

# Telescoping and Scope Economy

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## 1 Introduction: Universal Quantification Across Clauses

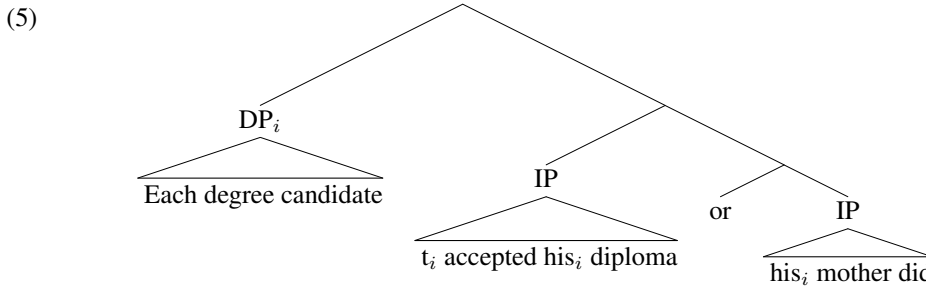
Universal quantifiers sometimes appear to bind variables across disjunction, conjunction, and even separate sentences:

- (1) Each degree candidate accepted his diploma or (if he was sick) his mother did.
- (2) Each degree candidate accepted his diploma and his mother took a picture.
- (3) Each degree candidate walked to the stage. He took his diploma from the Dean and returned to his seat. (=Roberts's 29, crediting Partee)<sup>1</sup>

In each of the sentences above, the universal quantifier “each degree candidate” appears to bind the variable “his” in a separate clause. In the disjunction case, the universal quantifier seems to take wide scope, outscoping even the disjunction itself. This gives (1) a meaning like (4a), instead of one where perhaps the quantifier is repeated in the second disjunct as in (4b):

- (4) a. For each degree candidate  $x$ , either  $x$  accepted  $x$ 's diploma or  $x$ 's mother accepted  $x$ 's diploma.  
b. Either for each degree candidate  $x$ ,  $x$  accepted  $x$ 's diploma or for each degree candidate  $x$ ,  $x$ 's mother accepted  $x$ 's diploma.

One explanation for this interpretation might be that the quantifier raises to c-command the entire disjunction structure:



In the conjunction and cross-sentential cases, the anaphora works the same, but there is no clear truth-conditional evidence that the quantifier takes wide scope. Whether the quantifier held scope over the whole conjunction or somehow scoped separately in each conjunct, the result would have the same truth conditions, since universal quantifiers and conjunction are commutative.

Roberts (1987, 1989) calls the phenomenon of such binding across clauses “telescoping” (citing Partee), since you start with a universal and then “zoom in” on a particular instance of that universal. She analyzes these cases as having a covert quantified expression that the hearer accommodates to make sense of the second clause, generating a meaning like the following:

- (6) Each degree candidate walked to the stage. (In every situation where a degree candidate walked to the stage,) he took his diploma from the Dean and returned to his seat.

\*These ideas benefitted greatly from discussions with Irene Heim, Danny Fox, and Gennaro Chierchia

<sup>1</sup>Example numbers are from Roberts (1987).

In this paper, I will explore instead the possibility of analyzing (2) and (3) the same way as (1) – namely, with the universal quantifier taking wide scope over both clauses or sentences. First, I will examine how two separate sentences might come to form a syntactic unit, an obvious precondition for something scope over them. Next, I will consider whether such movement would violate the Coordinate Structure Constraint. Last, I will answer an objection to such analyses arising from data involving downward-entailing operators.

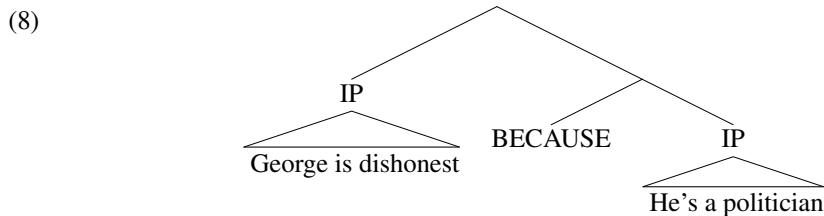
## 2 Multi-sentence Structures

Kehler (2002) argues that in order for two sentences to form a coherent discourse, they must stand in one of a small number of relationships to one another (e.g., one event follows the other, one causes the other, etc.). For instance, (7a) is an example of Kehler’s **Explanation** relation:

- (7) a. George is dishonest. He’s a politician. (=Kehler’s 34)  
 b. George is dishonest because he’s a politician. (=33)

The most salient reading for the discourse in (7a) is (7b), where we have added the word “because” to indicate a sort of causative relationship between the two sentences. So, where does this extra meaning come from?

