Tense and scope: Gerundive relatives and the interpretation of DPs

Michael Walsh Dickey
Northwestern University

1. Introduction

As noted by Hudson (1973) and Thompson (2001), sentences with gerundive relatives like (1) are systematically ambiguous.

(1) Two guys wearing parkas were presenting at the meeting this afternoon.

a. The guys were wearing parkas and presenting at the same time, during the meeting.

b. The guys were wearing parkas and presenting at different times.

On the relatively implausible event-time interpretation (1a), the events of wearing parkas (described in the underlined gerundive relative) and presenting (described in the main clause) overlap. They need not coincide entirely – the duration of the parka-wearing event could plausibly extend beyond the duration of the presenting event – but they must overlap at least partially. On the intuitively less anomalous independent reading in (1b), the two events need not overlap at all. They are anchored to different temporal reference points. This reading is highlighted by a preceding context which provides a reference time for the gerundive relative to anchor to:

(2) I saw a bunch of guys waiting outside the building in the cold this morning.

Two guys wearing parkas were presenting at the meeting this afternoon.

As with the event-time reading, there is nothing prohibiting the two events from overlapping temporally in the independent reading: the parka-wearing could in principle continue through the time of the meeting, even in the context given in (2). However, the

---

1 I am grateful to Katy Carlson, Lyn Frazier, and Chris Kennedy for valuable comments on this work, and to members of the NU psycholinguistics community for their help in obtaining and analyzing the results presented here. All mistakes and errors are my own.
independent reading does require that the two events hold at different times for at least part of their duration. While this global ambiguity has been described in the linguistic literature, it has never been investigated psycholinguistically. Perceivers’ basic preferences for resolving this ambiguity are unknown.

Thompson (2001) links this temporal ambiguity to a scope ambiguity associated with the cardinal DP containing the gerundive relative. She argues that the two readings are associated with two possible syntactic positions where the cardinal DP can be interpreted at LF. The independent reading (1b) arises when the DP containing the gerundive relative is interpreted in its surface VP-external position, outside the scope of the main clause’s tense. The event-time reading (1a) arises when the DP is interpreted in a VP-internal position, putting it and the gerundive relative inside the scope of tense. The temporal interpretation assigned to gerundive relatives in sentences like (1) thus provides a tool for investigating interpretive and scope preferences for DPs, a topic which has recently attracted considerable attention in the psycholinguistic literature (Frazier, 1999; Lidz & Muslonio, 2002; among others). This ambiguity constitutes a novel and previously unexamined case of scope interaction, complementing the better-studied cases of quantifier-negation interaction (Musolino, Crain & Thornton, 2000; Lidz & Musolino, 2002) and existential and universal quantifiers in multiply-quantified sentences (Kurtzmann & McDonald, 1993; Tunstall, 1998; Villalta, 199; Anderson, in prep.).

This paper presents two studies investigating this ambiguity in the interpretation of gerundive relatives. A set of ambiguous gerundive-relative sentences like (1) was presented in an off-line questionnaire study and a self-paced reading task followed by a timed comprehension question. In both studies, participants were asked to indicate which temporal interpretation of the gerundive relative they preferred. As with (1), the events described in the gerundive relative sentences were intuitively implausible on the overlapping event-time reading. However, despite this plausibility bias, participants exhibited a weak preference for the overlapping event-time reading for sentences like (1). Nevertheless, syntactic manipulations designed to favor VP-internal (non-presuppositional) and VP-external (presuppositional) interpretations of the DP did have reliable effects on the temporal interpretation of the gerundive relative in both studies, in line with the predictions of syntactically-oriented hypotheses regarding DP interpretative preferences such as Frazier’s (1999) Minimal Lowering.

The rest of this paper proceeds as follows. Section 2 lays out the linguistic analysis of gerundive relatives, focusing the connection between the syntactic position of a cardinal DP and the temporal interpretation of a gerundive relative contained in it. Section 3 briefly describes one hypothesis regarding interpretive preferences for DPs, Frazier’s (1999) Minimal Lowering hypothesis, and the predictions it makes for the interpretation of gerundive relative sentences like (1). Section 4 presents two studies examining the interpretation of gerundive relatives which test these predictions: an off-line questionnaire and a self-paced reading study with timed comprehension questions. Section 5 presents conclusions, discussing the implications of the studies’ results for Minimal Lowering and related hypotheses, and the role that context and presupposition accommodation play in LF-syntactic comprehension and temporal interpretation.
2. Structure and interpretation of gerundive relatives

As Enç (1986, 1987) has argued, the temporal interpretation of DPs and modifiers are typically independent of one another and of the sentence containing them. For instance, in the sentence “The president was a fool,” the time at which the person described as president was serving as president and the time at which s/he was a fool are independent of one another. The person referred to as the president might or might not be president at the time at which it was true that s/he was a fool. Similarly, the time at which the child was crying in “The child who was crying was standing outside” could be before, during, or after the time that child was standing outside. The full relative clause “who was crying outside” is temporally independent of the clause containing it.

However, gerundive relatives (GRs) do not appear to be as independent in their temporal interpretation as other relative clauses, as Thompson (2001) points out. Take the contrast in (3):

(3) a. Two guys who will be wearing parkas tomorrow were presenting at the meeting this afternoon.
   b. #Two guys wearing parkas tomorrow were presenting at the meeting this afternoon.

The conflicting temporal specifications in the GR sentence (3b) result in uninterpretability or infelicity. The same temporal ordering specifications are fine in the full relative-clause sentence (3a), suggesting that the temporal interpretation of GRs is much more tightly constrained, in line with their dependent status as non-finite clauses.

In contrast to full relative clauses, GRs appear to have only the independent and event-time readings described above. Under the event-time reading, the gerundive relative is interpreted as overlapping in time with the event described in the clause. For the independent reading, the GR must anchor to some temporal reference point which is either inferable or is provided by context. In a null context, this gives rise to two possible independent readings for the GR: one in which the GR anchors to the speech time (as illustrated in (4)) and one in which it anchors to an inferred past reference time (as illustrated in (5)).

(4) Two guys currently wearing parkas were presenting at the meeting this afternoon.
(5) Two guys wearing parkas were later presenting at the meeting (this afternoon).

