

Scope Relations and Infinitival Complements

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1. Quantifier Raising, clause-boundedness, and Infinitives

In one tradition, scope shifting is achieved by a syntactic operation that places one quantifier above another, and then provides an interpretation mechanism in which that quantifier out-scopes material it structurally c-commands (May 1985). Quantifier raising (QR) obeys some of the constraints found for other movement operations. A universal cannot scope out of islands: a relative clause (1a), a *wh*-complement (1b), or adjunct (1c) (examples from Johnson 2000):

- (1) a. Someone met the child that talked to everyone. $\exists > \forall, * \forall > \exists$
b. Someone wondered whether I talked to everyone. $\exists > \forall, * \forall > \exists$
c. Someone left the meeting before I talked to everyone. $\exists > \forall, * \forall > \exists$

But the locality conditions that hold of QR do not quite match up with those for other kinds of extraction. A further constraint on QR, which separates it from familiar long-distance operations, is clause-boundedness: a universal cannot QR from a finite complement (2):¹

- (2) Someone wished that Fred would visit everyone. $\exists > \forall, * \forall > \exists$

¹ In many cases, indefinites can scope out of barriers, or appear to (see e.g. Kratzer 1998, Reinhart 1997). An even more compelling instance for present purposes arises when universals appear to easily out-scope indefinites from finite clauses (Reinhart 1997; Johnson 2000):

- (i) Yesterday, a tour guide made sure that every tour to the Louvre was fun.

These examples are clearly relevant to restructuring cases, since the apparent wide-scope of those could be instances of (i).

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However, the clause-boundedness of QR must be limited to finite clauses, as infinitival complements like (3) are porous to QR, allowing nurses to co-vary with the chosen set of patients:

- (3) A different nurse began to examine every patient.

Some infinitival complements allow universals to QR with some ease, like (3) and (4a). Other infinitival complements, of verbs such as *decide*, appear to resist such construals, as indicated by the question mark in (4b):

- (4) a. A different student wanted to report on every article on the reading list.
 $\exists > \forall, \forall > \exists$
b. A different student decided to report on every article on the reading list.
 $\exists > \forall, ?\forall > \exists$

Hornstein (1994) proposes that the difference in the availability of inverse scope in different kinds of infinitival complements is a result of a clause-merger operation that renders sentences like (3) and (4a), but not (4b), a single clausal domain. If the two quantifiers are clause-mates, then QR can operate as a clause-bounded operation. Hornstein relates this operation of clause-merger to *restructuring*, the phenomenon in Romance and Germanic languages that makes certain infinitival clauses transparent for otherwise clause bounded syntactic operations. Typically, restructuring applies to predicates like *begin* and *want* (3),(4a), but not *decide* (Wurmbrand 2001).

It turns out, however, that Hornstein's analysis cannot be maintained. The kinds of complements that typically do not restructure in Romance languages can in fact allow an inverse scope construal in English. Kennedy (1997) gives (5a-c), which allow the embedded universal to put the indefinite matrix subject in its scope. (So (5a) can be true if every country is such that an American tourist expects to visit, and no one tourist expects to visit all the countries.)

- (5) a. At least one American tourist expects to visit every European country this year.
b. At least one American tourist hopes to visit every European country this year.
c. Some government official is required to attend every state dinner.
(Kennedy (1997): (46) (47) (50))

Kennedy points out that the predicates *expect*, *hope*, and *require* are, like *decide*, not restructuring predicates in any language that shows restructuring, casting doubt on Hornstein's proposal. Nevertheless, I believe that the intuitions reported in (4) should not be dismissed entirely. Lurking behind Hornstein's intuitions may be a comprehension or processing preference that allows inverse scope out of certain infinitivals more easily than others – a preference I will label Hornstein's Conjecture.² The question is whether QR is still difficult out of non-restructuring infinitives like (4b), compared to restructuring ones and mono-clausal constructions, even when a rich context is provided.

² Of course, Hornstein (1994) proposes a grammatical distinction in the availability of QR. By Hornstein's Conjecture I am reinterpreting his proposal as one of ease of comprehension.

In fact, the existence of QR out of infinitives in general poses an even more basic question: is QR out of infinitival clauses like (3), and (4a), just as available as in mono-clausal constructions? While it might not come as a surprise that QR would be easier within mono-clausal constructions than out of complex sentences, this has never been confirmed experimentally. Moreover, as we will see below, a finding of this sort has no obvious source in the syntactic mechanism of QR. The various syntactic constraints invoked on QR would not distinguish among infinitival constructions. In sum, this paper asks the following three questions:

- I. Is inverse scope, in general, more difficult to obtain out of complex sentences with infinitival clauses than mono-clausal sentences?
- II. Is there a difference among types of infinitival clauses in the availability of inverse scope? (Hornstein's conjecture)
- III. If the answer to I. or II. is 'yes', then what accounts for the greater ease of inverse scope in mono-clausal and restructuring constructions?

This paper reports on two comprehension experiments that address the first two of these questions, and their relevance to the third. The first experiment, which probed the availability of inverse scope readings in mono-clausal and infinitival constructions, shows that inverse scope is more available in mono-clausal constructions than certain infinitivals, even when a context strongly biases for inverse scope in both cases. Furthermore, there is some initial suggestive evidence that some types of infinitival complements give rise to inverse scope more readily than others. A second comprehension experiment, comparing only infinitival constructions, yielded similar suggestive results. After showing that current syntactic assumptions about QR do not predict either of these comprehension differences, I will outline a possible account which posits that quantifiers are easier to process if the members of their sets are contained in the situations immediately in the scope of the quantifier. This proposal predicts that quantifiers can scope out of embedded clauses if there is some overlap between the situations denoted by the matrix and embedded clause, a configuration that corresponds, as I will argue, to restructuring sentences.

2. QR and infinitives

It is generally believed that QR is a clause-bounded operation (see (2)). However, if QR is an A-bar movement operation, it is unclear why successive cyclic movement, as with *wh*-movement, does not allow for long-distance QR out of a tensed clause. Fox (2000) argues that unlike *wh*-movement, which is syntactically motivated, QR is semantically motivated. For Fox, any QR must be semantically motivated. If QR moved a quantifier to a landing site at the edge of an embedded clause, but does not lead to a distinct interpretation there, then it is illicit (6a). The only derivation that leads to inverse scope out of a clause, then, is long-QR. And that movement violates locality conditions on A-bar movement (6b). QR out of a tensed clause, then, can never be grammatical. (I will represent the LFs schematically, showing a quantifier phrase adjoining to the sentence,

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leaving traces in its base and intermediate positions. (6a) is to be read with the universal quantifier c-commanding the indefinite in its nuclear scope.)

(6) A different doctor said that every patient was ill.³

a. * [Every patient]_i [A different doctor said [_{CP} t_i [that t_i was ill]]]

ungrammatical because of uninterpreted position for QP in Spec, CP

b. * [Every patient]_i [A different doctor said [_{CP} that t_i was ill]]

ungrammatical because of movement violation

Since QR *is* possible out of infinitival complements, and if Fox's proposal is correct, we have to allow at least one of the derivations shown in (6) to be licit when the embedded clause is an infinitive. Either movement to the clause edge in non-finite clauses can be semantically motivated, or non-finite clauses are not barriers to movement, and so in one movement an embedded quantifier can out-scope a matrix quantifier. It is difficult to see how the first solution – semantically motivated movement to the clause edge – would be any different for infinitival complements than finite complements.⁴ This leaves the possibility that infinitival clauses are not boundaries for QR. As a corollary to this conclusion, Johnson (2000) notes that infinitives with overt complementizers as in (7a) prohibit inverse scope, while those infinitives without do not (7b).