I propose a small set of null operators that contribute the extra meaning of these relationships beyond the meaning of the component sentences. These operators form a complex structure out of two sentences akin to coordination:



To capture Kehler’s facts, we simply say that without such an element, two sentences may not be uttered as one sequential discourse.

### 2.1 Excursus: Narrative Continuity

Although it does not directly answer the question about the scope of universal quantifiers in telescoping structures, looking at discourses this way allows us to address another issue many researchers have discussed regarding telescoping. Roberts (among others, such as Poesio and Zucchi (1992)) notes that the possibility of telescoping “depends in part on the plausibility of a sort of narrative continuity between the utterances in the discourse” (p. 39), citing examples from Fodor and Sag (1982):<sup>2</sup>

- (9) a. Each student in the syntax class was accused of cheating on the exam, and he was reprimanded. (=31)  
 b. # Each student in the syntax class was accused of cheating on the exam, and he has a Ph.D. in astrophysics. (=32)

In another context, she notes, the same second sentence works fine:

- (10) Each candidate for the space mission meets all our requirements. He has a Ph.D. in astrophysics and extensive prior flight experience. (=33)

To address this observation, I will examine versions of the above sentences where the telescoping quantifier is replaced with a proper name. Notice that while versions of (9a) and (10) without telescoping sound fine, as shown in (11) and (12), the version of (9b) without telescoping still sounds bad, as shown

<sup>2</sup>Although these structures include the overt coordinator “and,” I presume that “and” is vacuous in such situations; the real meaning of the two-sentence structure comes from a null discourse operator instead.

in (13). Under Kehler’s analysis, this would be because there is no relation that could plausibly link the two sentences:

- (11) John from syntax class was accused of cheating on the exam, and he was reprimanded.
- (12) John meets all our requirements. He has a Ph.D. in astrophysics and extensive prior flight experience.
- (13) # John from syntax class was accused of cheating on the exam, and he has a Ph.D. in astrophysics.<sup>3</sup>

So, a necessary precondition for telescoping is that regardless of the scope of the quantifier, the two sentences must form a coherent discourse.

### 3 The Coordinate Structure Constraint and Scope Economy

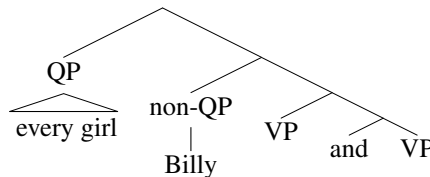
So, with the covert discourse operators based on Kehler’s work, the first ingredient for telescoping is in place: coordinate structures connecting what are apparently multiple sentences. However, as is well known, in most cases an element may only move out of one side of a coordinate structure if there is a trace or a variable for the element on the other side (Ross 1967):

- (14) (≈ Fox’s 56)
  - a. Who<sub>i</sub> do you think Mary likes *t<sub>i</sub>* and Bill hates *t<sub>i</sub>*?
  - b. \* Who<sub>i</sub> do you think Mary likes *t<sub>i</sub>* and Bill hates Sue?

In (14a), there is a trace in both coordinated sentences, but in (14b), “Sue” has taken the place of one of these traces and therefore the sentence is out. So, one condition on extraction from one clause of a coordinate structure is a trace or variable in the other clause.

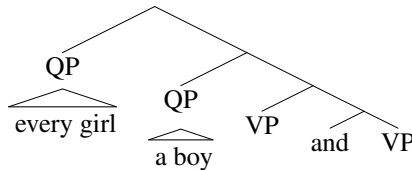
However, as Fox (1999) shows, this alone is not enough to allow quantifier raising:

- (15) a. \* Billy wants to date every girl in this class and has already asked her out. (=Fox’s 66a)
- b. \*



Fox argues that a quantification phrase QP in a coordinate structure can only raise above coordination if there is a scopal operator already above coordination that is non-commutative with QP. There is no such operator in (15a), so this sentence does not sound good under the reading where “her” is a bound variable. However, by simply replacing “Billy” with “a boy” as in (16a), we suddenly have a higher non-commutative operator:

- (16) a. A boy wants to date every girl in this class and has already asked her out. (=66b)
- b.