In (4), the adverb “currently” indicates that the state described in the GR (the parka-wearing) holds at speech time, following the presenting event described in the past-tense main clause. In (5), the adverb “later” indicates that the parka-wearing described in the GR precedes the event of presenting in the main clause. Since event in the main clause is

---

2 Thompson (2001) claims that the gerundive relative may only anchor to the speech time in the independent reading. This restriction appears to be prompted by her assumptions regarding the syntax of tense; it will not be discussed further here.
in the past, the event in the GR must have held at some time in the past, as well. The infelicity of (3), in which “tomorrow” forces the event in the GR to be in the future with respect to speech time, is likely due to the relative unavailability of future reference times in a null context.

Thompson argues that the availability of the event-time and independent readings for a GR corresponds directly to the LF-syntactic position where the DP containing it is interpreted. She assumes an LF structure similar to the simplified one in (6):

\[
\text{(6) } \left[ \text{TP } \text{DP}_{\text{subj}} \ T \ldots \left[ \text{VP } t_{\text{subj}} \left[ V \ldots \right] \right] \right]
\]

\(T\) here represents Tense. \(\text{DP}_{\text{subj}}\) and \(t_{\text{subj}}\) represent the subject DP and its VP-internal trace or copy. Either position is available for the interpretation of the DP, with the VP-internal position resulting in existential interpretations of indefinite DPs and the VP-external position resulting in specific, presuppositional or generic interpretations of indefinites (Deising, 1992, de Hoop, 1996; Van Geenhoven, 1998). Thompson assumes a copy-and-delete theory of movement, in which the position where the DP is interpreted corresponds to whichever copy of the DP is visible or interpreted at LF.

Under this analysis, the interpretive ambiguity of the GR is the result of a scope ambiguity for the subject DP. The DP may be interpreted either inside or outside the scope of the main clause’s Tense at LF, with VP-internal positions being inside Tense’s scope and VP-external positions being outside it scope.\(^3\) Assuming that gerundive relatives denote a property of times and introduce a temporal variable, this variable will be inside the scope of tense (or some other operator which closes off the event or temporal variables introduced by VP) when the DP is interpreted in VP-internal position. There, its temporal interpretation will co-vary with the temporal interpretation of the VP, giving rise to the event-time reading. The independent reading arises if the temporal variable associated with the GR is interpreted in a VP-external position, outside the scope of tense. In this position, the variable remains free and gets its value from preceding context via a contextually-determined variable assignment, receiving either the always-salient utterance time or a salient past interval as a value (cf. Krazer, 1998, Dickey, 2001). The two possible interpretations of a GR contained in a DP thus follow straightforwardly from standard assumptions about the syntax of DPs and sentence-level temporal interpretation.\(^4\)

\(^3\) The use of scope here is not intended as a claim that tense itself is a quantificational element. However, under the event-time reading, the event description in the gerundive relative must be under the scope of whatever element is responsible for binding off the event or temporal variable introduced by the event description in the main clause’s VP. That element could be a run-time operator (Krifka, 1992), an aspect operator (Kratzer, 1998; Dickey, 2001), a finiteness operator (Klein, 1998), or a quantifier over events (Musan, 1995). See Dickey (2001) for discussion of this issue.

\(^4\) Thompson also assumes a syntactic condition on temporal interpretation which stipulates that a GR’s temporal value is linked or somehow anchored to the temporal value of the projection it is contained in (or checked in) at LF. It is unclear how important this additional condition is, given the account of GR readings sketched above.
Thompson presents a number of strong empirical arguments in favor of the correlation between VP-internal or -external interpretation of a DP and the temporal interpretation of a GR. First, cases in which DPs must be interpreted in a position inside the scope of tense require the event-time reading for GRs contained in them. For example, GRs in there-insertion constructions appear to require (or at least strongly prefer) an event-time reading. Temporal information which conflicts with this interpretation results in infelicity or uninterpretability, as in (7):

(7) #There were two guys currently wearing parkas presenting at the meeting (this afternoon).

Similarly, object DPs (which must be interpreted inside the scope of tense, regardless of whether they are interpreted in the specifier of a VP-external AgrOP or their base VP-internal position) appear to have only the event-time reading:

(8) I ran into two guys wearing parkas.

In (8), the guys must be wearing parkas at the moment the speaker ran into them. It is not possible to interpret (8) as claiming that the parka-wearing took place at some moment other than the time of the event described in the VP.

Second, in cases in which other sentential elements determine the scope of a DP, those same elements determine the interpretation of a GR contained in the DP (and vice-versa). For example, GR interpretation interacts with the scope of cardinal DPs and adverbial quantifiers. The cardinal DP “three passengers” can be interpreted either inside or outside the scope of “five times” in (9) (Thompson’s example (39)):

(9) Three passengers complained to the flight attendant five times.

On a wide-scope reading, there is a set of three passengers who complained on 5 different occasions. On a narrow-scope reading, there are 5 occasions on which three (possibly different) passengers complained. Assuming that the adverbial quantifier “five times” takes scope over the VP (quantifying over the event introduced by it; cf. Diesing, 1992), these interpretations correspond to the two different positions the DP “three passengers” can be interpreted in: VP-external (wide scope for DP) and VP-internal (narrow scope for DP). Adding a GR to the DP shows that the two readings correlate with the choice of independent or event-time reading for the GR.

(10) Three passengers waiting for the flight complained to the flight attendant five times.

On the independent reading, only the wide-scope interpretation is available for the DP. This follows directly from the connection between the position where the DP is interpreted and the interpretation of the GR: since the independent reading forces the DP to be interpreted in VP-external position (outside the scope of tense), the DP must also be interpreted outside the scope of the adverbial quantifier. Additional evidence for this
comes from the fact that only the wide-scope reading is available for (10’), where the adverbial “later” forces an independent reading for the GR:

(10’) Three passengers waiting for the flight later complained to the flight attendant five times.

Similarly, the narrow-scope reading of the DP seems to force an event-time reading for the GR.

Thompson presents several other arguments regarding the distribution and interpretation of GRs, including evidence from coordination, extraposition, and reconstruction. They all converge on the claim that the position a DP is interpreted in at LF correlates with the interpretation of a GR contained in it. If a DP is interpreted in a position inside the scope of tense, a GR contained in it will be as well, resulting in the event-time reading. If a DP is interpreted in a position outside the scope of tense, a GR contained in it will be interpreted independently of that tense, giving rise to the independent reading.

