. Experiment 6 showed a numerical difference between matched and mismatched contrastive topics with no ellipsis, but the difference was not statistically reliable. Those results were consistent with the findings of the previous experiment, which showed that mismatch effects are amplified under ellipsis, but did not support the hypothesis that a contrastive topic mismatch would reduce acceptability even in the absence of ellipsis. However, the inclusion of a manipulation involving discourse connectives in Experiment 6 led to the novel finding of a 'repeated verb phrase penalty' in contexts where a parallel connective introduced a matched repeated

verb phrase. That finding was not predicted by the current account, but is consistent with findings in the pronominal literature (Gordon et al. 1993, inter alia) demonstrating a comparable 'repeated name penalty'.

The linguistic analysis developed in Chapters 3 and 4, which holds that the source of the mismatch penalty under ellipsis is an independent information structural constraint, generated novel predictions regarding the timecourse and relative costs of processing for contrastive topic ellipses. Those predictions were tested in two reading time studies reported in Chapter 6. The predictions tested in Experiment 7 addressed once more the dissociability of syntactic and information structural parallelism. Based on the findings from Experiments 1-2, I predicted that a mismatched antecedent would disproportionately affect processing following an ellipsis in contrastive topic structures as compared to simple focus structures. I also predicted that in the right context, a defective contrastive topic transition could disrupt processing prior to the ellipsis site. Both predictions were confirmed by online reading times, which showed the predicted interaction between antecedent form and information structure, with reliable effects both before and after the ellipsis. These findings together support the main claim of the thesis, that mismatch effects follow from an information structural constraint which operates independently of ellipsis.

Experiment 8 tested the prediction that mismatched contrastive topics would disrupt processing not only under ellipsis but also in structures which repeat a verb phrase in the target clause. That study compared reading times following the elided or repeated verb phrase for matched and mismatched contrastive topics and showed that mismatch slowed reading times following both mismatched ellipses and mismatched repeated verb phrases. In contrast with offline data recorded for Experiment 6, for Experiment 8 the size of the mismatch effect was not dependent on whether the target VP was elided. Differences between conditions, however, were generally not large enough to be statistically reliable. Consistent with other findings from Experiment 6, sentences featuring causal versus parallel connectives showed distinct processing profiles. While the post-verb phrase reading times did not show evidence of a penalty associated with repeating a verb phrase, reduced reading times were observed following a matched ellipsis introduced by a parallel connective, indicating that when an ellipsis is well-supported by prior context it can facilitate later processing.

6.2   The Information Structure Analysis

The primary contribution of this thesis to the linguistics literature is a resolution to the is-it-syntax-or-is-it-semantics debate, which has drawn on for more than three decades. By invoking information structure, the current analysis offers an account of antecedent mismatch which captures not only those cases where mismatch leads to reduced acceptability, but also those where mismatch has little or no effect.

Distinguishing between contrastive topic ellipses, which evoke a contrast between two arguments appearing in subject position, and simple focus ellipses, which evoke a clause-level contrast marked on an auxiliary verb (or other non-subject element), the current analysis draws, in many cases, the same line through the data as the Coherence account of Kehler (2000; 2002). The predictions of the two accounts are identical, for example, in cases where parallel coherence is supported by contrastive topic structure. Predictions diverge, however, when coherence and topic structure are dissociated, and the results presented here demonstrate that topic structure, not coherence, is the crucial factor. The account, as such, reconciles the conflicting data reported by Kehler, which showed that acceptability for mismatch varies based on coherence relation, and by Frazier and Clifton (2006), which showed no effect of coherence on ellipsis acceptability. In the former analysis, coherence and topic structure co-varied. In the latter, topic structure was held constant while coherence was manipulated.

The dissociation of topic structure and discourse coherence, moreover, offers insight into a problem that has been well-researched in the literature on nominal anaphors, but has largely been ignored in the literature on ellipsis. That problem addresses the availability of competing forms of reference. In the literature on pronouns, it has been found that under certain circumstances, a penalty is incurred for repeating a name—or other explicit form of reference—when context supports the use of a pronoun (the 'repeated name penalty' referenced above). The novel finding of a 'repeated verb phrase' penalty was reported here in Chapter 4. There it was shown that while information structure can affect the acceptability of an ellipsis (ellipses with mismatched contrastive topics tend to be degraded), form of reference is determined based on an interaction between information structure and discourse coherence, as signaled by a discourse connective.

6.2.1   A Revised Typology of Verbal Anaphora

The fact that some cases of mismatched ellipses are indeed acceptable has long been an issue for the typology of anaphors proposed by Hankamer and Sag (1976), Sag

and Hankamer (1984). One recent proposal (Merchant 2008) has sought an alternative to the processing-based explanation of the surface/deep hypothesis and has instead modeled differences between anaphor types based on the node in the syntactic tree where deletion occurs. Specifically, under that proposal, ellipsis occurs below the level of 'VoiceP', a proposed inflectional category which fills a position in tree structure dominating a lexical verb phrase. While that analysis admits the possibility that mismatches are sometimes acceptable under ellipsis and not other forms of anaphora, it cannot predict which mismatched ellipses are acceptable and which are not.

The findings from the current study offer an alternative view of this typology, whereby verbal anaphors which crucially involve a contrastive topic structure will not be acceptable with mismatch. This category includes subject focus ellipses, as well as stripping, gapping, and pseudogapping structures.[1] A similar proposal was advanced by Hendriks (2004) who argued that different types of verbal anaphors can be distinguished based on the manner in which they relate to topic structure. Some questions remain, particularly with respect to the role played by discourse coherence (Kehler 2000; 2002) and the availability of alternative focus patterns (Winkler 2005, Konietzkoa and Winkler 2010) under ellipsis.