Fox’s version of Scope Economy requires quantifier raising to change some scopal relationship. The existential quantifier “a boy” is not commutative with the universal quantifier, so the universal may raise above it, and hence above the conjunction. According to Fox, coordination itself is invisible to Scope

<sup>3</sup>As Kehler notes, you can almost always come up with some (sometimes outlandish) scenario to make a discourse coherent; the point is that (a) it is much harder to do so for sentences like (13) and (b) under such a scenario, the related telescoping sentence in (9b) sounds much better, too. See also Wang, McCready and Asher (2003) for a fuller discussion of discourse restrictions on telescoping.

Economy. Therefore, this higher operator is needed before Scope Economy is satisfied to allow the movement.<sup>4</sup>

### 3.1 Event Structure

So, if two sentences in discourse form a sort of coordination as proposed above, and telescoping is when a universal quantifier scopes above this coordination, what is the higher operator that licenses quantifier raising? To answer this question, let's first examine the meanings of two null discourse coordinators:

(17) John walked to the stage. He received his diploma from the Dean. This took two minutes / This happened twice.

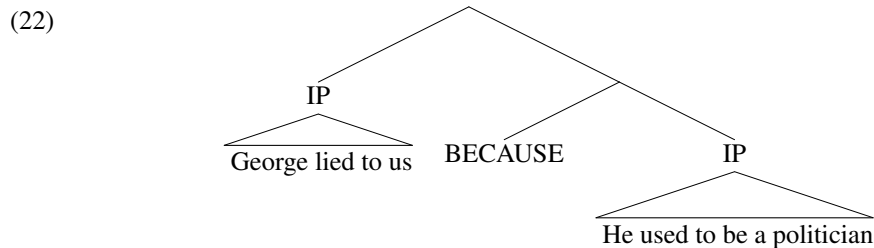
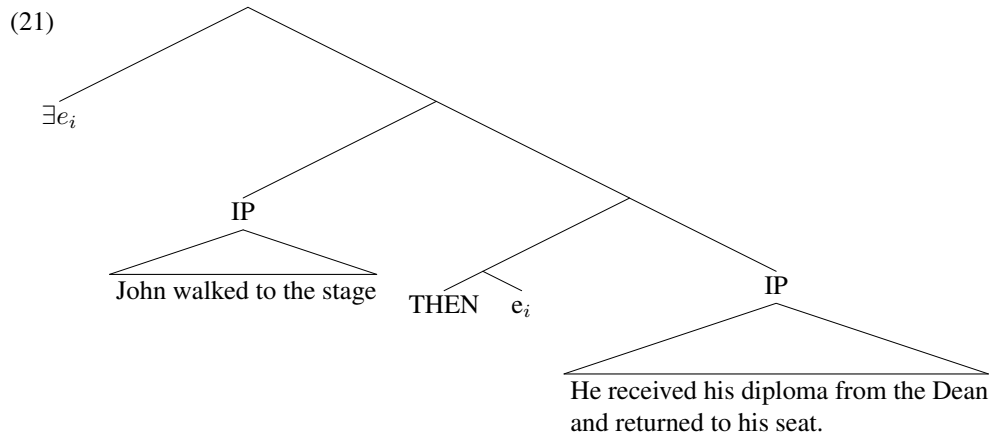
(18) George is dishonest. He is a politician. This has been the case for two years.

In (17), the pro-form “this” can pick one of two events: receiving the diploma or the event comprising both walking to the stage and receiving the diploma. In (18), the only events<sup>5</sup> “this” may target are the dishonesty and the being a politician – not any combination of the two, such as the causative relationship between them.

These facts suggest that the structure for the discourse in (17) has an extra event in it that the pro-form “this” may target. The structure for the discourse in (18) lacks this extra event. Rough meanings and structures for the two examples are given below:

(19)  $\llbracket \text{THEN } e \phi \psi \rrbracket = \exists e' \subset e . \exists e'' \subset e . \phi(e') \text{ and } \psi(e'') \text{ and } \tau(e'') < \tau(e')$

(20)  $\llbracket \text{BECAUSE } \phi \psi \rrbracket = \exists e . \exists e' . \phi(e) \text{ and } \psi(e')$  and in the closest worlds where  $\neg\phi(e), \neg\psi(e')$



In (21), John walks to the stage in a subevent of  $e$  and then receives his diploma in a subevent of  $e$ ; but in (22), the event in which George lies is simply asserted to be related to the event of his having been a politician.

<sup>4</sup>Notice that disjunction does not seem to have the same constraints as conjunction:

(i) Billy wants to date every girl in this class or has already asked her out.

So, it's possible that universal quantifiers only need the higher operator Fox discusses because they themselves are scopally commutative with conjunction.

<sup>5</sup>For the purposes of this analysis, I am using the term “event” to refer to both events and states.