Given this evidence, the behavior of GRs in unambiguously presuppositional DPs is interesting. As Thompson notes, the interpretation of a GR in a presuppositional DP like “two of the guys” is ambiguous:

(11) Two of the guys wearing parkas were presenting at the meeting this afternoon.

While intuition suggests that the independent reading of the GR may be favored, the event-time reading is nonetheless still available. This effect does not seem to be specific to overtly partitive DPs like “two of the guys”; the same effect holds for unambiguously presuppositional but non-partitive quantifiers such as “every” (see Thompson, 2001:307, for examples). This ambiguity is actually consistent with the LF syntax of strong quantifiers, as discussed by de Hoop (1996). De Hoop argues that LF position only constrains the interpretation of potentially ambiguous indefinites, including cardinal DPs like “two guys.” Her argument stems from the fact that in Dutch, inherently presuppositional or “strong” quantified DPs may appear overtly in either VP-internal or VP-external positions. The same optionality holds for the LF position of strong quantified DPs in English: they may appear in either VP-internal or VP-external position at LF. This optionality allows either the event-time or the independent reading for the GR.

To summarize, a variety of evidence shows that the LF-interpretive position of a DP influences the temporal interpretation of GRs dependent on the DP. Factors favoring VP-internal interpretation of a DP (such as there insertion) will favor an event-time interpretation of the GR. Factors favoring a VP-external interpretation of a DP (such as wide-scope interpretation of a DP with respect to an adverbial quantifier) favor an independent reading for the GR, and factors forcing an independent reading of the GR (such as adverbials like “later”) prompt VP-external, wide-scope interpretations of a DP. Cases in which either position for the DP is grammatically permissible – as with simple cardinal DPs like “two guys” and presuppositional DPs like “two of the guys” – permit
both independent and event-time interpretations for associated GRs. This relation between syntactic position and temporal interpretation of ambiguous GRs makes DPs with GRs useful for examining the processing and interpretation of DPs. A hypothesis regarding their processing is presented in the next section.

3. Minimal Lowering and the interpretation of DPs

A small but growing number of psycholinguistic studies have examined the interpretation of DPs in adults and children. Much of this work has focused on scope interactions between quantified DPs in multiply-quantified sentences (van Lehn, 1978; Kurtzmann & McDonald, 1993; Tunstall, 1998). However, there has been relatively little work focusing on the interpretation of single DPs in simple sentences, and there have been few attempts to delineate general principles which describe when and how perceivers interpret DPs more generally. One such attempt is Frazier’s (1999) Minimal Lowering hypothesis. Motivated by evidence from a variety of sources, Frazier proposes the principle in (12):

(12) **Minimal Lowering (ML)**
Lower only when necessary (interpret a DP in its surface position if possible).

This principle intersects with the syntax for DP subjects described in section 2 above, illustrated in (13):

(13) \[ \begin{array}{l}
TP \quad DP_{subj} \quad T \ldots \\
\end{array} \quad \begin{array}{l}
VP \quad DP_{subj} \quad [v \quad V \ldots ]
\end{array} \]

The DP subject raises to its VP-external surface position in English, leaving a phonologically unrealized copy in its base, VP-internal position. Either copy is eligible for interpretation at LF. ML predicts that the language processor will prefer to take the VP-external copy as the relevant one for LF interpretation. Frazier argues that ML derives from a general desire by the processor to perform interpretative operations early, to relieve memory pressure from accumulating uninterpreted material. With this simple principle, Frazier provides compact and interesting explanations for a variety of well-attested processing effects, including a surface-scope preference for quantified sentences (van Lehn, 1978; Kurtzmann & MacDonald, 1993; Tunstall, 1998; Lidz & Musolino, 2002; Anderson, in prep), preference for reconstruction to an intermediate site in ambiguous reconstruction sentences (Frazier, Plunkett & Clifton, 1996), and a preference for narrow focus (Crain, Ni & Conway, 1994), among others.

ML makes a clear prediction for the interpretation of subject DPs: the subject DP should prefer a VP-external, presuppositional interpretation (Diesing, 1992; de Hoop, 1996; Van Geenhoven, 1998). This prediction has been tested directly using sentences with cardinal DPs presented in single-sentence contexts by Frazier, Clifton, Rayner, Deevy & Koh (this volume):

(14) Five ships appeared on the horizon.
Three ships sank.
In a set of questionnaire and reading studies, participants showed a consistent preference for interpreting ‘three ships’ presuppositionally, as anaphoric to the set of five ships mentioned in the preceding context. Kaan & Wijnen (2001) present similar results from off-line sentence-completion and difficulty-rating tasks in Dutch, both involving two-sentence items. Both these sets of results are consistent with ML’s predictions. It is worth noting, however, that the items described for the Frazier, et al. study at least do not have corresponding control conditions. There are no conditions which strongly or unambiguously favor the VP-internal interpretation (like there insertion sentences) nor any sentences which involve unambiguously presuppositional DPs (like partitives, such as “three of the ships”) for comparison. Having such comparison conditions would strengthen the case that these preferences for DP interpretation are active, and that a syntactically-motivated principle like ML is behind them.

Testing the predictions of ML for DPs is more difficult out of context, as Frazier (1999) notes. However, if ML is correct, a reliable preference for interpreting subject DPs in their surface, VP-external position should emerge even in out-of-context cases. Given the discussion in section 2, gerundive relatives contained in cardinal DPs provide a good test case for ML’s predictions for out-of-context DPs. GR interpretation serves as an index of the position in which a DP is being interpreted. An independent reading for the GR means that the DP has been interpreted in its VP-external position, outside the scope of the main clause’s tense. An event-time reading means that the DP has been ‘lowered’ and interpreted in its VP-internal position, inside the scope of tense. ML thus predicts a basic preference for the independent reading of (1), (1b), repeated below:

(1) Two guys wearing parkas were presenting at the meeting this afternoon.

   a. The guys were wearing parkas and presenting at the same time, during the meeting.
   b. The guys were wearing parkas and presenting at different times.

The language processor should prefer to do its interpretive work early, under ML, and interpret the cardinal DP ‘two guys’ in its surface position. This should give rise to a preference for the independent reading for GRs, all things being equal.