(7) a. A different student wanted for you to read every book. (Johnson 2000: (27))
b. A different student wanted to read every book. (Johnson 2000: (25))

(7a) does not allow a reading where the *students* vary as a function of *books*, while (7b) does. If it is the presence of a complementizer projection blocks QR, we might assimilate (7a) to finite clause cases which could be argued to always project a complementizer layer. I have nothing more to contribute to the role that complementizers play.

I conclude, then, that QR *can* move a quantifier out of an embedded infinitival to a matrix adjoined position in one movement, as in (8).

(8) Every book_i [A different student wanted to read t_i]

³ Lyn Frazier points out that the lexical requirements of a sentence-internal reading of *different* here may be strong enough to override locality conditions, allowing (6a) to be construed with co-variation of doctors with respect to a set of patients.

⁴ Fox (2000: fn 55: 65-66) suggests that there may be a modal operator in the embedded clause in these infinitives, in which case QR to the clause edge would be licit under his Scope Economy. However, there are several reasons to doubt this. First, why would the infinitive but not the finite clause contain this modal operator (although see Wurmbrand (2006) for just such a proposal). Moreover, an analogous modal operator in finite clauses does not make inverse scope any easier there: *a boy expected John would read every book*. Wide-scoping the universal does not appear any easier here than without *would* in the embedded clause.

Although an innocuous move, this approach renders the QR operation in infinitives identical to that in mono-clausal constructions, modulo the amount of structure over which the QP moves.

(9) Every book_i [A different student read t_i]

We now have a paradox. If (8) is the right analysis, we have effectively resorted to Hornstein's mono-clausal analysis. But Kennedy showed that it was untenable. Furthermore, we do not have any reason yet to expect that inverse scope is achieved any differently in (8) than in (9). Processing evidence, then, could be brought to bear on whether inverse scope is achieved in the same way in these constructions by asking whether inverse scope is as available in (8) as it is in (9). While our intuitions might be suggestive, it has never been systematically tested whether inverse scope is harder for comprehenders to compute across a non-finite clause boundary than it is in a mono-clausal construction. The judgments given in the literature are variable, and Kennedy's examples (5) require strong biasing by "at least" to force the indefinite to co-vary with the universal. Pragmatic factors, too, help inverse scope in Kennedy's examples. One of the goals of the first experiment is to find out whether inverse scope is more difficult out of infinitives than out of mono-clausal constructions when these factors are controlled for. To that end, the experiments provide contexts rich enough to support inverse scope in all cases. If the difficulty of computing inverse scope out of infinitives is simply a result of there not being a rich enough context, then we would expect to find that inverse scope is just as available in all types of infinitives as in mono-clausal constructions. If inverse scope remains difficult out of infinitives, as compared to mono-clauses, then given the discussion above about the syntactic constraints on QR, non-syntactic factors are needed to account for the difference in availability of QR.

2.2 Infinitival Complement Types

The second goal of the experiments is to answer the question in II. Hornstein's Conjecture was that QR could operate more easily out of those infinitives that can be analyzed as mono-clausal constructions, falling under the process of restructuring, which creates one clause out of a verb-infinitive structure. While English provides no good evidence for such a process, some Romance and Germanic languages exhibit evidence that infinitival complements can (optionally) be reduced in syntactic structure (Rizzi 1978, Aissen and Perlmutter 1983). Operations that are otherwise clause-bounded are permitted in restructuring contexts. German long passive allows an embedded object in an infinitival complement to be promoted as surface matrix subject, a process that should only apply within, not across, clauses (10). In Italian, clitics like *lo* cannot climb out of most clauses, but in some infinitives they can (11a) while in others they cannot (11b).

(10) *German Long Passive*

dass der Traktor zu reparieren versucht wurde
 that the tractor.NOM to repair tried was
 'that they tried to repair the tractor' [Wurmbrand 2006: (14a):6]

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(11) *Italian Clitic Climbing*

- a. Ilaria lo vuole leggere
 Ilaria it.ACC wants to-read
 ‘Ilaria wants to read it.’
- b. *Ilaria lo decide leggere
 Ilaria it.ACC decide to-read
 ‘Ilaria decides to read it.’

In order for clause-bounded operations to apply, (10) and (11a) are argued to have a mono-clausal structure. “Restructuring” may be an operation that removes (“prunes”) otherwise obligatory nodes, such as CP and TP, which would be barriers for movement of the sort noted (see e.g. Rizzi 1978). An alternative is that restructuring constructions start out with less structure, with some matrix verbs being able to select VPs rather than CPs or TPs (Wurmbrand 2001). On all accounts, it is the matrix predicate that determines which infinitival complements restructure. (See Schmid, Bader, and Bayer 2005 for a psycholinguistics exploration of the diagnostics.)

English does not exhibit any evidence like German or Italian for restructuring. Whether English has such a process is unclear. Often, *modal* (12a), *aspectual* (12b), and *implicative* verbs (12c; which entail the truth of their complement), are considered “restructured” in the sense that they may select for smaller complements (VPs rather than whole clauses). One diagnostic is that as control verbs they do not permit the controlled PRO to agree with a plural denoting verb, while other non-restructuring predicates do (Landau 1999). So for instance, the PRO in (13a-c) can be plural, making the collective predicate *meet* or *together* grammatical when predicated of the embedded PRO. Those in (13a-c) cannot (Barrie 2004). This phenomena is dubbed partial control.

(12) *English “restructuring”* (Barrie 2004)

- a. *John must meet at 9/go shopping together. *no partial control*
b. *John started to meet at 9/go shopping together. *no partial control*
c. *John managed to meet at 9/go shopping together. *no partial control*

(13) *Non-restructuring*

- a. John wanted to meet at 9. *partial control ok*
b. John decided to meet at 9. *partial control ok*
c. John promised (his wife) to go to the opera together. *partial control ok*

How these facts argue for “less” structure is not clear in these works, but the intuition that (13a,b) involve less follows if they do not contain PRO, but rather a VP complement controlled in the sense of Chierchia 1984 by a meaning postulate that supplies the referent of the embedded subject (see also Wurmbrand 2001).

Let's set aside the modal verbs from further discussion since they are very likely raising, mono-clausal constructions anyway. The aspectuals, however, appear to be amenable to an analysis that posits smaller or "restructured" complements. I would like to add another piece of evidence that the *aspectual* complements are restructured in this way by characterizing such predicates as not introducing a separate event structure (a property that I will later suggest may play a role in the availability of inverse scope).

Semantically, the complement of an aspectual verb is eventive. The aspectual predicates tell us something about the *start* or *end* of such events, and in the case of *begin* or *start* say that the complement does not hold before the *beginning* time (Portner 1992). The semantic complement of the aspectuals ought to be a set of events, which is only available if the complement is a vP/VP or smaller, since events are existentially closed at the Aspect level (Kratzer 1998). Furthermore, the aspectual verb itself does not constitute a separate event, meaning that in (14a-c) the event denoted by the embedded predicate is the same event that is *finished* or *begun*.