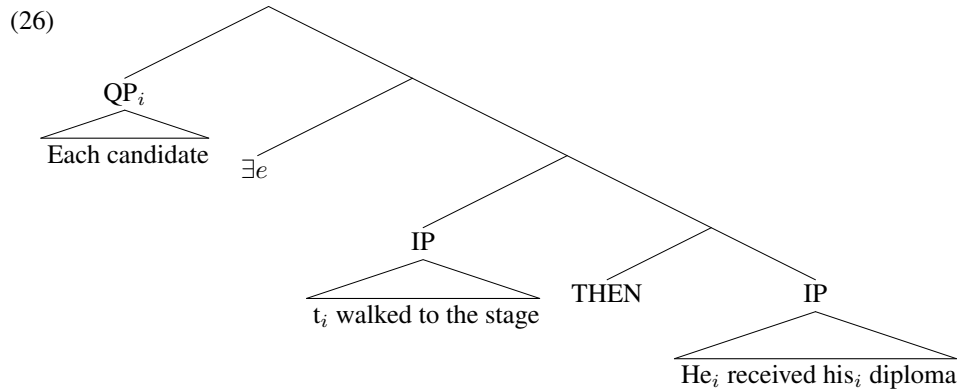
### 3.2 Telescoping

Notice now that structures with THEN, which have a higher existential event operator, allow telescoping, but structures with BECAUSE, which lack this higher operator, do not:<sup>6</sup>

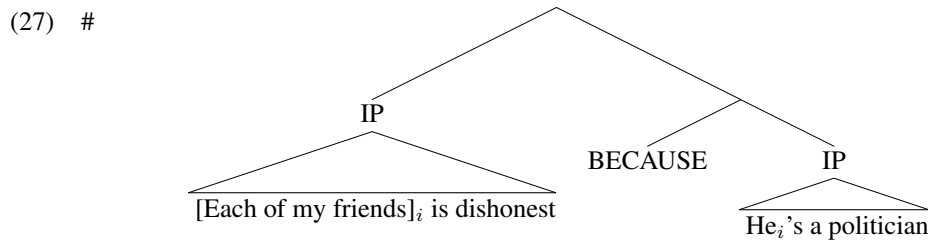
(23) Each degree candidate walked to the stage. He received his diploma from the Dean and returned to his seat.

(24) # Each of my friends is dishonest. He's a politician.

I propose that the two sentences in a telescoping case always form a coordinated structure as in (25), possibly with a covert coordinator. The universal quantifier in the first sentence can raise over this coordination, but only when licensed by the scopally non-commutative existential event operator:



Without such an operator, telescoping is disallowed for the same reasons as Fox's example (15a):



As far as I can see, Roberts's analysis has no principled account for why telescoping may occur in discourse structures that involve a higher event operator, but not in discourse structures that lack this operator.

### 3.3 Further Prediction

One further prediction of this analysis is that if the universal quantifier is somehow "trapped" in the first sentence, telescoping will fail. Consider the following sentence:<sup>7</sup>

(28) # Every degree candidate walked to the stage at once. He threw his cap in the air.

<sup>6</sup>As mentioned before, Wang et al. (2003) report in more detail (including a survey) on which discourse relations support telescoping.

<sup>7</sup>The word "every" does work in telescoping structures:

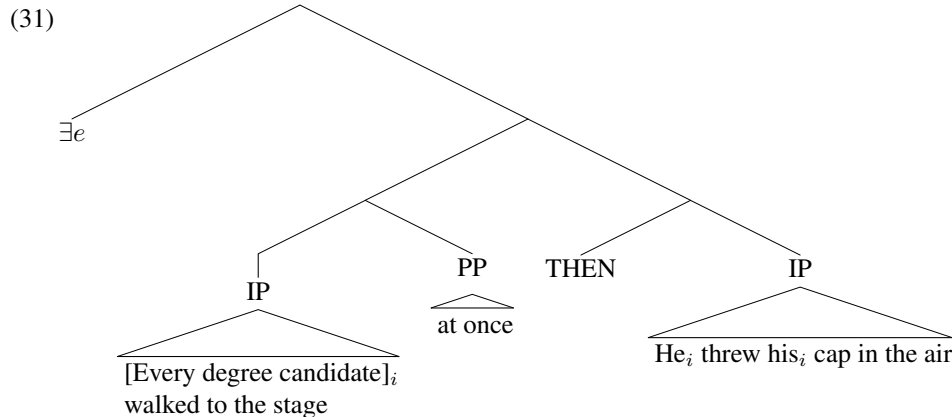
(ii) Every degree candidate walked to the stage. He received his diploma from the Dean and returned to his seat.