As is clear from the discussion above, ML gives a strongly syntactically-oriented account of the language processor’s operations and preferences in interpreting DPs. The basic preferences for wide-scope interpretation of DPs (and GRs contained in them) derives from their surface syntactic position, in conjunction with a desire by the processor to perform as much interpretive work as early as possible. In this regard, ML is similar to Lidz & Musolino’s (2002) principle of isomorphism, which claims that perceivers and

---

5 It is possible that a desire for discourse-referential simplicity is responsible for the preference seen in these results (cf. Crain & Steedman, 1985; Altmann & Steedman, 1988). A discourse model in which the three ships mentioned in the second sentence of (13) are taken to be a subset of the five ships mentioned in the first sentence is arguably simpler than one in which the two sentences describe two distinct and non-overlapping sets. We will return to the predictions that a Parsimony-based processor would make for the interpretation of GR sentences and cardinal DPs in the conclusions in Section 5.
learners prefer interpretations in which the surface syntactic position of a DP is isomorphic to the position where it is interpreted for scope purposes. Since the choice between independent and event-time readings for GRs depends on a choice regarding the scope of DPs with respect to tense, isomorphism also predicts a preference for the independent reading for ambiguous GR sentences. Importantly, both isomorphism and ML predict that interpretive preferences for GRs should be sensitive to syntactic manipulations which favor VP-internal (narrow scope) or VP-external (wide-scope) interpretation of a DP. Such syntactic factors are crucial to these accounts of DP and scope interpretation.

To summarize, Minimal Lowering predicts that independent readings should be preferred for ambiguous GR sentences like (1), all things being equal. This preference emerges because ML favors VP-external interpretations of subject DPs, which allow for early interpretation of the content of those DPs. This basic preference should also be affected by syntactic factors. In particular, ambiguous GR sentences (where ML can apply) should exhibit a preference for the independent reading, while sentences which require or provide strong evidence for a VP-internal interpretation of the DP containing the GR (like there insertion sentences) should not. Such additional syntactic manipulations are important for testing ML’s predictions, given the strong connection it assumes between LF-syntactic configurations and interpretation. Other syntactically-oriented accounts of scope and DP interpretation, such as Lidz & Musolino’s isomorphism principle, make similar predictions.

4. Experiments

These predictions were tested in two studies examining the interpretation of GR sentences. As noted in the introduction, interpretive preferences for GR sentences have never been systematically tested. These studies thus provide a first look at what those preferences are and what factors can influence them. They also provide preliminary evidence regarding the predictions that general principles like ML make for the scope and interpretation of DPs out of context.

In the first study, participants were presented with GR sentences and asked to choose between the event-time and independent interpretations for them in an off-line questionnaire. In the second study, participants read the same sentences in a self-paced reading task and made the same judgment in a sentence-final comprehension question. In both studies, the syntactic form of the sentences was manipulated, to provide a clear test of the prediction that syntactic structure should affect interpretive preferences for DPs (and in turn, for GRs).

4.1 Experiment 1: Off-line questionnaire

4.1.1 Design

In experiment 1, subjects were asked to choose between the two interpretations available for a GR sentence in a questionnaire. Participants were asked to choose between the
event-time and independent readings for the GR in an untimed forced-choice task. Paraphrases consistent with the two interpretations were provided for them, as in (15).

(15) Two guys wearing parkas were presenting at the meeting this afternoon.

  A: The guys were wearing parkas while they were presenting.
  B: The guys were wearing parkas and presenting at different times.

Participants were told to choose whichever paraphrase was most consistent with their first understanding of the sentence. The different time response (B) is most consistent with the independent reading, since under that reading, the two events described in the sentence must anchor to different temporal reference points. For at least part of their duration, the two events must be non-overlapping. The same time response (A) is most consistent with the event-time reading, which requires that the two events overlap in their temporal extension. Preferences for an event-time interpretation for a GR should show up as a preference for the same time response, while a preference for the independent reading should take the form of a preference for the different time response.

The GR sentences appeared in one of four forms, illustrated in (16):

(16) a. Two guys wearing parkas were presenting at the meeting this afternoon.
    b. There were two guys wearing parkas presenting at the meeting this afternoon.
    c. Two guys wearing parkas were later presenting at the meeting this afternoon.
    a. Two of the guys wearing parkas were presenting at the meeting this afternoon.

Condition (a), the ambiguous condition, provided the main test of predictions regarding the interpretive preferences for GRs contained in subject DPs outlined in section 3. ML predicts that participants should prefer the independent reading of the GR in this condition, since they should favor a VP-external interpretation of the DP containing it. Condition (b), the there-insertion condition, serves as a control, since it strongly favors or requires a “lowered” interpretation of the DP. This condition should therefore strongly favor an event-time interpretation for the GR. Condition (c), the “later” condition, serves as another control, since it unambiguously indicates an independent reading is required for the GR. Condition (d), the partitive condition, provides an interesting additional test of ML’s particular predictions for DP interpretation. As discussed in section 2 above, GRs occurring in overtly partitive DPs are in principle ambiguous, since the partitive DP may appear in either VP-internal of VP-external position at LF. However, Frazier argues

---

6 As Lyn Frazier (p.c.) points out, the different-time response is actually consistent with an interpretation in which “at different times” distributes over the guys mentioned. Under such an interpretation, the guys in question would each have been wearing parkas while presenting, but would have been doing so at different times. While such an interpretation would allow participants to avoid the presuppositionally more costly independent reading for the GR, it would create additional discourse-referential complexity by forcing participants to accommodate two different intervals and events of presenting within the interval evoked in the main clause (in this case, the meeting). It is unclear which variety of discourse-referential complexity perceivers would prefer. However, if at least some readers opted for this interpretation of the different-time response, the event-time bias observed in both experiments is actually stronger. Additional work is needed to clarify this issue.
that factors which favor a presuppositional reading of a DP (such as overt partitivity) should strengthen the preference for a VP-external interpretation of the DP. Such factors serve as evidence in support of the processor’s basic preference to interpret a DP early, in its surface position. (See Frazier, 1999, for discussion of the role such factors may have in explaining the stronger wide-scope preferences of ‘each’ compared to ‘every,’ for example.) The partitive condition may consequently exhibit a stronger preference for the independent reading for the GR.