- (14) a. Ed finished writing his novel. *Restructuring/aspectual*
 b. Ed began to write his novel. *Restructuring/aspectual*
 c. Ed decided to write his novel. *Non restructuring*

So (14b) denotes a partial (beginning) event of novel-writing by Ed. One intuitive implementation of this is that *begin* does not introduce any event argument distinct from the embedded verb (but see section 4, based on Portner 1992). Compare this, say, with *decide* in (14c) which involves an event that is distinct from the (potential) event denoted by the embedded predicate (the event that is a *deciding by Ed* is not an event of *novel-writing*). It is also likely that complements to the aspectuals do not contain a tense node since there is no plausible way to allow different temporal interpretations for the matrix vs. embedded clause in such cases:

- (15) a. #Earlier this evening, Michael began to cook dinner this morning.
 b. #Today, Michael started to make dinner at night.
 c. #Tonight, Michael will finish cooking the quiche yesterday.

I sum, I assume that the aspectuals are restructuring predicates in English, in the sense that they are structures containing only one TP, the matrix verb selecting for a VP. The verb *try*, also a typical restructuring verb, can be understood along similar lines. A *trying* event cannot be disassociated from the event denoted by the complement. At least in the agent's goals, the event of *trying* should overlap with the event denoted by the embedded predicate.

The implicative verbs represent another case where taking a close look at the number of events involved in the sentence provides evidence for restructuring. Karttunen (1971) shows that implicative verbs entail their complements while at the same time comment on, or implicate, certain things about that event. A sentence such as (16a)

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entails that *John finished his dissertation* and implicates that it was somehow difficult.⁵ The predicates in (16b-e) entail that the subject performed the action denoted by the embedded clause but also make some commentary on that action. *Forget*, a negative factive, entails the negation of its complement and implies that the agent *should* have performed the complement action.

- (16)
- a. John managed to finish his dissertation.
 - b. Mary bothered to talk to her parents.
 - c. Fred condescended to take his brother to the zoo.
 - d. The boys dared to dance with the girls.
 - e. Ed remembered/forgot to turn out the light.

An important property of implicative constructions is that we cannot construe the implicative verb as contributing a distinct event. We cannot factor out a *managing* event in (16a) from the event of *John finishing his dissertation*. Further diagnostics for restructuring, such as the unavailability of partial control and the inability for distinct temporal modifiers on the embedding and embedded predicate, all place implicatives in the restructuring category.

In contrast, typically non-restructuring predicates involve distinct events. A selection of typically non-restructuring predicates is shown in (17). In each, the embedded predicate can be modified by a distinct temporal modifier from the matrix predicate, and as shown above (13), also permit partial control.

- (17) a. Today, John $\left\{ \begin{array}{l} \text{expected} \\ \text{hoped} \\ \text{wanted} \\ \text{decided} \end{array} \right\}$ to go to Kingston tomorrow.

The state of *expecting* or *hoping* is distinct from the eventuality denoted by the complement clause: *expecting to do something* is clearly not the same eventuality as *doing that something*.

While discussion of events is not usually the criteria used for “restructuring”, this discussion serves to identify some criteria, including event identity, for “restructuring” in English so that we can test Hornstein’s Conjecture for English.⁶

⁵ We know that the complement is entailed, not presupposed, since under negation the complement is negated (unlike the factive complements).

- (i) John didn’t manage to finish his dissertation. *entails* *John didn’t finish his dissertation*.
- (ii) Mary didn’t know Fred finished his dissertation. *presupposes* *Fred finished his dissertation*.

⁶ The single-event distinction cannot be what determines restructuring in Romance and Germanic, for the simple reason that *want* typically restructures in these languages, and it is clear that *wanting* events are not identified with the wanted-event. Below, in the last section, I will explore the idea that *situations* (Kratzer 2007), not *events*, are a better notion here.

2.1 Background: processing and QR

Before turning to the experiments, I will briefly provide some psycholinguistic background to put the experimental component of this study in context and to motivate the experimental design. Processing studies of quantifier scope comprehension have identified a preference for surface scope interpretation in a doubly quantified sentences. A recurring question is whether this preference arises from general comprehension preferences or whether it arises from structural properties of the linguistic forms that represent scope relations. A role for linguistic structure in scope preferences has been argued for by Tunstall (1999). Anderson (2004) formulates a related processing principle, Processing Scope Economy, which says that the processor prefers to compute a scope representation with the simplest syntactic (LF) representation, and that computing an inverse scope representation will incur a processing costs. Anderson conducted off- and on-line experiments with doubly quantified sentences. Anderson supplied contexts that either supported or didn't support the inverse scope construal of a doubly-quantified sentence, which was presented as the final sentence of the contexts. This was followed by a comprehension question with two possible answers. A scenario biased to inverse-scope is given below:

(18) Anderson (2004: (58)37)

With the increased popularity of adventure sports, the cliffs outside Campbellton were becoming a popular destination. One weekend, the climbing equipment shop sponsored a race between climbing enthusiasts. While an official timed the event, an experienced climber scaled every cliff.

How many climbers scaled cliffs?

A. One. B. Several.

A *several* answer corresponds to an inverse scope construal, where the mapping between *cliffs* and *climbers* is many-to-many. A *one* response indicates a surface scope construal, where one *climber* scaled all the *cliffs*. However, a *one* response is compatible with the truth-conditions of an inverse scope representation of (18), which simply says that for all cliffs, there was some climber who scaled it. Anderson's design could potentially underestimate inverse scope construals, but since her interest, and ours below, is the ease of inverse scope, taking only a *several* response to indicate inverse scope is a safer measure.

Anderson found that even when a discourse supported inverse scope, as in (18), an inverse-scope interpretation still incurred a processing cost. Anderson measured longer reading times for sentences following the target that disambiguated to inverse-scope, as well as on reading the quantified sentence itself.

The basic design Anderson used in (18) will be applied in the following off-line experiments, since it promotes inverse scopes as much as possible (without fully disambiguating). Anderson's results are important for our purposes because in order to

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measure the relative difficulty of inverse scope among different syntactic constructions, we would do well to create scenarios that equally promote the inverse scope construal in the first place.

3. Experiment 1

Experiment 1 tested whether inverse scope is more easily available in mono-clausal constructions than infinitives, and, secondarily, whether there are differences between types of infinitival complements.

Since non-surface scopes are in general difficult for comprehenders, it is surmised that comprehenders compute a surface scope interpretation before they entertain inverse scope (cf. Kurtzman and MacDonald 1993). We want to compare the availability of *inverse* scope in various kinds of constructions, so reasonably complex scenarios were created that supported an inverse scope construal for the target sentences. Contexts that supported inverse scope construal followed patterns similar to that in (19).

(19) *Sample Item*

The restaurant was very busy on Saturday night. The head chef needed all his assistant chefs to pitch in. When he returned from the market, he was pleased that an assistant chef prepared / had begun / helped/ decided to prepare every dish.

How many assistant chefs prepared/ had begun /helped /decided to prepare dishes?

One Several

The final target sentence contained a matrix quantifier (*a NP*) and an embedded object QP (*every NP*). Following Anderson's (2004) strategy, a how-many question asked whether *a NP* denoted a plurality or singleton set. A plural answer (*several*) is only compatible with an inverse scope reading of the sentence.⁷

The target sentences had four different versions depending on clause type: (a) mono-clausal, (b) aspectual/restructuring, (c) implicative restructuring, and (d) non-restructuring. I divided English infinitival taking verbs into three classes, based mostly on Karttunen (1971), the typology of Wurmbrand 2001, and the discussion above.

(20)	Restructuring	Implicative Restructuring	Non-restructuring
	<i>begin</i>	<i>managed</i>	<i>decide</i>
	<i>start</i>	<i>bother</i>	<i>hope</i>
	<i>try</i>	<i>dared</i>	<i>expect</i>

If inverse scope is more difficult in infinitival constructions, then we predict that comprehenders will choose a "several" answer less often in the (b-d) conditions than the

⁷ As with Anderson's experiments, a "one" response is compatible with an inverse scope construal, thus potentially underestimating the amount of inverse scope construals.

mono-clausal constructions. Hornstein’s conjecture predicts that inverse scope will be more available in the restructuring conditions (b,c) than the non-restructuring sentences (d). No predications are made about the relative difficulty of the two types of restructuring predicates.