The current account has still broader implications, however, as the contrastive topic analysis developed here is not restricted to anaphora. Indeed, the prediction of the current analysis, that contrastive topics will show sensitivity to mismatch with or without ellipsis, offers insight into otherwise anomalous findings showing parallelism effects for putative deep anaphors (e.g. Murphy 1985), as well as apparently unrelated findings in the sentence-processing literature which demonstrate a facilitative effect of parallel structure for coordinate clauses which do not involve anaphora (Frazier et al. 1984; 2000, Knoeferle 2007). As described in Chapter 4, these two strands of the literature are brought together under the current account which considers ellipsis from the perspective of information structure and in the context of larger discourse.

6.2.2 Against Recycling

The findings presented here suggest that the various special-purpose mechanisms proposed as a part of the Recycling model (Arregui et al. 2006, Frazier 2008) are not necessary for explaining mismatch effects under ellipsis. Nor, in many cases, are they capable of predicting the range of effects described here. The processing results from

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[1]Sluicing is notably omitted from this group, as sluices do not involve contrastive topics, but instead involve backgrounding of an antecedent proposition under question formation.

Experiment 7, for example, are incompatible with the claims of the Recycling Hypothesis, which predicts added costs for repairing mismatched antecedents. The results from that study, however, showed that the disruptive effect of mismatch is crucially conditioned on information structure, and, moreover, can be detected throughout the target clause, including regions prior to the ellipsis site. Because the Recycling Hypothesis is framed in terms of syntactic processing, it fails to predict the observed interaction between antecedent form and topic structure, and because it assumes a process triggered at the ellipsis site, it is incapable of predicting the effect observed at the target subject. I offered in Chapters 2 and 3 similar critiques of the Recycling Hypothesis' claims regarding the role of presupposition (see Section 2.2.4) and pragmatic implicature (see Section 3.3.3). In both cases, the Recycling model addresses only a subset of the relevant data, positing a special-purpose account for effects that are not limited to ellipsis and can in fact be explained by appealing to more general discourse and information structural principles.

6.3   Rethinking Ellipsis

The proposal developed here, as such, offers a new perspective on ellipsis, where offline acceptability and ease of processing are both crucially dependent on the well-formedness of the larger discourse structure supporting the ellipsis. From this perspective, two critical questions regarding a fuller characterization of ellipsis emerge.

The first involves processes at the ellipsis site. I have argued against the claims of the Recycling Hypothesis, which assumes mismatched antecedents are repaired prior to being copied into an ellipsis site. I have argued instead that various cues in the prior context may be either consistent or inconsistent with the interpretation that is supported by the auxiliary verb at the ellipsis site. I have not described, however, the cognitive mechanism that supports identification of an antecedent or its integration at the ellipsis site. Results reported by Martin and McElree (2008) support a model where the antecedent is accessed via a 'content-addressable pointer' as opposed to a serial search, but much more work remains to be done on this question.

The next question is more tractable, given the current state of the literature, but is by no means trivial. Furthering the research program in ellipsis that I have laid out here will require scaling up our current sentence-level processing models to the discourse level. The current state of the literature reflects some understanding of the manner in which discourse-level relations can affect sentence-level processing (Rohde et al. to appear, Kehler et al. 2007), but at present there is only a very limited understanding of

how discourse segments become integrated into larger structures in real time. It is not surprising that processing models at the discourse level lag behind models of sentence processing in this way, as formal linguistic models of discourse are similarly limited.

6.4   Conclusions

The results from this thesis offer a re-examination of the theory of ellipsis, revealing confounds inherent in prior analyses and reconciling apparently contradictory data sets reported in the literature. Moreover, by demonstrating a link between ellipsis acceptability and more general principles governing well-formedness at the discourse level, this work offers a new perspective on ellipsis processing, suggesting possible directions for re-orienting our approach to ellipsis and for re-situating our understanding of it within the larger grammar.

Finally, it is my hope that the studies reported in this thesis have highlighted the importance of a dialog between linguistic analysis and the development of cognitive processing models. The analysis presented here was developed by pursuing both approaches to the question of ellipsis in tandem. The introduction of an experimental approach to data collection, for example, improved the quality of the empirical data available for analysis, sharpening the linguistic proposal as a result. This revised proposal generated new predictions for a processing model, which in turn informed the linguistic analysis. Rather than reify a divide between these two modes of investigation, it has been my experience that a timely shift in perspective reinforces their mutual relevance.

Appendix A

Experimental Stimuli

Stimuli used for all experiments are listed below. Condition labels are indicated in the first item of each section.

A.1   Stimuli used for Experiment 1

(163) a. matched antecedent, subject focus

b. matched antecedent, non-subject focus

c. mismatched antecedent, subject focus

d. mismatched antecedent, non-subject focus

(164) a. Venomous snakes are fairly easy to identify, and poisonous plants are as well.

b. It's fairly easy to identify venomous snakes, and most experienced hikers can.

c. It's fairly easy to identify venomous snakes, and poisonous plants are as well.

d. Venomous snakes are fairly easy to identify, and most experienced hikers can.

(165) a. Printer cartridges are simple to replace, and external drives are too.

b. It's simple to replace printer cartridges, but no one in the office does.

c. It's simple to replace printer cartridges, and external drives are too.

d. Printer cartridges are simple to replace, but no one in the office does.

(166) a. Scented candles are easy to make, and potpourri is too.

b. It's easy to make scented candles, and lots of people do.

  c. It's easy to make scented candles, and potpourri is too.

  d. Scented candles are easy to make, and lots of people do.

(167) a. Handmade pasta is simple to prepare, and pastry shells are too.

  b. It's simple to prepare handmade pasta, but few restaurants do.

  c. It's simple to prepare handmade pasta, and pastry shells are too.

  d. Handmade pasta is simple to prepare, but few restaurants do.

(168) a. Discrimination is usually hard to prove, and harassment can be too.

  b. It's usually hard to prove discrimination, and few plaintiffs do.

  c. It's usually hard to prove discrimination, and harassment can be too.

  d. Discrimination is usually hard to prove, and few plaintiffs do.