All the GR sentences which participants read were judged by the experimenter to be implausible under the event-time reading. The reason for this bias was two-fold. The first was to give participants significant reason to consider the independent reading out of context. Accommodation of an additional temporal reference point to support the independent reading may be difficult for discourse-referential reasons (cf. Crain & Steedman, 1985; Dickey, 2001), so providing additional evidence in support of such an interpretation seemed desirable. The second reason for this bias was to offset a potential same-time response bias introduced by the structure of the stimuli themselves. One condition (the later condition) essentially required a different-time response. Participants may have been sensitive to this fact and developed a response bias toward the same-time response in the other conditions as a result. Having the content of the stimuli militate against a same-time response (and an event-time interpretation) hopefully helped balance these two factors.

4.1.2 Methods

4.1.2.1 Participants

Forty-eight Northwestern University undergraduates naïve to the purposes of the experiment took part in exchange for course credit. All were native English speakers.

4.1.2.2 Materials

Sixteen experimental items like the one in (16) above were constructed. All were intuitively biased toward an independent reading (and a different-time response) given the relative implausibility of understanding the two events as overlapping. The experimental sentences were interspersed among 74 filler sentences of varying syntactic type. A list of all experimental items is found in the Appendix.

4.1.2.3 Procedure

Participants read the experimental and filler sentences and chose between two paraphrases for the sentences in an untimed forced-choice task, as described above. For each experimental and filler item, participants were instructed to choose whichever paraphrase was most consistent with their first understanding of the sentence. The sentences were presented in a questionnaire format, several sentences to a page. The questionnaire appeared in one of four versions, each with a different pseudo-random
order of presentation. The four versions of the experimental sentences were distributed across the questionnaire versions according to a Latin square design.

4.1.3 Results

The results of the experiment are presented in Table 1. The percentages given represent the proportion of different-time responses averaged across subjects and items, by condition.

Table 1: Proportion of different-time responses by condition, Expt. 1

<table>
<thead>
<tr>
<th>Proportion different-time responses</th>
<th>ambiguous</th>
<th>there insertion</th>
<th>later</th>
<th>partitive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>41.87%</td>
<td>34.88%</td>
<td>87%</td>
<td>56.25%</td>
</tr>
</tbody>
</table>

The proportion of different-time responses (and independent interpretations) was close to chance for the ambiguous and partitive conditions; both differed reliably from chance by participants (t=14.95 for the ambiguous condition, t=13.41 for the partitive condition, df=47, both p<.001) but not by items (t=1.27 for the ambiguous condition, t=0.78 for the partitive condition, df=15, both p>.2). The “later” condition differed reliably from chance by both participants (t=4.67, p<.01) and items (t=12.08, p<.001), and the there-insertion condition differed from chance reliably by items (t=19.06, p<.001) and marginally by participants (t=1.98, p<.07). There was not a bias in favor of the independent reading except for the “later” condition, and there was not a bias toward the event-time reading except (perhaps) in the there insertion condition.

Comparing the ambiguous condition with the control conditions, the ambiguous condition elicited reliably fewer different-time responses than the partitive, by both participants (t=3.71, p<.001) and items (t=2.72, p<.02). The there-insertion condition elicited numerically fewer different-time responses than the ambiguous condition, though this difference was only marginally reliable by participants (t=1.92, p<.08) and not reliable by items (t=1.15, p>.25).

4.1.4 Discussion

The results of Experiment 1 establish a baseline for the interpretation of these sentences. There was a weak (non-reliable) preference for the event-time interpretation for the ambiguous GR sentences, indicating a baseline preference for the VP-internal interpretation of the DP out of context. This weak preference could easily be due to the discourse-referential factors mentioned above, since an independent reading requires accommodation of an independent temporal reference point. However, the preference was easily manipulated by syntactic factors, with a there-insertion structure creating a nearly-reliable preference for the event-time interpretation and the partitive structure eliciting reliably more independent interpretation responses than the ambiguous baseline.
The strongly biased “later” control condition also showed the expected bias toward the independent reading, validating the other results.

These results provide support for the predictions of ML (and other syntactically-oriented theories of DP interpretation) regarding the interpretation of DPs out of context. While the ambiguous condition did not exhibit a clear preference for the independent reading and the VP-external interpretation of the DP, the syntactic manipulations used in the experiment did have clear effects on the interpretations favored for the GR. The there-insertion condition consistently favored an event-time interpretation, just as expected given the strong preference for VP-internal interpretation of the DP in there-insertion constructions. In addition, the partitive condition elicited consistently more independent readings than the ambiguous condition. This result is consistent with ML’s more fine-grained prediction that factors favoring a presuppositional interpretation of a DP should support a VP-external interpretation, by facilitating early interpretation of the DP. Interestingly, it is not clear whether this effect would be expected under other syntactically-oriented theories of scope preferences and DP interpretation (like Lidz and Musolino’s isomorphism account). Such accounts base their predictions on syntactic position alone, and both simple DPs and partitive DPs occupy the same syntactic position under the independent reading.

Reflecting on the effects of syntactic form above, it is worth noting that the content of the events described in these sentences was identical across conditions. The event-time and independent readings were equally plausible or implausible in all conditions. Participants’ preferences in assigning a temporal interpretation to these items were affected by syntactic structure alone. Further, the syntactic differences across the conditions were in principle independent of and potentially quite irrelevant to temporal interpretation. On the face of it, there is no a priori reason to expect that there-insertion or partitive syntax should give rise to systematically different temporal inferences. The fact that such differences appeared in this experiment provides evidence in favor of a strong connection between the syntactic position of a DP and the temporal interpretation of material contained in it, as argued by Enç (1987), Ogihara (1996), Thompson (2001), and others.

The results of experiment 1 thus establish a baseline for the interpretation of GR sentences. They also provide support for ML’s predictions for DP interpretation. The syntactic manipulations provide crucial control conditions as well, ones which have been lacking in previous studies testing ML’s predictions (Frazier, et al., this volume). However, the predicted preference for an independent reading for GRs was not found, likely due to the extra discourse-referential complexity associated with it. We will return to this effect in experiment 2 below and in the conclusions in section 5.
4.2 Experiment 2: Self-paced reading

4.2.1 Design

Experiment 2 was an on-line replication of experiment 1. Participants read the same items used in experiment 1 in a self-paced manner and answered the forced-choice questions from the off-line questionnaire as end-of-sentence comprehension questions. The sentences were segmented as in (17) below:

(17)   a. Two guys wearing parkas | were presenting at the meeting this afternoon.
   b. There were two guys wearing parkas | presenting at the meeting this afternoon.
   c. Two guys wearing parkas | were later presenting at the meeting this afternoon.
   a. Two of the guys wearing parkas | were presenting at the meeting this afternoon.