Let's assume that "at once" requires an argument that represents multiple events and asserts that the multiple events happened at the same time. This rules out:

(29) # John walked to the stage at once.

(30) # Every degree candidate is such that he walked to the stage at once.

So, "every degree candidate" cannot raise in (28) or it would not satisfy the requirements of "at once." This leaves a structure like the following:



In this structure, the universal quantifier cannot bind the pronouns in the second sentence, and therefore the discourse is ruled out under this reading. This fact is not captured by Roberts's analysis, where the universal quantifier does not have to move to bind the pronouns.

#### 4 Other Quantifiers

One question that immediately comes up, given this analysis, is can all quantifiers scope over multiple sentences? In fact, one possible counterargument to this analysis (due to Evans 1980) is the fact that negative quantifiers seem to telescope, but at the same time seem not to have scope over both sentences:

(32) a. Only one degree candidate walked to the stage. He accepted his diploma.

b. Only one degree candidate walked to the stage and accepted his diploma.

(32a) asserts that there is only one degree candidate whatsoever who walked to the stage and that this one candidate accepted his diploma. (32b), however, can be true when any nonzero number of degree candidates have walked to the stage, as long as only one among them accepted his diploma. (32a) simply cannot have the meaning of (32b), and Evans argues that this indicates that "only one" does not have wide scope in (32a).

To address this concern, first let me point out that the analysis in this paper does not preclude also having a sort of e-type analysis for quantifiers:

(33) Every degree candidate approached the stage (at once). They threw their caps in the air.

If the universal quantifier in the first sentence actually bound the pronouns in the second sentence, you would expect singular number, but the fact that the plural pronouns "they" and "their" are used *and* the noun "caps" is plural indicates that the pronouns are not bound by the quantifier. Instead, the pronouns have a meaning more like a definite description: "the degree candidates who approached the stage."

There is nothing in the analysis above that would preclude such a meaning for pronouns that seem to be bound by downward-entailing quantifiers such as "only one." In fact, when such a quantifier refers to more than one individual, the corresponding pronoun is also plural, as in (33) above:

(34) Only seven degree candidates walked to the stage. #He / They accepted #his diploma / their diplomas.

It is beyond the scope of this paper to determine what actually *prevents* such quantifiers from scoping over both of the sentences. However, such a restriction is needed independent of telescoping, since it has been noted (cf. Beghelli and Stowell 1997) that downward-entailing operators have a hard time receiving wide scope. For instance, as shown below, such operators in the object position cannot scope above the subject:

- (35) Every boy approached only one girl.  $\neq$  There's only one girl that every boy approached.  
(36) Every boy approached two girls, but  
    a. #*Every* boy approached only one girl.  
    b.  $\checkmark$  Only one girl was approached by *every* boy.

Therefore, I would submit that “only one” cases actually just receive an e-type analysis already required for sentences like (33) and telescoping is disallowed in these cases by a more general constraint on the movement of downward-entailing operators.<sup>8</sup>

## 5 Conclusion

I have presented a scope analysis of universal quantification across sentences. Contra Roberts, I have argued that a universal quantifier may raise to take scope over conjunction, disjunction, and even separate sentences. I have proposed that multiple sentences may form a single syntactic unit when coordinated by null discourse operators. Some of these discourse operators support a higher event operator, and only in these cases is telescoping allowed, due to Scope Economy requirements as argued for by Fox (1999).

Roberts's analysis, which does not require such a higher operator, cannot explain this restriction without further modification. Also, since her analysis does not posit movement, it cannot explain the facts in section 3.3, where telescoping is prohibited when the universal quantifier cannot move out of the first sentence. Last, it is unclear how Roberts's analysis would handle the disjunction cases.

As a side note, this analysis fits well with an explanation of why telescoping sentences must display “narrative continuity,” since to form the proper syntactic structure for telescoping, I propose that the sentences involved must be coordinated with a proper discourse operator. Also, as for downward-entailing operators, further study is required, but a first glance seems to support the view that they are restricted from wide scope by a more general constraint.

My proposal takes the unorthodox view that multiple sentences in discourse may form a single syntactic structure, subject to the same operations and restrictions as intra-sentential syntax, such as Quantifier Raising and Scope Economy. An interesting direction for future research would be to see this premise out to its logical conclusion and determine which other intra-sentential phenomena might apply across sentences in a discourse.

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<sup>8</sup>This restriction might even extend to other complex quantifiers, such as “at least two,” although the effect is harder to observe without the clear truth-conditional evidence that Evans points out for downward-entailing quantifiers.

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