3.1 Methods

Materials Fifteen items similar to that shown in (19) were created, giving a total of sixteen items. Each item had four different versions, depending on whether the target sentence was (a) mono-clausal, (b) aspectual restructuring, (c) implicative, or (d) non-restructuring. The scenarios were constructed in such a way that a plurality of objects was introduced (as with the dishes in (19)) and a plurality of actors (the chefs). In each scenario, some expectation or goal was set-up so that all the object-pluralities (e.g. books) would be in the denotation of the embedded predicate (i.e. read). The scenarios were constructed so that the plausibility of one actor performing that activity—or wanting, beginning, or managing to perform that activity— was low, thus biasing toward a inverse scope. Materials appear in Appendix A.

Participants 36 native English speakers from the United States and Canada were tested, about half of whom were undergraduates at the University of Massachusetts receiving course credit.

Procedures In a pen-and-paper questionnaire, participants were asked to read short paragraphs like that above and answer questions below “based on what the paragraph says”. From the four version of the 16 items, four lists of 16 items were prepared, so that participants saw each item once in only one condition. The lists were randomized and counterbalanced. The items were among 20 other items from unrelated experiment, as well as 3 fillers near the beginning of the questionnaire which gave target mono-clausal sentences where an inverse scope reading was the only pragmatically available one. These were included in the hopes of priming for inverse scope.

3.2 Results

The mean proportion of ‘several’ responses (i.e. inverse-scope interpretations) for all items in each condition are presented in Table 1.

mono-clausal (a)	restructuring (b)	implicative (c)	non-restruc (d)
.71	.61	.61	.49

Table 1 Mean Proportion of inverse scope responses

Paired t-tests on an items analysis revealed a significant difference between mono-clausal (a) versus restructuring construction (b) ($p < .03$); between mono-clausal and non-restructuring constructions (d) ($p < .003$). The difference between mono-clausal and implicative predicates (c) was not significant ($p = .089$). All other comparisons were not significant, although comparison between (c) and (d) was $p < .088$. Paired t-tests on subjects performance revealed similar results: there was not a significant difference

between (a) and (b) ($p = .069$), but significant differences between (a) and (c) ($p = .05$) and (a) and (d) ($p < .001$). The differences between the restructuring/implicative and non-restructuring was not significant (both p values were $> .057$ on an items analysis).

3.3 Discussion

The results of Experiment 1 showed a significant difference between mono-clausal and infinitival constructions. The most robust difference, highly significant on both items and subjects analysis, was between the mono-clausal condition (a) and non-restructuring condition (d). This result confirms that inverse scope is more difficult out of at least some infinitival complements than in mono-clausal constructions. Moreover, since the contexts were heavily biased toward inverse scope – just as much, or more, than Kennedy’s examples – then the difficulty appears to be a property of non-restructuring infinitives themselves, not just an issue of presenting contexts to bring out inverse scope.

The difference between mono-clausal and restructuring predicates (significant on an items analysis but marginal on the subjects analysis) is suggestive that inverse scope is also harder out of restructuring predicates than mono-clauses. This is unexpected under a grammatical implementation of Hornstein’s restructuring account, since that would treat mono-clauses and restructuring constructions identically.

In conclusion, Experiment 1 revealed a difference between inverse scope in non-restructuring constructions and mono-clausal constructions. Experimental evidence, then, confirms the answer to Question I. As noted above, nothing about the syntactic representation of QR out of infinitives predicts this difference. Moreover, the suggestive evidence that mono-clausal and restructuring conditions may differ also suggests that there is a much more fine-grained distinction between these constructions. The experiments do not provide evidence that, as per Hornstein’s Conjecture, different types of infinitives give rise to differences in the availability of inverse scope. However, the restructuring predicates are clearly intermediate between the mono-clausal and non-restructuring conditions numerically. Experiment 2 was designed to make a fuller comparison between the types of infinitival constructions.

4. Experiment 2

In Experiment 2, the predicates were broken down according to a more fine-grained distinction according to the restructuring diagnostics outlined in Section 2. While the aspectual and implicative constructions are quite naturally construed as denoting one event, there remain predicates that are restructuring in other languages, for instances *try* and *want*, for which the English evidence does not comport well. I will call these *potentially restructuring* predicates, since their status is unclear. In Experiment 1, *try* was included in the aspectual restructuring predicates, while *want* was included in the non-restructuring predicates. This was based on the fact that *trying* events are naturally construed as proper parts of the event described by the complement, while *wanting* events are intuitively distinct from the desired event/situation denoted by the complement infinitive. However, *try* is not exactly like the aspectual verbs, since it refers to an agent’s

goals. This can be seen with goal-oriented *by*-phrases, which specify a time at which an agent wishes to accomplish something, as in (21a) with *try*. The aspectuals however, do not allow the *by*-phrase to denote a goal-time for the completion of the embedded event (21b); the *by*-phrase can only indicate the time the climbing event began:

- (21) a. We tried to climb Mount Monadnock by sunset.
b. #We began to climb Mount Monadnock by sunset.

Time-adverbials, such as *before*-clauses, can target the embedded clauses of *try* but not *begin* or *start*. (22a) can mean that we had a goal that was (an accomplishment) of an event of mountain climbing before sunset, but (22b) cannot mean we began an event that was an event of mountain-climbing before sunset.

- (22) a. We tried to climb the mountain before sunset.
b. We began to climb the mountain before sunset.

Try, then, is goal oriented and in this way allows us modify the embedded event (the accomplishment of which is the goal) independently of *try*. *Begin*, for whatever reason, does distinguish between the beginning of an event and its end-point or goal, but simply specifies the beginning point of that event.⁸ In this respect, the single-event analysis does not hold of *try*. Nevertheless, *try* is robustly found as an (optional) restructuring verb across Romance and Germanic (Wurmbrand 2001).

Similarly, *want* is also restructuring in many languages, although as we have shown above (section 2), *wanting eventualities* are necessarily distinct from the desired (or goal) eventuality denoted by the embedded clause. Since the status of *want* and *try* are unclear (I will refer to them as *putative restructuring predicates*) they are tested separately from the aspectuals (the core restructuring predicates) in Experiment 2. In addition to these two, there is a third condition of the typically non-restructuring predicates. The three conditions, restructuring (a), potentially restructuring (b), and non-restructuring (c) are shown below.

- | | | | |
|------|------------------|------------------------------|----------------------|
| (23) | a. Restructuring | b. Potentially Restructuring | c. Non-restructuring |
| | <i>Begin</i> | <i>want</i> | <i>decide</i> |
| | <i>start</i> | <i>try</i> | <i>hope</i> |
| | <i>finish</i> | | <i>expect</i> |

4.1 Methods

Materials As in Experiment 1, participants were presented with scenarios that were biased to an inverse scope construal. There were 12 items, each consisting of a paragraph, constructed like the scenarios in Experiment 1. Each item had three different versions, depending on whether the target sentence was restructuring (a), potentially restructuring

⁸ The reason that the aspectuals are not compatible with a goal *by*-phrase cannot simply be because they do not provide a goal. A plausible analysis of the aspectual complements is that the agent is engaged in an event, the end point of which, in the normal course of events, would be realized as an event denoted by the embedded predicate. This should be sufficient to provide a goal or accomplishment.