The pipes ( | ) indicate presentation regions. The sentences were broken into two presentation regions because a subset of the items were too long to be displayed in a single line on the screen. Since some of the sentences had to be presented in two segments, it was decided that all of them should be similarly segmented.

At issue in this experiment was whether participants would draw similar temporal inferences about these GR sentences when reading them under time pressure, and whether those inferences would remain robust even for an end-of-sentence question, in which the syntactic form of the GR sentence was no longer accessible to them. Participants’ clear sensitivity to syntactic form in experiment 1 may have been due in part to the fact that they could consult the written sentences while making a judgment about their meaning. Denying them access to this information provides a stronger test of whether syntactic form is affecting semantic or discourse representations constructed for these sentences.

4.2.2 Methods

4.2.2.1 Participants

Forty Northwestern University undergraduates naïve to the purposes of the experiment took part in exchange for course credit. All were native English speakers. None had participated in experiment 1.

4.2.2.2 Materials

The sixteen experimental items used in experiment 1 were segmented as in (18) above. The experimental sentences were interspersed among 76 filler sentences of varying syntactic type. Twelve of the sixteen sentences were presented on a single line; four had to be broken up over two lines due to their length in characters, with the first presentation segment appearing on the first line and the second presentation segment appearing on the second. Comprehension questions following the sixteen experimental items were similar to the questions used in the questionnaire described in experiment 1. However, due to
constraints imposed by the experiment-running program, a slightly different format had to be used to elicit participants’ interpretive judgments. Participants were provided with the two events described in the sentence and asked whether they occurred at the same time or at different times:

(18) Two guys wearing parkas were presenting at the meeting this afternoon.

The men were wearing parkas and presenting

AT DIFFERENT TIMES AT THE SAME TIME

4.2.2.3 Procedure

Participants read the sixteen experimental and 76 filler sentences in a self-paced reading task, presented on either a laptop or a desktop PC using the PCEXPT experiment-running suite by Charles Clifton. Sentences were presented in a non-cumulative moving-window format. Each sentence was preceded by a preview of underscores indicating where the characters of the sentence would appear. Participants pressed either of two marked buttons on the keyboard to reveal the presentation segments and advance through the sentence. At the end of each sentence, the sentence disappeared from the screen to be replaced after a pause with either the preview of another sentence or a comprehension question regarding the sentence just read. Each comprehension question had two answers below it, one aligned left and the other aligned right. The same buttons were used to indicate which answer participants preferred: they pressed the left button to indicate that the left-hand answer was correct, and the right button to indicate that the right-hand was correct.

The sentences were presented in one of four versions, each with a different pseudo-random order of presentation. The four versions of the experimental sentences were distributed across the questionnaire versions according to a Latin square design. Each of these experimental lists was preceded by a ten-item set of practice trials, to familiarize participants with the self-paced reading task.

4.2.3 Results

Mean reading times from the self-paced reading task are presented in Table 2, by condition. Reading times are given in milliseconds. Separate means were computed for trials which elicited same-time and different-time responses for the end-of-sentence comprehension question.
Table 2: Whole-sentence reading times, Expt. 2, divided by response

<table>
<thead>
<tr>
<th></th>
<th>Same-time responses</th>
<th>Diff.-time responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambiguous condition</td>
<td>1785</td>
<td>1672</td>
</tr>
<tr>
<td>There-insertion cond.</td>
<td>1993</td>
<td>2029</td>
</tr>
<tr>
<td>“later” condition</td>
<td>2007</td>
<td>1813</td>
</tr>
<tr>
<td>Partitive condition</td>
<td>1961</td>
<td>1956</td>
</tr>
</tbody>
</table>

Statistical analysis on the means for segment 1 and segment 2 revealed no reliable differences (all Fs<1). Because of this, and because no comparisons for either segment were planned, only whole-sentence reading times are reported in Table 2.

Comparison of whole-sentence reading times in the different-time and same-time means shows some potentially interesting differences. Looking first at the “later” condition, reading times were numerically higher for the same-time responses than for the different-time responses. The “later” condition was also the slowest of all the conditions given a same-time response. This difference suggests that the same-time response (and the event-time interpretation) resulted in processing difficulty in the presence of “later.” Similarly, the there-insertion condition elicited longer readings times for the different-time responses than for the same-time responses. The there-insertion condition was also the slowest of all conditions given a different-time response. This pattern suggests that the different-time response (and the independent interpretation) resulted in processing difficulty given the syntax of the there-insertion condition. Turning to the ambiguous condition, a similar pattern appears: reading times were again numerically higher for the same-time responses than for the different-time responses. This result indicates that the same-time responses (event-time interpretations) caused greater processing difficulty than the different-time ones. Due to the small number of responses in some conditions (see Table 3), these differences are noisy and must be interpreted with caution. We will return to their potential significance in the discussion below.
Average proportions of different-time responses for the end-of-sentence comprehension question are presented in Table 3. The percentages given are averaged across subjects and items, by condition.

Table 3: Proportion of different-time responses by condition, Expt. 2

<table>
<thead>
<tr>
<th></th>
<th>ambiguous</th>
<th>there insertion</th>
<th>later</th>
<th>partitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>different-time</td>
<td>30.0%</td>
<td>17.5%</td>
<td>70.6%</td>
<td>38.1%</td>
</tr>
<tr>
<td>responses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The proportion of different-time responses (and independent interpretations) was lower in this experiment than the first experiment. The ambiguous and there-insertion conditions were both reliably below chance in the proportion of different-time responses they elicited, both by items (ambiguous: t=2.93, p=.01; there insertion: t=5.25, p<.001; df=15) and participants (ambiguous: t=5.73, p<.001; there insertion: t=10.40, p<.001; df=39). The partitive condition was closer to chance performance: the difference was reliable by participants (t=2.90, p<.01) but not by items (t=1.60, p<.15). The “later” condition elicited reliably more different-time responses than chance would predict, both by items (t=4.88, p<.001) and by participants (t=4.71, p<.001). The absence of a clear preference for the independent reading seen in experiment 1 appeared even more clearly in this study. There was a bias in favor of the event-time reading in all conditions except for the “later” condition.