(169) a. Monitoring systems are fairly simple to install, and security panels are also.

  b. It's fairly simple to install a monitoring system, but few commercial businesses do.

  c. It's fairly simple to install monitoring systems, and security panels are also.

  d. A monitoring system is fairly simple to install, but few commercial businesses do.

(170) a. PIN numbers are easy to forget, and usernames are too.

  b. It's easy to forget PIN numbers, and plenty of customers do.

  c. It's easy to forget PIN numbers, and usernames are too.

  d. PIN numbers are easy to forget, and plenty of customers do.

(171) a. Eating disorders are hard to treat, and substance abuse can be too.

  b. It's hard to treat eating disorders, and usually only specialists do.

  c. It's hard to treat eating disorders, and substance abuse can be too.

  d. Eating disorders are hard to treat, and usually only specialists do.

(172) a. Heirloom plants are pretty simple to grow, and ornamentals are too.

  b. It's pretty simple to grow heirloom plants, and many gardeners do.

  c. It's pretty simple to grow heirloom plants, and ornamentals are too.

  d. Heirloom plants are pretty simple to grow, and many gardeners do.

(173) a. Total calories can be hard to estimate, and fat content can be too.

  b. It can be hard to estimate total calories, and few consumers do.

  c. It can be hard to estimate total calories, and fat content can be too.

      d.   Total calories can be hard to estimate, and few consumers do.

(174)   a.   Car batteries are pretty easy to replace, and spark plugs are also.

             b.   It's pretty easy to replace a car battery, and most service centers will.

             c.   It's pretty easy to replace car batteries, and spark plugs are also.

             d.   A car battery is pretty easy to replace, and most service centers will.

(175)   a.   Fleas are sometimes hard to kill, and dust mites are too.

             b.   It's sometimes hard to kill fleas, but many prescription treatments do.

             c.   It's sometimes hard to kill fleas, and dust mites are too.

             d.   Fleas are sometimes hard to kill, but many prescription treatments do.

A.2   Stimuli used for Experiment 2

(176)   a.   matched antecedent, subject focus

             b.   matched antecedent, non-subject focus

             c.   mismatched antecedent, subject focus

             d.   mismatched antecedent, non-subject focus

(177)   a.   The workers didn't install the line as quickly as the engineers did.

             b.   The line wasn't installed by the workers as quickly as it could have been.

             c.   The line wasn't installed by the workers as quickly as the engineers did.

             d.   The workers didn't install the line as quickly as it could have been.

(178)   a.   The students didn't explain the material as clearly as the instructors did.

             b.   The material wasn't explained by the students as clearly as it could have been.

             c.   The material wasn't explained by the students as clearly as the instructors did.

             d.   The students didn't explain the material as clearly as it could have been.

(179)   a.   The orderlies didn't clean the room as thoroughly as the nurses did.

             b.   The room wasn't cleaned by the orderlies as thoroughly as it could have been.

             c.   The room wasn't cleaned by the orderlies as thoroughly as the nurses did.

             d.   The orderlies didn't clean the room as thoroughly as it could have been.

(180)   a.   The detectives didn't conduct the interview as quickly as the officers did.

             b.   The interview wasn't conducted by the detectives as quickly as it could

have been.

    c.   The interview wasn't conducted by the detectives as quickly as the officers did.

    d.   The detectives didn't conduct the interview as quickly as it could have been.

(181)   a.   The rangers didn't inspect the campsite as thoroughly as the fire fighters did.

    b.   The campsite wasn't inspected by the rangers as thoroughly as it could have been.

    c.   The campsite wasn't inspected by the rangers as thoroughly as the fire fighters did.

    d.   The rangers didn't inspect the campsite as thoroughly as it could have been.

(182)   a.   The interns didn't record the data as carefully as the researchers did.

    b.   The data wasn't recorded by the interns as carefully as it could have been.

    c.   The data wasn't recorded by the interns as carefully as the researchers did.

    d.   The interns didn't record the data as carefully as it could have been.

(183)   a.   The networks didn't report the accident as accurately as the newspapers did.

    b.   The accident wasn't reported by the networks as accurately as it could have been.

    c.   The accident wasn't reported by the networks as accurately as the newspapers did.

    d.   The networks didn't report the accident as accurately as it could have been.

(184)   a.   The organizers didn't promote the event as widely as the funders did.

    b.   The event wasn't promoted by the organizers as widely as it could have been.

    c.   The event wasn't promoted by the organizers as widely as the funders did.

    d.   The organizers didn't promote the event as widely as it could have been.

(185)   a.   The architects didn't review the design as carefully as the builders did.

    b.   The design wasn't reviewed by the architects as carefully as it could have been.

      c.   The design wasn't reviewed by the architects as carefully as the builders did.

      d.   The architects didn't review the design as carefully as it could have been.

(186)   a.   The buyers didn't examine the agreement as thoroughly as the sellers did.

      b.   The agreement wasn't examined by the buyers as thoroughly as it could have been.

      c.   The agreement wasn't examined by the buyers as thoroughly as the sellers did.

      d.   The buyers didn't examine the agreement as thoroughly as it could have been.

(187)   a.   The hospitals didn't fulfill the request as quickly as the churches did.

      b.   The request wasn't fulfilled by the hospitals as quickly as it could have been.

      c.   The request wasn't fulfilled by the hospitals as quickly as the churches did.

      d.   The hospitals didn't fulfill the request as quickly as it could have been.

(188)   a.   The airlines didn't handle the cancellation as professionally as the hotels did.

      b.   The cancellation wasn't handled by the airlines as professionally as it could have been.

      c.   The cancellation wasn't handled by the airlines as professionally as the hotels did.

      d.   The airlines didn't handle the cancellation as professionally as it could have been.

