

A new synonymy problem for E-type theories

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1 The data

The sentences in (1) are true under exactly the same conditions. Yet, they differ in what discourse referents they make available, as can be seen in the contrast in (2).

- (1) a. All the boys read a different book.
- b. No boys read the same book.
- (2) a. All the boys read a different book, and all of them liked it.
- b. * No boys read the same book, and all of them liked it.

In this squib, I demonstrate that this data point cannot be captured in an E-type theory of cross-sentential binding, as exemplified by Heim 1990 or Elbourne 2005.

2 E-type theories

In E-type theories of anaphora (Evans 1980, Elbourne 2005), cross-sentential pronouns and donkey pronouns are analyzed as definite descriptions, so the Logical Form of the pronoun *it* in (3a) and (4a) is the definite description *the donkey*. This analysis captures the equivalence in meaning of sentences with pronouns and sentences with definite descriptions, as below.

- (3) a. Christopher owns a donkey. It brays.
- b. Christopher owns a donkey. The donkey brays.
- (4) a. If a farmer beats a donkey, it brays.
- b. If a farmer beats a donkey, the donkey brays.

On the other hand, Heim 1990 observes that there is a difference in the distribution of pronouns and definite descriptions; the former require some kind of ‘formal link’ to an antecedent in the preceding discourse; the latter do not. This is exemplified by (5), where the pronoun is only possible when the preceding discourse includes the antecedent *a wife*. Replacing the pronoun with an overt definite description results in grammaticality in both sentences.

- (5) a. Every man who has a wife is sitting next to her. (Heim 1990)
 b. * Every married man is sitting next to her.
- (6) a. Every man who has a wife is sitting next to his wife.
 b. Every married man is sitting next to his wife.

Heim 1990 and Elbourne 2005 propose that the formal link between a pronoun its antecedent can be analyzed as a case of syntactic ellipsis: a pronoun is a definite description with a deleted NP. Through analogy with canonical cases of ellipsis in natural language, this NP ellipsis must be licensed by syntactic identity of the deleted material with an earlier antecedent. Thus, in (5a), the NP *wife* serves as the antecedent; in (5b), no such antecedent exists.

Sentences with two occurrences of the same noun (pointed out by Hans Kamp via Heim 1990) impose further restrictions on E-type theories. In (7a), the pronoun *he* must retrieve an NP. However, without further constraints on the theory, the antecedent cannot be the simple NP *bishop* (as in (7b)), because the minimal situation described by the antecedent contains two bishops, so the definite description ‘*the bishop*’ is not well defined.

- (7) a. When a bishop insults a bishop, he gets in trouble.
 b. When a bishop insults a bishop, he ~~bishop~~ gets in trouble.

Within E-type theories, two solutions exist to this problem—either enriching the syntactic material that is elided or allowing the context to enrich the retrieved meaning. Heim 1990 provides an algorithm whereby syntactic structure from the antecedent phrase can be reconstructed under ellipsis, so the the elided NP becomes equivalent to the complex NP ‘*bishop who insults a bishop*,’ as in (8). There is only one such bishop, so the logical form is well-defined.

- (8) When a bishop insults a bishop, he ~~bishop who insults a bishop~~ gets in trouble.

Alternatively, Elbourne 2005 provides a semantic solution. Under his analysis, the logical form of the sentence is indeed that of (7b); however, he proposes that the interpretation of the definite description is enriched by contextually-determined domain restriction. With this domain restriction, the definite description might again be interpreted as something like ‘*bishop who insults a bishop*,’ so the logical form in (7b) becomes well-defined.

I will argue here that both of these proposals face challenges with the contrast in (2). For Heim 1990, there is no way to run the syntactic algorithm in a way to admit an antecedent for (2a) but not for (2b). Elbourne 2005 faces more general problems with cross-sentential functional pronouns, but a plausible enrichment to his theory runs into similar problems as those for Heim 1990.