Comparing the ambiguous condition with the control conditions, the there-insertion condition elicited reliably fewer different-time responses than the ambiguous, by both participants (t=2.85, p<.01) and items (t=2.389, p<.05). The ambiguous condition elicited fewer different-time responses than the partitive condition, though this difference was marginally reliable by participants (t=1.73, p=.091) and right at the margin of reliability by items (t=2.11, p=.052).

4.2.4 Discussion

The results of this experiment once again show a clear effect of syntactic form on the interpretation of GRs, in line with the predictions of ML and syntactically-oriented theories of DP interpretive preferences. There-insertion sentences (which favor VP-internal interpretations) elicited fewer different-time responses than ambiguous sentences, which in turn elicited fewer different-time responses than partitive sentences (which favor VP-external interpretations). The “later” condition once again reassuringly elicited the most different-time responses, reliably more than chance. Thus, even without the written form to consult, participants were still influenced by the syntactic form of the sentences in drawing temporal inferences. However, not having the verbatim form of the sentence to available to them clearly had an effect: participants gave noticeably fewer independent readings for the sentence-final questions in this study than in the questionnaire in experiment 1. One reason for this difference may be that participants were forced to consult the meaning representation or situation model constructed for the
GR sentences by the end-of-sentence task. Such representations are widely believed to pay less attention to details of syntactic form (Jarvella, 1971; Chang, 1980; and others). However, if this is correct, it suggests that participants’ longer-term encoding of the meaning of these sentences (as in the discourse representation) was influenced by the sentences’ syntactic form.

The numerical differences seen in the reading-time data suggest that participants were affected by the syntactic manipulations in these sentences as they were reading them, as well. The slower reading times for the “later” condition for same-time responses indicates that participants were attending to the manipulations on-line, since the event-time interpretation should have been much harder to arrive at in the presence of “later.” The slower reading times for the there-insertion condition given a different-time response also suggest that the manipulations had an effect on interpretation during reading, since the independent interpretation should have been much harder to arrive at given there-insertion syntax. Further, and intriguingly, the slower reading times for the ambiguous condition for a same-time response are consistent with the predictions of ML for on-line performance. It is precisely this case, in which a VP-internal interpretation must be assigned to a DP, that ML predicts should be dispreferred and should incur a processing cost. Given the noisiness of the data and the limited number of observations in the different-time response case, this result must be interpreted with caution. However, if it is robust, this result provides the first on-line, within-sentence evidence for ML that I am aware of.¹

5. Conclusions

The results of the two experiments in section 4 provide a first look at perceivers’ preferences in resolving the ambiguity associated with the interpretation of GRs. Across the experiments, participants showed a weak baseline preference for the event-time interpretation, particularly for the ambiguous condition. However, both off-line (with the syntactic form to consult) and under time-pressure (without the surface form in front of them), participants showed effects of syntactic structure on the temporal interpretation of GR sentences. This effect appeared perhaps most clearly in experiment 2, in the fully reliable difference between the there-insertion and ambiguous conditions. There-insertion sentences elicited more same-time responses (and event-time interpretations) than the ambiguous sentences. This result follows directly given the strong connection between the position where DPs are interpreted at LF and the position of GR’s with respect to tense argued for in section 2. Syntactic factors which force the DP to be interpreted in a position inside the scope of tense also force the GR contained in it to be interpreted inside tense’s scope, resulting in the event-time reading. This result suggests that the interpretation of GRs can serve as a reliable probe of scope and DP interpretation, even in out-of-context cases like the ones considered here.

¹ See Frazier, et al. (this volume) for evidence from eyetracking during reading that readers assign interpretations consistent with ML’s predictions by sentence’s end. See Villalta (1999) and Anderson (in prep.) for evidence from self-paced reading that contexts which bias an inverse-scope reading for a multiply-quantified sentence create processing difficulty at least by sentence’s end.
Given this, the results here provide interesting evidence regarding the predictions of theories of scope preferences and DP interpretation like Minimal Lowering, or Lidz & Musolino’s principle of isomorphism. As described above, the syntactic form of a GR sentence with cardinal DPs affected the GR’s interpretations, in ways consistent with the predictions of syntactically-oriented theories like ML. Interestingly, this effect appeared perhaps most clearly in experiment 2, when participants were prevented from consulting the verbatim form of the sentence and were presumably consulting longer-term, more abstract representations of the sentence. Further, the results of experiment 1 provide evidence consistent with predictions specific to ML. In experiment 1, the partitive condition elicited reliably more different-time responses than the ambiguous condition, despite the fact that the subject DPs occupy the same surface syntactic position in the two conditions. ML predicts that factors promoting a presuppositional interpretation of a DP (like overt partitivity) should favor early interpretation, resulting in a stronger surface-position interpretive preference for such DPs. Consistent with this prediction, overt partitivity promoted the independent reading and (by hypothesis) the VP-external interpretation of the subject DP.

One fact to be explained in these results is the bias across conditions (except the “later” condition) toward the event-time reading for GRs. As discussed in section 3, ML and other syntactically-oriented theories of DP interpretation predict a baseline preference for a VP-external interpretation of the DP and for the resulting independent reading, all things being equal. However, all things are not equal in the current experiments. As noted in section 4.2, discourse-referential concerns bias against the independent reading in the out-of-the-blue sentences tested here. Accommodation of an additional reference time (required by the independent reading) may be difficult for the processor in out-of-the-blue contexts (cf. Crain & Steedman, 1985; Altmann & Steedman, 1988). By choosing the independent reading in such out-of-context cases, the processor must not only accommodate the presuppositions associated with the VP-external interpretation of the DP but also accommodate a free temporal variable for the gerundive relative. (Minimally, it must accommodate two separate intervals into the discourse model constructed for the sentence, one for the event described in gerundive relative and the other for the main event description in the sentence.) This fact may well have biased people against the independent reading, except when local grammatical factors (like the presence of “later”) required it. This explanation predicts that preceding context should remove the event-time bias for ambiguous GR sentences. Intuition suggests that this is the case, as illustrated by the mini-discourse from the introduction (repeated as (19) below):

(19) I saw a bunch of guys waiting outside the building in the cold this morning.
    Two guys wearing parkas were presenting at the meeting this afternoon.

Here, the independent reading for the GR is clearly available (and seems to be preferred). The event-time reading of the GR also seems to create a less coherent discourse, giving the impression that the guys mentioned in the second set are not among the guys mentioned in the first. This latter intuition is consistent with the claim that VP-external interpretations of the DP (ones in which it and the GR contained in it are outside the
scope of tense) are presuppositional, while VP-internal ones (where the GR and DP are inside the scope of tense) are non-presuppositional. Experiments to test these intuitions are currently underway.