(189)   a.   The cities didn't enforce the ordinance as rigorously as the counties did.

      b.   The ordinance wasn't enforced by the cities as rigorously as it could have been.

      c.   The ordinance wasn't enforced by the cities as rigorously as the counties did.

      d.   The cities didn't enforce the ordinance as rigorously as it could have been.

(190)   a.   The staffers didn't answer the query as honestly as the officials did.

      b.   The query wasn't answered by the staffers as honestly as it could have been.

      c.   The query wasn't answered by the staffers as honestly as the officials did.

    d.   The staffers didn't answer the query as honestly as it could have been.

(191)   a.   The doctors didn't handle the material as safely as the technicians did.

    b.   The material wasn't handled by the doctors as safely as it could have been.

    c.   The material wasn't handled by the doctors as safely as the technicians did.

    d.   The doctors didn't handle the material as safely as it could have been.

(192)   a.   The owners didn't treat the animal as humanely as the authorities did.

    b.   The animal wasn't treated by the owners as humanely as it could have been.

    c.   The animal wasn't treated by the owners as humanely as the authorities did.

    d.   The owners didn't treat the animal as humanely as it could have been.

(193)   a.   The actors didn't perform the scene as gracefully as the dancers did.

    b.   The scene wasn't performed by the actors as gracefully as it could have been.

    c.   The scene wasn't performed by the actors as gracefully as the dancers did.

    d.   The actors didn't perform the scene as gracefully as it could have been.

(194)   a.   The cops didn't count the money as carefully as the tellers did.

    b.   The money wasn't counted by the cops as carefully as it could have been.

    c.   The money wasn't counted by the cops as carefully as the tellers did.

    d.   The cops didn't count the money as carefully as it could have been.

A.3   Stimuli used for Experiment 3

(195)   a.   matched antecedent, active (unmarked) target

    b.   mismatched antecedent, passive (marked) target

    c.   matched antecedent, passive (marked) target

    d.   mismatched antecedent, active (unmarked) target

(196)   a.   The technicians didn't install the line as quickly as they could have.

    b.   The technicians didn't install the line as quickly as it could have been.

    c.   The line wasn't installed by the technicians as quickly as it could have been.

    d.   The line wasn't installed by the technicians as quickly as they could have.

(197)   a.   The students didn't explain the material as clearly as they could have.

       b.   The students didn't explain the material as clearly as it could have been.

       c.   The material wasn't explained by the students as clearly as it could have been.

       d.   The material wasn't explained by the students as clearly as they could have.

(198)   a.   The orderlies didn't clean the room as thoroughly as they could have.

       b.   The orderlies didn't clean the room as thoroughly as it could have been.

       c.   The room wasn't cleaned by the orderlies as thoroughly as it could have been.

       d.   The room wasn't cleaned by the orderlies as thoroughly as they could have.

(199)   a.   The detectives didn't conduct the interview as quickly as they could have.

       b.   The detectives didn't conduct the interview as quickly as it could have been.

       c.   The interview wasn't conducted by the detectives as quickly as it could have been.

       d.   The interview wasn't conducted by the detectives as quickly as they could have.

(200)   a.   The rangers didn't inspect the campsite as thoroughly as they could have.

       b.   The rangers didn't inspect the campsite as thoroughly as it could have been.

       c.   The campsite wasn't inspected by the rangers as thoroughly as it could have been.

       d.   The campsite wasn't inspected by the rangers as thoroughly as they could have.

(201)   a.   The interns didn't record the measurement as carefully as they could have.

       b.   The interns didn't record the measurement as carefully as it could have been.

       c.   The measurement wasn't recorded by the interns as carefully as it could have been.

       d.   The measurement wasn't recorded by the interns as carefully as they could have.

(202)   a.   The networks didn't report the accident as accurately as they could have.

b. The networks didn't report the accident as accurately as it could have been.

c. The accident wasn't reported by the networks as accurately as it could have been.

d. The accident wasn't reported by the networks as accurately as they could have.

(203) a. The organizers didn't promote the event as widely as they could have.

b. The organizers didn't promote the event as widely as it could have been.

c. The event wasn't promoted by the organizers as widely as it could have been.

d. The event wasn't promoted by the organizers as widely as they could have.

(204) a. The architects didn't review the design as carefully as they could have.

b. The architects didn't review the design as carefully as it could have been.

c. The design wasn't reviewed by the architects as carefully as it could have been.

d. The design wasn't reviewed by the architects as carefully as they could have.

(205) a. The buyers didn't examine the agreement as thoroughly as they could have.

b. The buyers didn't examine the agreement as thoroughly as it could have been.

c. The agreement wasn't examined by the buyers as thoroughly as it could have been.

d. The agreement wasn't examined by the buyers as thoroughly as they could have.

(206) a. The hospitals didn't fulfill the request as quickly as they could have.

b. The hospitals didn't fulfill the request as quickly as it could have been.

c. The request wasn't fulfilled by the hospitals as quickly as it could have been.

d. The request wasn't fulfilled by the hospitals as quickly as they could have.

(207) a. The airlines didn't handle the cancellation as professionally as they could have.

b. The airlines didn't handle the cancellation as professionally as it could

have been.

    c. The cancellation wasn't handled by the airlines as professionally as it could have been.

    d. The cancellation wasn't handled by the airlines as professionally as they could have.

(208)   a. The cities didn't enforce the ordinance as rigorously as they could have.

    b. The cities didn't enforce the ordinance as rigorously as it could have been.

    c. The ordinance wasn't enforced by the cities as rigorously as it could have been.

    d. The ordinance wasn't enforced by the cities as rigorously as they could have.

(209)   a. The staffers didn't answer the query as honestly as they could have.

    b. The staffers didn't answer the query as honestly as it could have been.

    c. The query wasn't answered by the staffers as honestly as it could have been.

    d. The query wasn't answered by the staffers as honestly as they could have.