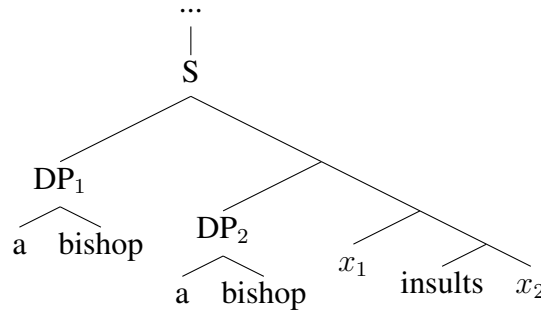
3 Heim 1990

The latter part of Heim 1990 sketches an analysis in which an E-type pronoun reconstructs complex syntactic structure from the preceding discourse. In a nutshell, the proposal allows the antecedent of an elided definite description to be a sentence of the form [[Det A] B], with the resulting definite description receiving the interpretation in (9).

$$(9) \llbracket \text{he} \llbracket [\text{Det A}] \text{B} \rrbracket \rrbracket = \iota x. \llbracket \text{A} \rrbracket(x) \wedge \llbracket \text{B} \rrbracket(x)$$

Thus, the antecedent sentence in (7a) contains a subtree of the form in (10b); if this is retrieved as the antecedent of the E-type pronoun, the resulting definite description receives an interpretation equivalent to that in (10a). As seen in (8), this resolves the symmetry problem for this example.

- (10) a. the bishop who insults a bishop
 b.

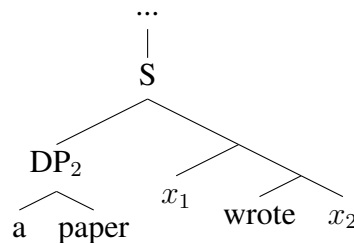


Cases of ‘quantificational subordination’ (Karttunen 1969, Roberts 1987, Heim 1990) are cases in which a pronoun retrieves a functional reading that is constructed through the interaction of an indefinite noun phrase and a distributive operator. In (11), for example, note that the pronoun *it* co-varies with the professors, but does not refer to the professors themselves; rather, for each professor, the pronoun picks out the paper they wrote.

- (11) Three professors each wrote a paper. Each of them submitted it to a highly ranked journal.

The analysis of Heim 1990 carries over directly to these cases: the antecedent sentence contains the subtree in (12b), so the pronoun can be reconstructed as the definite description in (12a).

- (12) a. the paper they wrote
 b.



Following Evans 1977, Heim observes that not all environments seem to allow such an E-type pronoun to find a grammatical antecedent, as seen in (13a). However, she proposes that this is not a constraint on the algorithm for recovering the antecedent of an E-type pronoun, but rather, it’s a matter of discourse cohesion: the reason that the discourse in (13a) is deviant is the same reason why the contradictory discourse in (13b) is deviant.

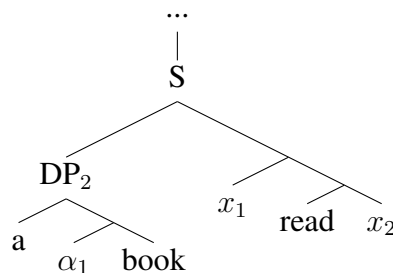
- (13) a. * No NYU professor owns a car, and they each drive it on Sunday.
 b. * No NYU professor owns a car, and they each drive the car they own on Sunday.

Turning finally to the case at hand, we consider the discourse in (2a), repeated here in (14). As before, we have a case of quantificational subordination, where, for each boy, the pronoun *it* picks out the book that he read.

(14) All the boys read a different book, and all of them liked it.

In order to get this reading, we need to find a sentential antecedent of appropriate form to allow construction of a definite description in (15a). Initially, the presence of the adjective *different* may seem problematic, as we do not want to end up with the infelicitous definite description ‘*the different book he read.*’ However, several possible solutions present themselves: either the interpretation rule in (9) is revised to allow the definite description to ignore certain modifiers, or we posit, following Barker 2007, that the adjective itself raises to a higher position, thus generating the logical form in (15b).

(15) a. the book they read
 b.



The problem for such an analysis, however, is that whatever mechanism we use to provide a suitable antecedent for the pronoun in (14), the same mechanism will generate an analogous antecedent for the pronoun in (16), repeated from (2b). Specifically, the derivation of the antecedent sentence in (16) will also contain the logical form in (15b) (modulo the determiner *althe*), so the pronoun in (16) should be equally replaceable by the definite description in (15a).

(16) * No boys read the same book, but all of them liked it.