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(b), and non-restructuring (c). The target sentence contained a matrix indefinite (*a NP*) and an embedded object QP (*every NP*). Following Anderson's (2004) strategy, a how-many question asked whether *a NP* denoted a plurality or singleton set. A plural answer (*several*) is only compatible with an inverse scope reading of the sentence. A sample item is provided in (24). All materials appear in the appendix.

(24) *Sample Item*

There was a big highway accident and a lot of injured people were sent to the local hospital. All the hospital staff was called in to help, so people were in good hands. Once the victims arrived, a nurse (a) began / (b) tried / (c) decided to examine every patient.

How many nurses began/ tried/ decided to examine patients?

Several One

Participants 48 University of Massachusetts, Amherst undergraduates were tested in an in-class setting. All were native English speakers, and all received 1 extra-credit point for their linguistics course.

Procedures In a pen-and-paper questionnaire, participants were asked to read short paragraphs like that above and answer questions below "based on what the paragraph says". Twelve items were crossed with the three conditions. Three lists were prepared, so that participants saw each item once in only one condition. The lists were randomized and counterbalanced. Eight distracter items were included (which included unambiguous *how-many* questions), as well as 20 fillers from an unrelated experiment.

4.2 Results

The mean proportion of inverse-scope interpretations for all items in each condition are presented in Table 2.

<u>restructuring(a)</u>	<u>potentially restructuring (b)</u>	<u>non-restruc (c)</u>
<u>.37</u>	<u>.35</u>	<u>.32</u>

Table 2 Mean Proportion of inverse scope responses Experiment 2

Total inverse answers across conditions: .35

There was no significant difference between any of the conditions. While the overall direction of differences falls in line with Hornstein's conjecture (more inverse scope responses in restructuring conditions than non-restructuring, with the putative restructuring predicates falling in the middle), the individual items were highly variable and no significant effect was found.

It is of note, however, that there were a great number of participants who recorded no inverse-scope answers at all, which is surprising given the strength of some contexts

in promoting inverse scope. 1/5 (or 10 of 51) subjects got no inverse scope at all. And 20 subjects recorded less than 20% inverse scope. Furthermore, 6 subject answered inverse scope 80% of the time. I suspect that the first group—the ‘surface scope readers’—managed to accommodate the surface scope meanings in these contexts. For instance, in the scenario in (24), they may have construed the target sentence iteratively, with one nurse beginning to examine patients over a period of time.

4.3 Discussion

The hypothesis about Hornstein’s Conjecture was not confirmed, although numerically the comparison between all three conditions fell in the right distribution. The results were not significant, and the numerical spread suggests only a tendency for a difference between the restructuring and non-restructuring predicates, conditions (a) vs. (c), as per Hornstein’s Conjecture.

The average total inverse scope answers for the restructuring predicates was surprising, due to the high number of surface scope readers. Anderson (2004), using similarly biased scenarios but with mono-clausal target sentences, reports a 53% preference for inverse scope in biasing contexts. Also, Experiment 1 showed an even higher proportion of inverse scope responses overall, although as noted above this could be due to priming effects.

5. General Discussion

Experiment 1 showed comprehenders resisted inverse scope out of a non-restructuring infinitives as compared to mono-clausal constructions. Similarly, Experiment 1 showed that inverse scope was harder out of aspectual complement than mono-clausals (on the analysis by items), and inverse scope was harder out of implicative complements than mono-clauses (although only on a subjects analysis). In sum, the Experiment 1 showed that even when a context supported inverse scope out of infinitives, comprehenders still resisted an such an interpretation.

We saw that a straightforward syntactic solution would not distinguish between infinitival and mono-clausal constructions. Whatever complications to the syntactic representation that inverse scope poses, or to syntactic processing (Anderson 2004), mono-clause and infinitival clauses should behave the same way. The results of the Experiment show they do not. In the remaining section, I will sketch two non-syntactic approaches to why inverse scope out of infinitives is more difficult for comprehenders. The first is a pragmatic proposal based on the plausibility of surface-scope in infinitival constructions that introduce intensional contexts. The second is a semantic approach based on the complexity of the situations, and their part structure, denoted by the combination of main and embedded clause.

5.1 A pragmatic approach

The non-restructuring predicates, which resist inverse scope compared to mono-clauses even in supporting contexts, are all intensional predicates: *want*, *hope*, *decide*, *choose*, *promise*, *plan*. They are non-veridical, in that their complement does not hold (either for the speech participants or the attitude holder herself). As a consequence, the holder of such attitudes can *hope* or *want* or *plan* for something that is either not possible or pragmatically improbable. In this case, whatever pressures might force an inverse scope reading in mono-clauses, because the result is implausible, could be perfectly natural in the context of these attitudes.

An item from Experiment 1 (item [8] in Appendix A) illustrates. The surface scope reading for the mono-clausal condition in (25a) is pragmatically implausible since it is hard for one person to (simultaneously, at least) sing every part. However, it is not unlikely that a student could decide, however foolishly, to sing every part (25b).

- (25) The school choir was practicing a new piece that was divided into parts for soprano, alto, tenor, and bass singers. All the parts needed to be sung...
- a. ... The director was happy that a student **sang** every part
 - b. ... The director was happy that a student **decided to sing** every part

The difference that was found between non-restructuring and mono-clausal constructions could be an artifact of surface scope being, in general, more plausible in the non-restructuring cases as compared to the simple clause cases. Since surface scope incurs less processing cost than inverse scope (Anderson 2004), comprehenders may be more willing to interpret a sentence like (25b) with surface scope since it is still a plausible scenario. Only in the case of (25a), then, would comprehenders be forced scope shift, since the forward scope leads to an anomaly.

While the experiments do not rule out such a hypothesis, I believe there are some reasons to doubt this particular approach. If it were the case, we would not expect surface scope to in general be difficult with non-restructuring constructions as long as a suitable scenario provides motivation for inverse scope. The experimental scenarios were designed so that an inverse scope in non-restructuring cases would be plausible (and it is difficult to see why it would be any less plausible than a surface scope construal). In all items, multiple characters corresponding to the indefinite (i.e. students in (25)) are introduced. Moreover, in many scenarios (7/16 items) the context was enriched in such a way that there was an expectation, on the part of a third character, that more than one actor was involved. So for instance, in the scenario below (item [5] in appendix A), the editor sets up an expectation that “all the copy editors pitch in”, one which is implied to have been fulfilled.

- (26) The local newspaper had a big issue coming out and the editor wanted all the copy editors to pitch in. When he came into the newsroom, he was relieved that a copy proofread every article/ decided to proofread every article.

Also, the implausibility of surface scope in mono-clauses are not nearly as strong in all cases in the experiment. As with example (27), it is possible to imagine one copyeditor proofreading all the articles. None of the mono-clause conditions are on a par with examples like (28), where it is incompatible with our knowledge of the world that one person can sit in every seat:

(28) When I got to the theatre, a person was sitting in every seat. # $\exists > \forall$

Moreover, Kennedy's examples (5), which are all heavily biased to inverse scope, appear to be quite difficult. Why would that be so if it weren't the case the inverse scope is hard absolutely in non-restructuring contexts. In any event, I leave it as an open question whether the pragmatic plausibility of forward scope in non-restructuring, i.e. intensional contexts, is what distinguishes it from mono-clausal constructions.