(210)   a. The doctors didn't handle the material as safely as they could have.

    b. The doctors didn't handle the material as safely as it could have been.

    c. The material wasn't handled by the doctors as safely as it could have been.

    d. The material wasn't handled by the doctors as safely as they could have.

(211)   a. The owners didn't treat the animal as humanely as they could have.

    b. The owners didn't treat the animal as humanely as it could have been.

    c. The animal wasn't treated by the owners as humanely as it could have been.

    d. The animal wasn't treated by the owners as humanely as they could have.

A.4 Stimuli used for Experiment 4

(212)   a. contrastive topic, ellipsis

    b. contrastive topic, no ellipsis

    c. simple focus, ellipsis

    d. simple focus, no ellipsis

(213)   a. It's fairly simple to install monitoring systems, and security panels are too.

    b. It's fairly simple to install monitoring systems, and security panels are

        simple to install too.

    c.   Monitoring systems are fairly simple to install, but few commercial businesses do.

    d.   Monitoring systems are fairly simple to install, but few commercial businesses do install them.

(214)   a.   It's usually hard to prove racial discrimination, and sexual harassment is too.

    b.   It's usually hard to prove racial discrimination, and sexual harassment is hard to prove too.

    c.   Racial discrimination is usually hard to prove, and few trial plaintiffs do.

    d.   Racial discrimination is usually hard to prove, and few trial plaintiffs do prove it.

(215)   a.   It's really simple to change printer cartridges, and external drives are also.

    b.   It's really simple to change printer cartridges, and external drives are simple to change also.

    c.   Printer cartridges are really simple to change, but few office workers do.

    d.   Printer cartridges are really simple to change, but few office workers do change them.

(216)   a.   It's pretty easy to make scented candles, and holiday cards are too.

    b.   It's pretty easy to make scented candles, and holiday cards are easy to make too.

    c.   Scented candles are pretty easy to make, and many gift shops do.

    d.   Scented candles are pretty easy to make, and many gift shops do make them.

(217)   a.   It's usually hard to treat eating disorders, and substance abuse is too.

    b.   It's usually hard to treat eating disorders, and substance abuse is hard to treat too.

    c.   Eating disorders are usually hard to treat, and only trained specialists do.

    d.   Eating disorders are usually hard to treat, and only trained specialists do treat them.

(218)   a.   It's very simple to prepare handmade pasta, and pastry shells are too.

    b.   It's very simple to prepare handmade pasta, and pastry shells are simple to prepare too.

    c.   Handmade pasta is very simple to prepare, but few local restaurants do.

    d.   Handmade pasta is very simple to prepare, but few local restaurants do prepare it.

(219)   a.   It's really easy to forget PIN numbers, and user names are too.

    b.   It's really easy to forget PIN numbers, and user names are easy to forget too.

    c.   PIN numbers are really easy to forget, and many bank customers do.

    d.   PIN numbers are really easy to forget, and many bank customers do forget them.

(220)   a.   It's pretty simple to grow summer vegetables, and flowering plants are too.

    b.   It's pretty simple to grow summer vegetables, and flowering plants are simple to grow too.

    c.   Summer vegetables are pretty simple to grow, and many home gardeners do.

    d.   Summer vegetables are pretty simple to grow, and many home gardeners do grow them.

(221)   a.   It's often hard to estimate total calories, and fat content is too.

    b.   It's often hard to estimate total calories, and fat content is hard to estimate too.

    c.   Total calories are often hard to estimate, and few grocery shoppers do.

    d.   Total calories are often hard to estimate, and few grocery shoppers do estimate them.

(222)   a.   It's often hard to kill head lice, and bed bugs are too.

    b.   It's often hard to kill head lice, and bed bugs are hard to kill too.

    c.   Head lice are often hard to kill, but many prescription treatments do.

    d.   Head lice are often hard to kill, but many prescription treatments do kill them.

A.5 Stimuli used for Experiment 5

(223)   a.   contrastive topic, ellipsis

    b.   contrastive topic, no ellipsis

    c.   simple focus, ellipsis

    d.   simple focus, no ellipsis

(224) a. The line wasn't installed by the workers as quickly as the engineers did.

b. The line wasn't installed by the workers as quickly as the engineers installed it.

c. The workers didn't install the line as quickly as it could have been.

d. The workers didn't install the line as quickly as it could have been installed.

(225) a. The material wasn't explained by the students as clearly as the instructors did.

b. The material wasn't explained by the students as clearly as the instructors explained it.

c. The students didn't explain the material as clearly as it could have been.

d. The students didn't explain the material as clearly as it could have been explained.

(226) a. The room wasn't cleaned by the orderlies as thoroughly as the nurses did.

b. The room wasn't cleaned by the orderlies as thoroughly as the nurses cleaned it.

c. The orderlies didn't clean the room as thoroughly as it could have been.

d. The orderlies didn't clean the room as thoroughly as it could have been cleaned.

(227) a. The interview wasn't conducted by the detectives as quickly as the officers did.

b. The interview wasn't conducted by the detectives as quickly as the officers conducted it.

c. The detectives didn't conduct the interview as quickly as it could have been.

d. The detectives didn't conduct the interview as quickly as it could have been conducted.

(228) a. The campsite wasn't inspected by the rangers as thoroughly as the fire fighters did.

b. The campsite wasn't inspected by the rangers as thoroughly as the fire fighters inspected it.

c. The rangers didn't inspect the campsite as thoroughly as it could have been.

d. The rangers didn't inspect the campsite as thoroughly as it could have been inspected.

(229)   a.   The data wasn't recorded by the interns as carefully as the researchers did.

    b.   The data wasn't recorded by the interns as carefully as the researchers recorded it.

    c.   The interns didn't record the data as carefully as it could have been.

    d.   The interns didn't record the data as carefully as it could have been recorded.

(230)   a.   The accident wasn't reported by the networks as accurately as the newspapers did.

    b.   The accident wasn't reported by the networks as accurately as the newspapers reported it.

    c.   The networks didn't report the accident as accurately as it could have been.

    d.   The networks didn't report the accident as accurately as it could have been reported.