One fact left to explain is the relatively high number of independent readings reported for GRs in there-insertion constructions (especially in experiment 1). This result is surprising, assuming that indefinite DPs in there-insertion contexts require a VP-internal and non-presuppositional reading. However, there is some evidence suggesting that referential-like readings are available even in there-insertion sentences, given the right context:

(20) I saw a bunch of people waiting around in the cold this morning before work. There were two guys wearing parkas outside the door.

Intuitively, the two guys mentioned in the second sentence of (20) are preferentially construed as members of the set of people waiting in the cold mentioned in the first sentence. Whatever interpretive processes are responsible for the facts in (20) might explain the relatively large number of independent readings seen for the there-insertion conditions in the current studies.

The results of these studies provide initial evidence regarding the interpretations favored for gerundive-relative sentences, a previously uninvestigated ambiguity. These results thus set the stage for further investigation of the interpretation of these constructions. They also provide evidence that syntactic factors affecting scope preferences for DPs also affect the interpretation of GRs contained in them, even when discourse-referential factors (such as the additional accommodation required in out-of-the-blue contexts) and plausibility (the relative implausibility of the same-time readings in the experimental items) seem likely to offset them. This fact is consistent with the predictions of syntactically-oriented theories of DP interpretation such as Minimal Lowering, indicating that they have force even in a null context. It also shows that perceivers are sensitive to the strong connection between LF-syntactic structure and interpretation, even when real-world knowledge about the events involved is stacked against it.

Appendix

Materials used in experiments 1 and 2. The pipes ( | ) indicate presentation regions for the self-paced reading task.

(1)
a. Two guys wearing parkas | were presenting at this afternoon’s meeting.
b. There were two guys wearing parkas | presenting at this afternoon’s meeting.
c. Two guys wearing parkas | were later presenting at this afternoon’s meeting.
d. Two of the guys wearing parkas | were presenting at this afternoon’s meeting.
Tense and scope

(2)
a. Three women wearing Prada | were showering in the locker room.
b. There were three women wearing Prada | showering in the locker room.
c. Three women wearing Prada | were later showering in the locker room.
d. Three of the women wearing Prada | were showering in the locker room.

(3)
a. Three businessmen wearing raincoats | were trying on swimsuits.
b. There were three businessmen wearing raincoats | trying on swimsuits.
c. Three businessmen wearing raincoats | were later trying on swimsuits.
d. Three of the businessmen wearing raincoats | were trying on swimsuits.

(4)
a. Two surgeons sitting in the lounge | were operating on a patient.
b. There were two surgeons sitting in the lounge | operating on a patient.
c. Two surgeons sitting in the lounge | were later operating on a patient.
d. Two of the surgeons sitting in the lounge | were operating on a patient.

(5)
a. Two kids sitting on the swings | were painting a picture together.
b. There were two kids sitting on the swings | painting a picture together.
c. Two kids sitting on the swings | were later painting a picture together.
d. Two of the kids sitting on the swings | were painting a picture together.

(6)
a. Three prisoners standing in the yard | were talking to the guards.
b. There were three prisoners standing in the yard | talking to the guards.
c. Three prisoners standing in the yard | were later talking to the guards.
d. Three of the prisoners standing in the yard | were talking to the guards.

(7)
a. Two singers wearing only a push-up bra | were talking to a reporter.
b. There were two singers wearing only a push-up bra | talking to a reporter.
c. Two singers wearing only a push-up bra | were later talking to a reporter.
d. Two of the singers wearing only a push-up bra | were talking to a reporter.

(8)
a. Three players standing in the outfield | were talking to the press.
b. There were three players standing in the outfield | talking to the press.
c. Three players standing in the outfield | were later talking to the press.
d. Three of the players standing in the outfield | were talking to the press.

(9)
a. Three workers using chainsaws | were sanding the wood.
b. There were three workers using chainsaws | sanding the wood.
c. Three workers using chainsaws | were later sanding the wood.
d. Three of the workers using chainsaws | were sanding the wood.

(10)
a. Four supermodels talking on cell phones | were walking down the runway.
b. There were four supermodels talking on cell phones | walking down the runway.
c. Four supermodels talking on cell phones | were later walking down the runway.
d. Four of the supermodels talking on cell phones | were walking down the runway.
(11)  
a. Two men holding ice cream cones were sitting in the sauna.  
b. There were two men holding ice cream cones sitting in the sauna.  
c. Two men holding ice cream cones were later sitting in the sauna.  
d. Two of the men holding ice cream cones were sitting in the sauna.

(12)  
a. Two students sobering up were doing jello shots in their apartment.  
b. There were two students sobering up doing jello shots in their apartment.  
c. Two students sobering up were later doing jello shots in their apartment.  
d. Two of the students sobering up were doing jello shots in their apartment.

(13)  
a. Three firemen waiting at the fire station were resuscitating the victim.  
b. There were three firemen waiting at the fire station resuscitating the victim.  
c. Three firemen waiting at the fire station were later resuscitating the victim.  
d. Three of the firemen waiting at the fire station were resuscitating the victim.

(14)  
a. Two policemen following the suspects were testifying against them in court.  
b. There were two policemen following the suspects testifying against them in court.  
c. Two policemen following the suspects were later testifying against them in court.  
d. Two of the policemen following the suspects were testifying against them in court.

(15)  
a. Three men standing in front of the Sears Tower were testifying in court.  
b. There were three men standing in front of the Sears Tower testifying in court.  
c. Three men standing in front of the Sears Tower were later testifying in court.  
d. Three of the men standing in front of the Sears Tower were testifying in court.

(16)  
a. Two passengers waiting to check in were complaining to the flight attendant.  
b. There were two passengers waiting to check in complaining to the flight attendant.  
c. Two passengers waiting to check in were later complaining to the flight attendant.  
d. Two of the passengers waiting to check in were complaining to the flight attendant.
References


Frazier, Lyn, Charles Clifton, Keith Rayner, Patricia Deevy and Sungryong Koh. This volume. Interface problems: Processing sentences in context.


Department of Linguistics
Northwestern University
2016 Sheridan Road
Evanston IL 60208-4090

dickey@ling.northwestern.edu