

Free Variable Economy

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Outline. Reinhart and Fox, among others, have argued that semantic interpretation involves certain *economy principles*. In particular, Fox (1999) argued that pronouns can only be bound non-locally if doing so yields an interpretation that is different from the one that would result from local binding (BINDING ECONOMY, henceforth BE) and similarly, that scope-taking elements can only take non-local scope if this results in an interpretation that is different from the local scope interpretation (SCOPE ECONOMY, henceforth SE).

This paper makes two contributions to the understanding of such economy principles. First, it argues that they should be thought of as *interpretive preferences* rather than strict *grammatical constraints*. They do not rule out interpretations altogether, but rather yield a preference for certain interpretations over others. Second, the paper identifies an empirical problem for BE and proposes an alternative, FREE VARIABLE ECONOMY (FVE), which (i) accounts for local binding effects, (ii) overcomes the empirical problem of BE and (iii) makes some interesting new predictions which are indeed borne out by the facts.

Economy Principles as Interpretive Preferences. Fox argues that BE and SE account for long-standing puzzles concerning VP-ellipsis. In particular, BE accounts for Dahl’s puzzle: the fact that (1-d) is not a possible reading of the target clause in (1).

- (1) Max said that he called his mother, and Bob did too.
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|---|-----------------|
| a. ... Bob also said that Bob called Bob’s mother. | [sloppy-sloppy] |
| b. ... Bob also said that Max called Max’s mother. | [strict-strict] |
| c. ... Bob also said that Bob called Max’s mother. | [sloppy-strict] |
| d. #... Bob also said that Max called Bob’s mother. | [strict-sloppy] |

To get this reading, the source clause in (1) must be associated with the LF in (2).¹ BE blocks this LF, because *his* could be bound more locally by *he* instead of *Max* without changing the interpretation.

- (2) [Max]¹ [t₁ said that [[he]² [t₂ called his₁ mother]]] C : he = Max

In certain contexts, however, (1-d) *is* a suitable interpretation of the target clause in (1) (cf. Hardt, 1993, p.119):

- (3) Did Max call everyone’s mother?
Well, Max said that he called his mother, and Bob did too.

Such examples are problematic if BE is thought of as a strict grammatical constraint.

Similarly, SE accounts for the fact that the scope ambiguity in (4-a) is not present in (4-b) (Sag, 1976, Williams, 1977) but reappears in (4-c) (Hirschbuhler, 1982).

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|---|--------------------------------|
| (4) a. A boy admires every teacher. | (∃ > ∀)(∀ > ∃) |
| b. A boy admires every teacher. Mary does, too. | (∃ > ∀)(∀ > ∃) |
| c. A boy admires every teacher. A girl does, too. | (∃ > ∀)(∀ > ∃) |

However, the (∀ > ∃) that is missing in (4-b) *is* available for structurally equivalent examples in certain contexts (cf. Johnson and Lappin, 1997, p.311):

¹Upper indices are *binder* indices; lower indices are *binding* indices. Pronouns without a binding index, such as *he* in (2), are referential. Their interpretation is determined by context, not by the grammar. $[\alpha]^n[\beta]$ is interpreted as $\alpha'(\lambda x_n.\beta')$, where α' and β' are the interpretations of α and β , respectively.

- (5) In the morning, a nurse checked every patient. ($\exists > \forall$)($\forall > \exists$)
 In the afternoon, Doctor Jones did.

These examples show that economy principles should be thought of as interpretive preferences rather than grammatical constraints. They do not rule out interpretations altogether, but rather yield a preference for certain interpretations over others.

A Problem for Binding Economy. BE wrongly predicts that (6) does not have the strict reading given in (6-b). To obtain this reading, the source clause of (6) must be associated with the LF in (7). But this LF is blocked by BE (cf. example (2)). This example is not just problematic for BE, but also for any other account of Dahl’s puzzle.

- (6) Every boy said that he called his mother and that Billy did too.
 a. Every boy x said that Billy called Billy’s mother too. [sloppy]
 b. Every boy x said that Billy called x ’s mother too. [strict]

- (7) [Every boy]¹ [t₁ said that [[he₁]² [t₂ called his₁ mother]]]

Free Variable Economy. Suppose φ is a logical form and φ' is another logical form which is identical to φ except for the binding index on one of the pronouns occurring in it. Let’s call φ' a *v-alternative* of φ in this case. Furthermore, for every constituent Γ in φ and φ' , let’s call the binding indices on traces and pronouns in Γ which are not bound in Γ the *free variables* in Γ . Then we could think of φ' as being more *economical* than φ if some constituent in φ' contains fewer free variables than the corresponding constituent in φ , and every other constituent in φ' contains at most as many free variables as the corresponding constituent in φ .² Based on this idea we could state the following principle:

Definition (Free Variable Economy). *If φ' is a v-alternative of φ , φ' and φ yield the same interpretation, and φ' is more economical than φ , then φ' is preferred over φ .*

FVE accounts for the fact that (1-d) is a dispreferred reading of (1) (when considered out of context), whereas (6-b) is *not* a dispreferred reading of (6). To see this consider the relevant logical forms, (2) and (7). (2) has a more economical v-alternative, in which *his* is bound by *he*. The crucial constituent Γ is [[he]² [t₂ called his_i mother]]. If $i = 1$, as in (2), then Γ contains a free variable; if $i = 2$, as in the v-alternative, Γ contains no free variable. The crucial constituent Δ in (7) is [[he₁]² [t₂ called his_i mother]]. If $i = 1$, as in (7), Δ contains one free variable; if $i = 2$, as in the v-alternative, Δ *still* contains that same free variable. So (2) is dispreferred, but (7) is not.

FVE also generates some new predictions. For example, it predicts that (8-a) and (8-b) are both dispreferred readings of (8), which has been confirmed by informants.

- (8) Every boy said that he was sure that he called his mother, and that Bill was too.
 a. #... that Bill was also sure that the boy had called Bill’s mother.
 b. #... that Bill was also sure that Bill had called the boy’s mother.

References: Dahl, 1973: *On so-called sloppy identity*, Synthese. Fox, 1999: *Economy and semantic interpretation*, MIT Press. Hardt, 1993: *VP-ellipsis: form, meaning, and processing*, UPenn dissertation. Heim, 1998: *Anaphora and semantic interpretation: a reinterpretation of Reinhart’s approach*, MTWPL. Hirschbühler, 1982: *VP-deletion and accross-the-board quantifier scope*, NELS. Johnson and Lappin, 1997: *A critique of the minimalist program*, L&P. Sag, 1976: *Deletion and logical form*, MIT dissertation. Williams, 1977: *Discourse and logical form*, LI.

²Notice that we compare the number of free variables, not the number of *occurrences* of free variables.