(231)   a.   The event wasn't promoted by the organizers as widely as the funders did.

    b.   The event wasn't promoted by the organizers as widely as the funders promoted it.

    c.   The organizers didn't promote the event as widely as it could have been.

    d.   The organizers didn't promote the event as widely as it could have been promoted.

(232)   a.   The design wasn't reviewed by the architects as carefully as the builders did.

    b.   The design wasn't reviewed by the architects as carefully as the builders reviewed it.

    c.   The architects didn't review the design as carefully as it could have been.

    d.   The architects didn't review the design as carefully as it could have been reviewed.

(233)   a.   The agreement wasn't examined by the buyers as thoroughly as the sellers did.

    b.   The agreement wasn't examined by the buyers as thoroughly as the sellers examined it.

    c.   The buyers didn't examine the agreement as thoroughly as it could have been.

    d.   The buyers didn't examine the agreement as thoroughly as it could have

been examined.

(234)   a.   The request wasn't fulfilled by the hospitals as quickly as the churches did.

          b.   The request wasn't fulfilled by the hospitals as quickly as the churches fulfilled it.

          c.   The hospitals didn't fulfill the request as quickly as it could have been.

          d.   The hospitals didn't fulfill the request as quickly as it could have been fulfilled.

(235)   a.   The cancellation wasn't handled by the airlines as professionally as the hotels did.

          b.   The cancellation wasn't handled by the airlines as professionally as the hotels handled it.

          c.   The airlines didn't handle the cancellation as professionally as it could have been.

          d.   The airlines didn't handle the cancellation as professionally as it could have been handled.

(236)   a.   The ordinance wasn't enforced by the cities as rigorously as the counties did.

          b.   The ordinance wasn't enforced by the cities as rigorously as the counties enforced it.

          c.   The cities didn't enforce the ordinance as rigorously as it could have been.

          d.   The cities didn't enforce the ordinance as rigorously as it could have been enforced.

(237)   a.   The query wasn't answered by the staffers as honestly as the officials did.

          b.   The query wasn't answered by the staffers as honestly as the officials answered it.

          c.   The staffers didn't answer the query as honestly as it could have been.

          d.   The staffers didn't answer the query as honestly as it could have been answered.

(238)   a.   The material wasn't handled by the doctors as safely as the technicians did.

          b.   The material wasn't handled by the doctors as safely as the technicians handled it.

          c.   The doctors didn't handle the material as safely as it could have been.

      d.   The doctors didn't handle the material as safely as it could have been handled.

(239)   a.   The animal wasn't treated by the owners as humanely as the authorities did.

      b.   The animal wasn't treated by the owners as humanely as the authorities treated it.

      c.   The owners didn't treat the animal as humanely as it could have been.

      d.   The owners didn't treat the animal as humanely as it could have been treated.

(240)   a.   The scene wasn't performed by the actors as gracefully as the dancers did.

      b.   The scene wasn't performed by the actors as gracefully as the dancers performed it.

      c.   The actors didn't perform the scene as gracefully as it could have been.

      d.   The actors didn't perform the scene as gracefully as it could have been performed.

(241)   a.   The money wasn't counted by the cops as carefully as the tellers did.

      b.   The money wasn't counted by the cops as carefully as the tellers counted it.

      c.   The cops didn't count the money as carefully as it could have been.

      d.   The cops didn't count the money as carefully as it could have been counted.

A.6   Stimuli used for Experiment 6

(242)   a.   match, ellipsis, because

      b.   match, no ellipsis, because

      c.   mismatch, ellipsis, because

      d.   mismatch, no ellipsis, because

(243)   a.   The fire fighters endorsed the strike because the police force did.

      b.   The fire fighters endorsed the strike because the police force endorsed it.

      c.   The strike was endorsed by the fire fighters because the police force did.

      d.   The strike was endorsed by the fire fighters because the police force endorsed it.

(244)   a.   The airline spokesperson acknowledged the incident because the government official did.

b. The airline spokesperson acknowledged the incident because the government official acknowledged it.

c. The incident was acknowledged by the airline spokesperson because the government official did.

d. The incident was acknowledged by the airline spokesperson because the government official acknowledged it.

(245) a. The screen writers picketed the studio because the stage actors did.

b. The screen writers picketed the studio because the stage actors picketed it.

c. The studio was picketed by the screen writers because the stage actors did.

d. The studio was picketed by the screen writers because the stage actors picketed it.

(246) a. The teaching assistants reviewed the material because the faculty instructor did.

b. The teaching assistants reviewed the material because the faculty instructor reviewed it.

c. The material was reviewed by the teaching assistants because the faculty instructor did.

d. The material was reviewed by the teaching assistants because the faculty instructor reviewed it.

(247) a. The family doctor recommended the treatment because the cardiac specialist did.

b. The family doctor recommended the treatment because the cardiac specialist recommended it.

c. The treatment was recommended by the family doctor because the cardiac specialist did.

d. The treatment was recommended by the family doctor because the cardiac specialist recommended it.

(248) a. The football team supported the fundraiser because the baseball players did.

b. The football team supported the fundraiser because the baseball players supported it.

c. The fundraiser was supported by the football team because the baseball players did.

d. The fundraiser was supported by the football team because the baseball players supported it.

(249) a. match, ellipsis, just like

b. match, no ellipsis, just like

c. mismatch, ellipsis, just like

d. mismatch, no ellipsis, just like

(250) a. The newspaper reporter investigated the story just like the television anchor did.

b. The newspaper reporter investigated the story just like the television anchor investigated it.

c. The story was investigated by the newspaper reporter just like the television anchor did.

d. The story was investigated by the newspaper reporter just like the television anchor investigated it.