5.2 A semantic approach

The second approach is a semantic one. To see where it leads, let's first consider the logical representation of inverse scope of the distributive universal quantifier *every* which scopes over indefinites. When the predicate is eventive there is a (existential) quantifier binding the event variable (existential quantifier over events (EQE)), perhaps at the edge of the VP (Parsons 1990). In the case of (29), when the universal scopes over the EQE, the members of the universally quantified set are distributed over some (possibly different) event or situations by (possibly) different agents. I will move to using situations instead of events, a move that will become clearer below.

(29) A boy read every book. (on $\forall > \exists$ reading)

(30) $\lambda s \forall x [\text{book}(x)(s) \rightarrow \exists s' [s' \leq s \ \& \ \exists y [\text{boy}(y)(s') \rightarrow \text{read}(y)(x)(s')]]]$

The set of situations s such that for all books x there is some situation s' that is part of s and there is some boy in s' who reads x in s' .

The quantificational subject, then, bears a scope relation with the situation quantifier that ranges over situations described by the predicate: for each book in (30), there is a (possibly different) situation in which that book is read (by some, possibly different, boy). When we make the same move with bi-clausal constructions, things become a little more complex.

First, a denotation for a non-restructuring sentence is given in (31). It denotes the set of situations that are *wanting* situations of Fred. Additionally, an accessibility relation (a bouletic one)⁹ is added so that in all situations s' compatible with what Fred wants in s , the complement infinitive is true in s' .

⁹ This formulation of attitude reports differs slightly from more standard formulations, in that I have shown a distinct conjunct ("want(Fred,s)") representing the *wanting* situation. Also, I am collapsing the situation argument here with the Davidsonian event argument. See Portner 1992 for such a move.

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- (31) a. Fred wants to be here.
 b. $\{s: \text{want}(\text{Fred},s) \ \& \ \forall s' \in \text{Bouletic}(\text{Fred},s): \text{Fred is here in } s'\}$

The crucial piece is that there are two situation arguments. Turning to the inverse scope cases (32a), where the universal scopes over both the indefinite and the EQE, we arrive at a representation like (32b). In this case, there is a scope relation between the quantificational subject and the EQE. Each member of the set of *books* is mapped to a (possibly different) wanting situations (where s , s' , and r are variables over possible situations).

- (32) a. A student wants to read every book
 b. $\lambda s \forall x [\text{book}(x)(s) \rightarrow \exists s' [s' \leq s \ \& \ \exists y [\text{boy}(y)(s') \rightarrow \text{want}(y,s') \ \& \ \forall r \in \text{Buletic}(y,s'): y \text{ reads } x \text{ in } r]]]$

The set of situations s such that for all books x there is some situation s' (that is part of s) and s' is a wanting situation and there is some student y in s' whose wanted situations r are situations in which y reads x .

informally: for each book x , there is some situation in which there is wanting by some student y such that in all wanted situations of y , y reads x .

Here the members of the universally quantified set are not in the situations that the universal quantifier immediately scopes over. The universal quantifier scopes over the existential that binds situations of wanting to read those books.¹⁰ That is, we have mapped each book to a (possibly different) situation, a situation in which there is wanting by some student. Curiously, however, the mapping is not between books and situations that involve those books. Rather, it is a mapping between books and a situation which only indirectly, via the accessibility relation, involves situations in which those books are read. This is an added step compared to the mono-clausal case, where for each member of the universally quantified set there was a (possibly unique) situation which contained those members. This added complexity can be demonstrated in the charts below, where the set of books is mapped (via \rightarrow) with situations (I have matched each book with a unique situation of reading, which corresponds to the most natural interpretation.)

¹⁰ Strictly speaking, these are situations *in which* there is a *state of wanting*, but I gloss over that distinction for now. I am also ignoring the *de re / de dicto* ambiguity here. The situation variable on the predicate books could be either s' or r , depending on whether it is an actual book that a student wants to read, or some possible book.

(33) Mono-clausal

Books		\exists -quantified situations (situations which contain the book)
b_1	\rightarrow	s_a : b_1 is read in s_a
b_2	\rightarrow	s_b : b_2 is read in s_b
b_3	\rightarrow	s_c : b_3 is read in s_c
b_4	\rightarrow	s_d : b_4 is read in s_d

In the bi-clausal, non-restructuring constructions, the books are mapped to situations which are wanting situations by some student. A further (set of) situations is introduced: each book is read in some (possible) situation (which I will denote with a subscripted r).

(34) Bi-clausal:

Books		\exists -quantified Situations	Situations which contain the book
b_1	\rightarrow	s_a : $\exists y$. wanting by y in s_a	$\forall r_a \in \text{Boul}(y, s_a)$: b_1 is read in r_a
b_2	\rightarrow	s_b : $\exists y$. wanting by y in s_b	$\forall r_b \in \text{Boul}(y, s_b)$: b_2 is read in r_b
b_3	\rightarrow	s_c : $\exists y$. wanting by y in s_c	$\forall r_c \in \text{Boul}(y, s_c)$: b_3 is read in r_c
b_4	\rightarrow	s_d : $\exists y$. wanting by y in s_d	$\forall r_d \in \text{Boul}(y, s_d)$: b_4 is read in r_d

The books are not read *in* the *wanting* situations, rather they are read in merely accessible situations. It is this added complexity, going from EQ-situations to situations in which the books are read, that I would like to suggest is responsible for the relative difficulty of (distributed) inverse scope in such bi-clausal constructions. Crucially, the complexity is not that there are multiple situations in these representations (that would just come down to the propositional complexity of the sentences). Rather, it is the fact that there is a “mismatch”, informally speaking, between the situations the books are mapped to and the situations the books (or their modal counterparts) are actually in. It is not in the linguistic representation per se where this mismatch is, but in the model supporting the truth of these meanings.

When we turn to the restructuring cases, which I argued involve one event, the EQE quantifies over situations that directly contain the members of the universally quantified set. (Again, the move from events to situations should be innocuous here.)

(35) a. A student began to read every book.

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- b. $\lambda s \forall x [\text{book}(x)(s) \rightarrow \exists s' [s' \leq s \ \& \ \exists y [\text{student}(y)(s') \rightarrow s' \text{ contains a (partial) reading of } x \text{ by } y]]]$

The set of situations s such that for all books x there is some situation s' that is part of s and there is some student in s' and s' is a (partial) reading of x by y .

The mapping between books and situations in which there are books is direct. It is crucial here to stipulate that the situations in the denotation of y *began to read* x are partial situations of book-reading. We do not want (35) to entail that books were read, but we do want some book-reading to be in the situations that (34) denotes. This predicts that restructuring cases should behave just like mono-clausal constructions. However, Experiment 1 showed, albeit only significant in an items analysis, that inverse scope was more difficult in aspectual verbs than mono-clausal constructions. Moreover, Hornstein's Conjecture (although not experimentally verified) suggests that the aspectuals cases should fall somewhere between the mono-clausal and non-restructuring conditions.

I think there is a way, using situation semantics, to make the aspectual constructions more complex than mono-clauses but less complex than non-restructuring infinitives. Portner (1992) gives aspectual constructions a similar semantics to non-restructuring infinitival complements. What ties these kinds of complements together is that they are future oriented in some way or another. Portner adopts a meaning for future oriented infinitives (FIs) that is dependent on the part-structure of situations. In the case of non-restructuring infinitives, the infinitive denotes a set a of situations that begin with a (counterpart) of the embedding, e.g. *wanting*, situation and “grows into” a situation (has temporally later sub-situations) where the complement holds. Crucially, though, as with the formulation in (32b) above, the wanting situation is distinct from the situation in which the complement (possibly) holds.