Importantly, though, unlike the case of deviance that we saw in (13), replacing the pronoun in (16) with the definite description in (15a) does *not* generate a contradiction. In particular, an equivalent sentence with an overt definite description turns out to be perfectly acceptable, as seen in (17b). The reason for this is that the antecedent sentence in (16) and (17) does in fact entail (in fact, it presupposes) that each boy read a book; it just asserts that no two of these books are the same.

(17) a. All the boys read a different book, and all of them liked the book they read.
 b. No boys read the same book, but all of them liked the book they read.

The syntactic version of the E-type theory thus incorrectly predicts the sentence in (16) to be exactly as grammatical as the sentence in (14).

4 Elbourne 2005

Elbourne 2005 proposes that the elided NP of an E-type pronoun is a simple NP constituent from the preceding discourse; thus, as mentioned above, under his analysis the sentence in (18a) has the logical form in (18b). As will be described presently, the problem of indistinguishable participants is resolved through contextual domain restriction.

- (18) a. When a bishop insults a bishop, he gets in trouble.
b. When a bishop insults a bishop, he ~~bishop~~ gets in trouble.

Turning to the case at hand, shown above in (2) and (14)/(16), Elbourne's analysis would postulate that the pronoun is replaced with the simple NP *the book*. Elbourne might thus draw some comfort from the fact that the contrast in (2) is more or less replicated when the pronoun is replaced with this NP, as seen in (19).¹

- (19) a. All the boys read a different book, and all of them liked the book.
b. * No boys read the same book, but all of them liked the book.

However, be this as it may, this observation just kicks the can further down the road. As we will see, running Elbourne's interpretive algorithm on the sentences in (19) yields the same challenge as our initial puzzle in (2): it is impossible to allow (19a) to receive a grammatical interpretation, but not (19b).

The key component of Elbourne's analysis that allows him to resolve cases of symmetry is a mechanism of contextual domain restriction. Based on the observation that speakers can say *the office* without fully specifying exactly which one, Elbourne posits that a similar domain restriction can apply to cases like (18), enriching *bishop* to mean '*bishop who insulted someone*.' One piece of evidence that Elbourne offers for this proposal is the observation that in completely symmetric sentences, like the one in (20), grammaticality judgements do indeed degrade, ostensibly because even domain restriction cannot distinguish the two participants in these cases.

- (20) * Whenever a bishop and a bishop meet, he blesses him.

Elbourne does not provide an analysis for cases of quantificational subordination, but we can imagine what such an extension of the system might look like. Under Elbourne's analysis, a sentence with universal quantification is true of a situation *s* if for each *x* in the restrictor of the universal, *s* contains a minimal situation *s'* that verifies that the sentence's predicate holds of *x*. For instance, if the sentence in (21) is true of a situation *s*, then *s* contains each minimal situation in which a farmer owns a donkey.

- (21) Each farmer owns a donkey.

Because all these sub-situations are minimal, the structure of *s* is thus fine enough that we can extract the relevant farmer-donkey pairs by examining the sub-situations that it is comprised of. For cases of quantificational subordination, as in (22), we might then imagine a mechanism that allows quantification over this set of farmer-donkey pairs.

¹I say 'more or less' because I find the sentence in (19a) to be slightly less good than that in (2a). However, the judgements are nevertheless replicated in the fact that (19a) remains significantly better than (19b).

(22) Each farmer owns a donkey and each of them treats { it / the donkey } kindly.

Turning to the sentence in (19a) (taken to be the logical form of (2a)), an analogous analysis holds. Any situation verifying the first sentence contains minimal situations with boy-book pairs, as well as the additional global information that these books are all different. Like for (22), evaluation of the second sentence allows quantification over the boy-book pairs introduced by the first sentence. The uniqueness presupposition of *the* is satisfied because there is a single book per boy.

However, turning to (19b), we have exactly the same state of affairs. Although Elbourne does not provide a definition for *no*, we note again that (23b) is true in exactly the same situations as (23a). In particular, in order to get the correct truth conditions, a situation verifying (23b) must contain all minimal situations in which a boy reads a book, so that these books can be compared. Whatever mechanism allows quantification over minimal boy-book situations for (19a) can feed off the same richness of representation in (19b), so again, the uniqueness presupposition of *the* is satisfied, because there is a single book per boy.

- (23) a. All the boys read a different book.
b. No boys read the same book.