(251) a. The trial judge inspected the exhibit just like the plaintiff's attorney did.

b. The trial judge inspected the exhibit just like the plaintiff's attorney inspected it.

c. The exhibit was inspected by the trial judge just like the plaintiff's attorney did.

d. The exhibit was inspected by the trial judge just like the plaintiff's attorney inspected it.

(252) a. The local media covered the debate just like the national outlets did.

b. The local media covered the debate just like the national outlets covered it.

c. The debate was covered by the local media just like the national outlets did.

d. The debate was covered by the local media just like the national outlets covered it.

(253) a. The building residents approved the deal just like the property owners did.

b. The building residents approved the deal just like the property owners approved it.

c. The deal was approved by the building residents just like the property owners did.

  d. The deal was approved by the building residents just like the property owners approved it.

(254) a. The school counselor attended the meeting just like the vice principal did.

  b. The school counselor attended the meeting just like the vice principal attended it.

  c. The meeting was attended by the school counselor just like the vice principal did.

  d. The meeting was attended by the school counselor just like the vice principal attended it.

(255) a. The restaurant manager disregarded the review just like the head chef did.

  b. The restaurant manager disregarded the review just like the head chef disregarded it.

  c. The review was disregarded by the restaurant manager just like the head chef did.

  d. The review was disregarded by the restaurant manager just like the head chef disregarded it.

A.7 Stimuli used for Experiment 7

(256) a. matched antecedent, contrastive topic

  b. matched antecedent, simple focus

  c. mismatched antecedent, contrastive topic

  d. mismatched antecedent, simple focus

(257) a. Venomous snakes are fairly easy to identify, and poisonous plants are also, as far as I know.

  b. It's fairly easy to identify venomous snakes, and most experienced hikers can, as far as I know.

  c. It's fairly easy to identify venomous snakes, and poisonous plants are also, as far as I know.

  d. Venomous snakes are fairly easy to identify, and most experienced hikers can, as far as I know.

(258) a. Monitoring systems are fairly simple to install, and security panels are too, based on my own experience.

  b. It's fairly simple to install monitoring systems, but few commercial busi-

nesses do, based on my own experience.

    c.   It's fairly simple to install monitoring systems, and security panels are too, based on my own experience.

    d.   Monitoring systems are fairly simple to install, but few commercial businesses do, based on my own experience.

(259)   a.   Racial discrimination is usually hard to prove, and sexual harassment is too, according to recent government figures.

    b.   It's usually hard to prove racial discrimination, and few trial plaintiffs do, according to recent government figures.

    c.   It's usually hard to prove racial discrimination, and sexual harassment is too, according to recent government figures.

    d.   Racial discrimination is usually hard to prove, and few trial plaintiffs do, according to recent government figures.

(260)   a.   Printer cartridges are really simple to change, and external drives are also, as far as I know.

    b.   It's really simple to change printer cartridges, but few office workers do, as far as I know.

    c.   It's really simple to change printer cartridges, and external drives are also, as far as I know.

    d.   Printer cartridges are really simple to change, but few office workers do, as far as I know.

(261)   a.   Scented candles are pretty easy to make, and holiday cards are too, from what I've been told.

    b.   It's pretty easy to make scented candles, and many gift shops do, from what I've been told.

    c.   It's pretty easy to make scented candles, and holiday cards are too, from what I've been told.

    d.   Scented candles are pretty easy to make, and many gift shops do, from what I've been told.

(262)   a.   Eating disorders are usually hard to treat, and substance abuse is too, according to current medical practices.

    b.   It's usually hard to treat eating disorders, and only trained specialists do, according to current medical practices.

    c.   It's usually hard to treat eating disorders, and substance abuse is too,

according to current medical practices.

d. Eating disorders are usually hard to treat, and only trained specialists do, according to current medical practices.

(263) a. Handmade pasta is very simple to prepare, and pastry shells are too, based on what I've seen.

b. It's very simple to prepare handmade pasta, but few local restaurants do, based on what I've seen.

c. It's very simple to prepare handmade pasta, and pastry shells are too, based on what I've seen.

d. Handmade pasta is very simple to prepare, but few local restaurants do, based on what I've seen.

(264) a. PIN numbers are really easy to forget, and user names are too, from what I have heard.

b. It's really easy to forget PIN numbers, and many bank customers do, from what I have heard.

c. It's really easy to forget PIN numbers, and user names are too, from what I have heard.

d. PIN numbers are really easy to forget, and many bank customers do, from what I have heard.

(265) a. Summer vegetables are pretty simple to grow, and flowering plants are too, based on what I've read.

b. It's pretty simple to grow summer vegetables, and many home gardeners do, based on what I've read.

c. It's pretty simple to grow summer vegetables, and flowering plants are too, based on what I've read.

d. Summer vegetables are pretty simple to grow, and many home gardeners do, based on what I've read.

(266) a. Total calories are often hard to estimate, and fat content is too, according to a new study.

b. It's often hard to estimate total calories, and few grocery shoppers do, according to a new study.

c. It's often hard to estimate total calories, and fat content is too, according to a new study.

d. Total calories are often hard to estimate, and few grocery shoppers do,

according to a new study.

(267)   a.   Car batteries are pretty easy to replace, and spark plugs are also, from what people have said.

b.   It's pretty easy to replace car batteries, and most service centers will, from what people have said.

c.   It's pretty easy to replace car batteries, and spark plugs are also, from what people have said.

d.   Car batteries are pretty easy to replace, and most service centers will, from what people have said.

(268)   a.   Head lice are often hard to kill, and bed bugs are too, from what I've been told.

b.   It's often hard to kill head lice, but many prescription treatments do, from what I've been told.

c.   It's often hard to kill head lice, and bed bugs are too, from what I've been told.

d.   Head lice are often hard to kill, but many prescription treatments do, from what I've been told.