Portner gives the same denotation for the infinitival complement of *begin*. While I argued in section 2.2 that there is only one event in aspectual constructions (the beginning event is an event that is in the denotation of the complement), Portner argues, in a situation semantics, that there is a distinct situation associated with the *beginning* event, which provides a reference situation for the infinitive. Portner argues that FIs are a “set of future-oriented alternatives of some kind to the reference situation”. Opacity is involved, then, in the sense that infinitives have in their meaning not the reference situation itself, but a counterpart of the reference situation.¹¹ The infinitive is a function from that reference situation to sets of situations that begin with a counterpart of that reference situation and have (temporally later) sub-situations that are in the denotation of the embedded VP. A sentence like (36a) has the meaning in (36b).

- (36) a. John started to wash the dishes.

¹¹ Portner's counterpart relation is stronger than usual – what he calls a duplicate-counterpart relation. The counterpart situations are exactly alike qualitatively as well as being located in their respective worlds in just the same way.

- b. {s: it is not the case that there exists immediately before s an s' which contains as its initial segment a duplicate counterpart of s which contains a situation of John washing the dishes and **there exists immediately after s a situation whose initial segment is a counterpart of s and which contains a situation of John washing the dishes.**}

The formulation in (36b) is complex, but the important part is put in bold. (The first clause stipulates that no dishwashing occurs before the time at which the starting situation holds, which is how the semantic contribution of the aspectual verb is captured, as a change in the existence of an event at a particular time (Dowty 1979)). The infinitive then is a set of situations whose beginning part is a counterpart of the starting situation and has as another part a situation that is in the denotation of [John washing the dishes].

Portner argues for this account by pointing out that there can be a “gap” between the time of the starting situation and the time of the initial segment of the dish-washing. Portner shows that unlike gerundive complements (37a), infinitival complements to aspectual verbs do not have to be true right at the time of starting: (37b) is true if Mary turns on the stereo at 5pm and only listens at 5:01pm.

- (37) a. Mary started listening to the CD at 5pm. (Porter 1992 (163a,b):353)
 b. Mary started to listen to the CD at 5pm.

Crucially, though, although the beginning/starting situation has a counterpart which is a (partial) situation of John washing the dishes, the starting situation is not identical to the initial part of the dish-washing (or CD-listening) situation.

Now we can see why a wide-scope distributive quantifier, which bears a scope relation with the top-most quantifier over situations in its nuclear scope, could involve the same kind of complexity in aspectuals as non-restructuring predicates. If we scope the universal over the EQE that binds the *starting* situations in (38), we get a starting situation for each book (books → starting situations), but the mapping between books and situations in which those books are (partially) read is indirect:

- (38) a. A student started to read every book.
 b. $\lambda s \forall x [\text{book}(x) \rightarrow \exists s' < s \ \& \ \exists y [\text{boy}(y)(s') \rightarrow \exists s'' \text{ immediately after } s' \text{ whose initial segment is a counterpart of } s' \text{ and contains a situation } s'' \text{ in which } y \text{ reads } x]$

Like the non-restructuring cases, the books are mapped to situations (s') of beginning or starting, which only indirectly, through both a counterpart relation and part relation, are (partial) situations in which books are read. If, as proposed above, this indirect mapping between the universally quantified set and the situations they are part of is what make inverse scope out of infinitives more difficult, then we expect aspectuals to behave just like non-restructuring cases.

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However, there is a certain amount of vagueness in infinitival complements to aspectual verbs. While it seems true that in (37b) the starting situation could not contain a situation of CD-listening, the sentence is still true if CD-listening happens from the very start. It may be the vagueness in how we construe situations which is responsible for whether we construe the starting situation as containing a CD-listening situation or simply leading to another (very closely following) situation. If the part-structure of situations has this kind of vagueness, something Kratzer has pointed out, then we might expect aspectuals to fall somewhere in the middle according to inverse scope possibilities depending on how precise we construe the overlap between situations.

Since gerundive complements to aspectuals, as in (37a), require the kind of situation overlap just described (where the starting situation is also a situation of CD-listening) we would predict, on this approach, that inverse scope is more likely here. So in following the scenario, we predict more inverse scope response for (39b) than (39a).

- (39) All the toilets in the apartment building were broken and the landlord had to hire five plumbers in order to get the toilets fixed...
- a. ... A plumber began to fix every toilet.
 - b. ...A plumber began fixing every toilet.

My intuitions support the hypothesis that inverse scope out of the gerundive is easier than out of the infinitive.

We are left with the implicative constructions. I argued that these were restructuring based on the fact that *managing* events were not distinct from the events denoted by the complement infinitive, in which case we would expect them to behave like mono-clausal constructions. The subjects analysis of Experiment 1 revealed a small difference, however, such that inverse scope was less likely for implicative constructions than mono-clausal constructions.

While the experiment does not settle the question, it could be the case that other factors inhibit inverse scope in implicatives. Implicatives of the sort used in Experiment 1, such as *dare*, *manage*, implicate that doing something was difficult or challenging for the agent (Karttunen 1971). One way for comprehenders to make sense of the choice of implicative verb in these cases is to assume that the agent *managed* or *dared* to do something difficult, and in many cases this would correspond to forward scope. For instance, in the scenario in (40), one plumber fixing all the toilets makes sense of the implicative *manage*, since that would be difficult to do.

- (40) All the toilets in the apartment building were broken and the landlord had to hire five plumbers in order to get the toilets fixed. A plumber managed to fix every toilet.

When looking at the individual items in Experiment 1, 13 of the 16 items showed less inverse scope for implicatives than mono-clauses. Interestingly, however, of the three implicative items that showed *more* inverse scope than mono-clauses, two of these used

the implicative verb *help*. This verb is unlike *manage* and *dare* in that it does not imply that the event was difficult for the agent, thus removing a pragmatic reason for accepting surface scope.

Again, further work needs to tease apart implicatives from mono-clauses. In particular, an experiment that used more neutral implicatives could test whether it is the complexity of the situation/event structure that increases difficulty for inverse scope.

5. Conclusion

The experiments verified at least one intuition: inverse scope is harder out of some infinitivals than mono-clause constructions. If the discussion about the clause-boundedness of QR is on the right track—and we conclude that we cannot make any syntactic distinction between QR within one clause and QR across an infinitival complement—then this finding is not easily accounted for. I proposed two ways of approaching the difference. The pragmatic approach, which argued that surface scope is more plausible for non-restructuring/intensional predicates than it is for mono-clauses, is one possibility. However, this may not capture the absolute difficulty of inverse scope in these constructions, and why even in the presence of a context that supports inverse scope, a difference still emerges.

The semantically-based approach characterized the cost of inverse scope when more than one situation was involved. Moreover, there is hope that this approach can discriminate between different types of infinitival complements: the extent to which we can construe some overlap between the situations in the matrix and embedded clause, then the mapping will more directly match the universally quantified set with the situations which contain members of that set. The intermediary status of the restructuring predicates—Hornstein’s Conjecture—supports this approach.

The semantic approach makes some very different predictions from existing syntactic and processing approaches to scope relations. First, it is important to see that, strictly speaking, the situation-based approach does not tie the difficulty in bi-clausal construction to inverse scope per se. The difficulty is a (distributive) universal quantifier taking immediate scope over existentially quantified situations that do not themselves directly contain the members of the quantified set. This predicts then when scope is disambiguated to $\forall > \exists$, bi-clausal constructions will be more difficult to process than mono-clausal constructions. In (40), the universal is the head of a relative clause (which is a scope island)¹² which binds a gap in an embedded infinitive in (40a-c).