One possible rebuttal is to argue that the sentence in (23b) is in fact completely symmetric, akin to the sentence in (20). In particular, observing that (24) becomes ungrammatical with singular *boy*, we might postulate that the sentence in (23b) has a logical form that amounts to (25), quantifying over *pairs* of boys. If the minimal sub-situations each contain identical book-reading boys, perhaps there is no way to tell the two boys apart.

- (24) * No boy read the same book.
(25) –[a boy and a boy read the same book]

However, this argument is a sword that cuts both ways. Specifically, whatever justification is provided to motivate a symmetric analysis of (23b), exactly the same argument can be made for the (23a), which also takes a plural restrictor and has truth conditions that compare pairs of boys to each other. The rebuttal thus incorrectly predicts (19a) to be as ungrammatical as (19b).

Perhaps the simplest way to illustrate the situation is to again consider the paradigm in (26), repeated from (17). Under Elbourne's analysis, ellipsis is syntactically determined, but domain restriction is fully contextual. Somehow, in the resolution of the definite description '*the book*' in sentence (19a), the context is able to provide a domain restriction that amounts to '*that he read*,' evidenced by the equivalence of (19a) and (26a). In (19b), there is nothing stopping the context from providing exactly the same domain restriction. The example in (26b) shows that such a restriction selects a unique individual from the antecedent situation. Nevertheless, the sentence in (19b) is ungrammatical.

- (26) a. All the boys read a different book, and all of them liked the book they read.
b. No boys read the same book, but all of them liked the book they read.

Elbourne's theory of domain restriction thus provides no way to distinguish the grammatical (19a) from the ungrammatical (19b); working backwards, it also cannot explain the contrast in (2).

5 Towards a dynamic analysis

In my argument against an E-type theory of cross-sentential anaphora, the implicit contending hypothesis has been the theory of dynamic semantics, in the tradition of Kamp 1981, Heim 1982, and Groenendijk and Stokhof 1991, among many others. By no means do I wish to suggest that the data with *same* and *different* follow immediately from a theory dynamic semantics, and I will certainly not try to provide an analysis here. However, it bears noting that one of the important differences between dynamic semantics and E-type semantics is that in dynamic semantics, the ‘meaning’ of a sentence is richer than simply the set of situations in which it is true. In dynamic semantics, nouns additionally bear a *dynamic potential* that is modulated based on the semantic properties of the quantifier under which it is embedded. In this spirit, the reader is invited to consider the data laid out here from the point of view of the growing number of dynamic approaches to *same* and *different*, including those of Brasoveanu 2011, Bumford 2015, and Kuhn 2015.

References

- Barker, C. (2007). Parasitic scope. *Linguistics and Philosophy*, 30(4):407–444.
- Brasoveanu, A. (2011). Sentence-internal *different* as quantifier-internal anaphora. *Linguistics and Philosophy*, 34(2):93–168.
- Bumford, D. (2015). Incremental quantification and the dynamics of pair-list phenomena. *Semantics and Pragmatics*, 8(9):1–70.
- Elbourne, P. (2005). *Situations and Individuals*. Current Studies in Linguistics. MIT Press, Boston, MA.
- Evans, G. (1977). Pronouns, quantifiers, and relative clauses. *Canadian Journal of Philosophy*, 7.
- Evans, G. (1980). Pronouns. *Linguistic Inquiry*, 11(2):337–362.
- Groenendijk, J. and Stokhof, M. (1991). Dynamic predicate logic. *Linguistics and Philosophy*, 14(1):39–100.
- Heim, I. (1982). *The Semantics of Definite and Indefinite Noun Phrases*. PhD thesis, University of Massachusetts, Amherst, MA.
- Heim, I. (1990). E-type pronouns and donkey anaphora. *Linguistics and Philosophy*, 13(2):137–178.
- Kamp, H. (1981). A theory of truth and semantic representation. In Groenendijk, J., Janssen, T., and Stokhof, M., editors, *Formal Methods in the Study of Language*, volume 135 of *Mathematical Center Tracts*, pages 277–322. Amsterdam, Netherlands.
- Karttunen, L. (1969). Discourse referents. *Proceedings of the 1969 conference on Computational linguistics*, pages 1–38.

Kuhn, J. (2015). *Cross-categorial singular and plural reference in sign language*. PhD thesis, New York University.

Roberts, C. (1987). *Modal Subordination, Anaphora, and Distributivity*. PhD thesis, University of Massachusetts, Amherst.