A.8   Stimuli used for Experiment 8

(269)   a.   match, ellipsis, because

b.   match, no ellipsis, because

c.   mismatch, ellipsis, because

d.   mismatch, no ellipsis, because

(270)   a.   The fire fighters endorsed the strike because the police force did, but the mayor was opposed.

b.   The fire fighters endorsed the strike because the police force endorsed it, but the mayor was opposed.

c.   The strike was endorsed by the fire fighters because the police force did, but the mayor was opposed.

d.   The strike was endorsed by the fire fighters because the police force endorsed it, but the mayor was opposed.

(271)   a.   The night manager ignored the rules because the shift supervisor did, but the damage was done.

b. The night manager ignored the rules because the shift supervisor ignored them, but the damage was done.

c. The rules were ignored by the night manager because the shift supervisor did, but the damage was done.

d. The rules were ignored by the night manager because the shift supervisor ignored them, but the damage was done.

(272) a. The airline spokesperson acknowledged the incident because the government official did, but the details were sketchy.

b. The airline spokesperson acknowledged the incident because the government official acknowledged it, but the details were sketchy.

c. The incident was acknowledged by the airline spokesperson because the government official did, but the details were sketchy.

d. The incident was acknowledged by the airline spokesperson because the government official acknowledged it, but the details were sketchy.

(273) a. The screen writers picketed the studio because the stage actors did, but the action was ignored.

b. The screen writers picketed the studio because the stage actors picketed it, but the action was ignored.

c. The studio was picketed by the screen writers because the stage actors did, but the action was ignored.

d. The studio was picketed by the screen writers because the stage actors picketed it, but the action was ignored.

(274) a. The teaching assistant reviewed the material because the faculty instructors did, but the students weren't motivated.

b. The teaching assistant reviewed the material because the faculty instructors reviewed it, but the students weren't motivated.

c. The material was reviewed by the teaching assistant because the faculty instructors did, but the students weren't motivated.

d. The material was reviewed by the teaching assistant because the faculty instructors reviewed it, but the students weren't motivated.

(275) a. The family doctor recommended the treatment because the cardiac specialist did, but the prognosis wasn't good.

b. The family doctor recommended the treatment because the cardiac specialist recommended it, but the prognosis wasn't good.

c. The treatment was recommended by the family doctor because the cardiac specialist did, but the prognosis wasn't good.

d. The treatment was recommended by the family doctor because the cardiac specialist recommended it, but the prognosis wasn't good.

(276) a. The football team supported the fundraiser because the baseball players did, but the owners weren't invited.

b. The football team supported the fundraiser because the baseball players supported it, but the owners weren't invited.

c. The fundraiser was supported by the football team because the baseball players did, but the owners weren't invited.

d. The fundraiser was supported by the football team because the baseball players supported it, but the owners weren't invited.

(277) a. The accounting firm denied the allegations because the legal team did, but the prosecutor was determined.

b. The accounting firm denied the allegations because the legal team denied them, but the prosecutor was determined.

c. The allegations were denied by the accounting firm because the legal team did, but the prosecutor was determined.

d. The allegations were denied by the accounting firm because the legal team denied it, but the prosecutor was determined.

(278) a. match, ellipsis, just like

b. match, no ellipsis, just like

c. mismatch, ellipsis, just like

d. mismatch, no ellipsis, just like

(279) a. The newspaper reporter investigated the story just like the television anchor did, but the accounts were different.

b. The newspaper reporter investigated the story just like the television anchor investigated it, but the accounts were different.

c. The story was investigated by the newspaper reporter just like the television anchor did, but the accounts were different.

d. The story was investigated by the newspaper reporter just like the television anchor investigated it, but the accounts were different.

(280) a. The younger children abandoned the game just like the older kids did, but

the scores were even.

b. The younger children abandoned the game just like the older kids abandoned it, but the scores were even.

c. The game was abandoned by the younger children just like the older kids did, but the scores were even.

d. The game was abandoned by the younger children just like the older kids abandoned it, but the scores were even.

(281) a. The trial judge inspected the exhibit just like the plaintiff's attorney did, but the defendant was absent.

b. The trial judge inspected the exhibit just like the plaintiff's attorney inspected it, but the defendant was absent.

c. The exhibit was inspected by the trial judge just like the plaintiff's attorney did, but the defendant was absent.

d. The exhibit was inspected by the trial judge just like the plaintiff's attorney inspected it, but the defendant was absent.

(282) a. The home team missed the kick just like the visiting school did, but the coach was furious.

b. The home team missed the kick just like the visiting school missed it, but the coach was furious.

c. The kick was missed by the home team just like the visiting school did, but the coach was furious.

d. The kick was missed by the home team just like the visiting school missed it, but the coach was furious.

(283) a. The local media covered the debate just like the national outlets did, but the reporting was better.

b. The local media covered the debate just like the national outlets covered it, but the reporting was better.

c. The debate was covered by the local media just like the national outlets did, but the reporting was better.

d. The debate was covered by the local media just like the national outlets covered it, but the reporting was better.

(284) a. The building residents approved the deal just like the property owners did, but the contract was delayed.

b. The building residents approved the deal just like the property owners

approved it, but the contract was delayed.

c. The deal was approved by the building residents just like the property owners did, but the contract was delayed.

d. The deal was approved by the building residents just like the property owners approved it, but the contract was delayed.

(285) a. The school counselor attended the meeting just like the vice principal did, but the parents weren't there.

b. The school counselor attended the meeting just like the vice principal attended it, but the parents weren't there.

c. The meeting was attended by the school counselor just like the vice principal did, but the parents weren't there.

d. The meeting was attended by the school counselor just like the vice principal attended it, but the parents weren't there.

(286) a. The restaurant manager disregarded the review just like the head chef did, but the owner was upset.

b. The restaurant manager disregarded the review just like the head chef disregarded it, but the owner was upset.

c. The review was disregarded by the restaurant manager just like the head chef did, but the owner was upset.

d. The review was disregarded by the restaurant manager just like the head chef disregarded it, but the owner was upset.

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