- (40) a. Every book that some student wanted to read (has been banned).
 b. Every book that some student began to read (has been banned).
 c. Every book that some student managed to read (had been banned).
 d. Every book that some student read (has since been banned).

¹² The indefinite might appear to out-scope islands, but this would happen equally across the types of sentences in (40) so that cannot account for any difference between mono- and bi-clausal sentences.

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Compared to the mono-clause in (40d), the complex sentences here should be hard to process. Of course, the bi-clausal constructions exhibit more propositional and syntactic complexity (the bi-clausal constructions require long distance binding by relative operator movement), which could be responsible for intuitions that (40a) is more difficult than (40d).

The semantic approach also makes another processing prediction. If the embedding situation is more salient or relevant to the distribution of the members of the universally quantified set, then comprehenders might find inverse scope easier because the members of the universally quantified set will bear a more direct relation to the embedding situation. In the following scenario, the *wanting* situations are relevant:

- (41) The library administrators were considering removing a lot of the back issues of a linguistic journal, because in the last few months only a few of the most recent issues had been checked out. The linguistics department representative on the library committee, however, pointed **out that over a long period of time, someone will want to read every issue**, so all of the issues should be available.

In this scenario, the point is being made in the doubly quantified sentence in bold that every issue will be *wanted* at some point. The focus is on situations of wanting certain issues (rather than on the reading situations, since under the library's proposal the journals won't be available for reading at all!). The approach taken here may accommodate this since comprehension is easier if the relation between the quantifier and the situations is more direct. Of course, the logical form of these bi-clauses sentences is still such that the quantifier binds an argument in a distinct (set of) situations than the situations it immediately quantifies over. However, the over all information conveyed by the utterance is about the relation between the journal issues and wanting situations, which should make it easier for comprehenders to let the universal quantify over *wanting* situations directly. Further work is needed to tease apart what kinds of information-structure properties of utterances helps inverse scope. In particular, we need to ask the question from a production stand point: how are speakers most likely to convey the kinds of meanings expressed by these inverse scopes out of infinitives. The meanings seem be most easily expressed if the universal quantifier serves as a topic. It is interesting to note that passivization out of these complements, a strategy that would topicalize the embedded object quantifier, is not available for the predicates under question, like *want*.

- (42) *Every journal issue will be wanted to be read.

Nevertheless, (42) seems to come closest to unambiguously expressing the intended meaning of the target sentence in (41). Taking a closer look at the means by which speakers (grammatically) express these meanings might shed light on the comprehension difficulties.

Appendix

A. Experiment 1 Materials

1. The 8th grade class was having a dance. The teachers were worried that the boys wouldn't want to hang out with the girls. When the dance began, they were happy that a boy was dancing /had started/ dared/ wanted to dance with every girl.
How many boys were dancing with the girls?
One Several
2. The restaurant was very busy on Saturday night. The head chef needed all his assistant chefs to pitch in. When he returned from the market, he was pleased that an assistant chef prepared / had begun / helped/ decided to prepare every dish.
How many assistant chefs had begun to prepare dishes?
One Several
3. A Lobby group in Washington set out to make sure a new bill would pass in the Senate. Representatives from the lobby group were sent to Capitol Hill. A lobbyist convinced/ tried / managed / hoped to convince every senator to vote for the bill.
How many lobbyists managed to convince senators to vote for the bill?
One Several
4. All the toilets in the apartment building were broken and the landlord had to hire five plumbers in order to get the toilets fixed. A plumber fixed/ tried / managed / promised to fix every toilet.
How many plumbers promised to fix toilets?
One Several
5. The local newspaper had a big issue coming out and the editor wanted all the copy editors to pitch in. When he came into the newsroom, he was relieved that a copy editor had proofread /had begun / managed/ decided / to proofread every article.
How many copy editors proofread articles?
One several
6. Last week, 50 protesters were marching outside the embassy. Many police officers were sent to keep the peace. When riots broke out, a police officer arrested / began / managed / decided / to arrest every protest
How many police officers began to arrest protestors?
One Several
7. The chemistry lab was busy and had 30 experiments to finish. The lab director hired a number of assistants to get the work done. Within one week, a research assistant had run / had begun / had managed / wanted to run every experiment.
How many research assistants managed to run experiments?
One Several
8. The school choir was practicing a new piece that was divided into parts for soprano, alto, tenor, and bass singers. All the parts needed to be sung. The director was happy that a student sang / tried / managed / decided to sing every part.
How many students decided to sing the parts?
One Several

Scope Relations and Infinitival Complements

9. There was a big highway accident and a lot of injured people were sent to the local hospital. All the hospital staff was called in to help. Once the victims arrived, a nurse examined / began / managed / decided / to examine every one of them.
How many nurses examined victims?
Several One
10. There was a house on fire last week and it spread to 10 other neighboring houses. Fireman were called to rescue people trapped in the burning houses. Although it was dangerous, a fireman got / tried / managed / hoped / to get into every house.
How many fireman tried to get into the houses?
Several One
11. The local rock climbing club hosted a competition. The location had many cliffs so lots of climbers could compete at the same time. As soon as the start signal went off, a climber scaled / began/ managed/ choose [sic] / to scale every cliff.
How many climbers managed to scale cliffs?
One Several
12. The community center put on a play. They needed to make 30 costumes in one day. Luckily, many volunteers showed up to make the costumes. A volunteer made / started / helped / promised to make every costume.
How many volunteers promised to make costumes?
One Several
13. John's school was hosting a car wash to raise money. John hoped that a lot of students would participate. When he arrived at the school, John was pleased that a student had washed / had begun/ helped/ had promised / to wash every car that was waiting in line.
How many students washed cars?
One Several
14. The members of the wine tasting club decided to sample twenty new wines from Australia. Each member was supposed to choose at least one wine to try. An hour into their club meeting, a member of the club had tasted / had begun / managed / decided / to taste every wine.
How many club members began to taste wine?
One Several
15. The day care center bought a lot of new books, so that all the children would have something to read. The teacher at the center was happy to learn that a child read / had started / managed / wanted / to read every book
How many children managed to read the books?
One Several
16. The body shop had 20 cars that needed to be repaired in a short time. All the mechanics were called in to help. On Monday morning, a mechanic repaired / started / managed / planned to repair every car.
How many mechanics planned to repair the cars?
One Several

Scope Relations and Infinitival Complements

they sang the song for the first time, the director was happy that a student (a) began / (b) tried / (c) decided to sing every part in perfect tune.

How many students tried to sing?

One Several

9. There was a big highway accident and a lot of injured people were sent to the local hospital. All the hospital staff was called in to help, so people were in good hands. Once the victims arrived, a nurse (a) began / (b) tried / (c) decided to examine every patient.

How many nurses decided to examine patients?

Several One

10. The local community center held a county fair to raise money for the hospital. They set up a number of rides for children, such as a Ferris wheel and bumper cars. The event was a success and the rides were popular with all the kids. As soon as the fair opened, a child (a) started / (b) wanted / (c) decided to go on every ride.

How many children began to go on rides?

Several One

11. The local climbing club hosted a competition at an area with a lot of cliffs. Amateur climbers were invited to take part in the challenge. As soon as the start signal went off, a climber (a) began / (b) tried / (c) decided to scale every cliff.

How many climbers tried to scale cliffs?

One Several

12. Last weekend, there was a big sale at the local Honda dealership. They were selling last year's hybrid cars and lots of people showed up. Soon after the sale began on Saturday morning, a customer (a) began / (b) wanted / (c) decided to test drive every car.

How many customers decided to test drive cars?

Several One

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