Nothing else for *something else*: A variable-free account

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Outline

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- Analysis in Variable-Free Semantics

Parallels between *something else* and pronouns (I): Basic cases

Culicover & Jackendoff (1995) note that the anaphoric dependence with implicit variables in *something else* parallels that of overt pronouns.

(1) discourse anaphora

a. John met Bill$_i$. Mary met *him*$_i$.

b. John met Bill$_i$. Mary met *someone else*$_{j\neq i}$.

(2) variable binding

a. Every American$_i$ boy loves *himself*$_i$.

b. Every American$_i$ loves *someone else*$_{j\neq i}$.

Parallels between *something else* and pronouns (II): Functional readings

(3) Paycheck

a. Every Englishman$_i$ gave his$_i$ paycheck to his wife. Every American$_j$ gave *it* (= **his**$_j$ **paycheck**) to his mistress.

b. Every Englishman$_i$ gave a rose to his$_i$ wife. Every American$_j$ gave a tulip to *someone else* (= someone other than **his**$_j$ **wife**).

(4) Bach-Peters sentence

a. Everyone$_i$ who deserved *it*$_j$ got the prize$_j$ he$_i$ wanted.

b. Everyone$_i$ who deserved *something else*$_{k\neq j}$ got the prize$_j$ he$_i$ wanted.

Implicit variables don't have syntactic forms (I)

Implicit variables don't have the plural/singular number distinction. So, they can behave like plural pronouns.

(5) split antecedence

a. John$_i$ told Mary$_j$ that *they*$_{i\oplus j}$ were going to be asked to do the work.

b. John$_i$ told Mary$_j$ that *someone else* $_{k\neq i\oplus j}$ was going to be asked to do the work.

Implicit variables don't have syntactic forms (I) (cont.)

This is not discourse anaphora since you can do it with quantificational antecedents:

(5′) Every instructor$_i$ made sure that every TA$_j$ communicated clearly to the students that they can talk with either him$_i$ or her$_j$ about questions they have on homework assignments but that they are not allowed to discuss homework assignments with *anyone else*$_{k\neq i\oplus j}$.

Implicit variables don't have syntactic forms (II)

Implicit variables don't have the kind/entity anaphor distinction. So, they are compatible with both kind and entity anaphora.

(6) kind/entity-antecedent ambiguity

a. John saw a red balloon, and Bill saw *it*, too.
(entity antecedent only)

a'. John saw a red balloon, and Bill saw *one*, too.
(kind antecedent only)

b. John saw a red balloon, but Bill saw *something else*.
'Bill saw something other than **the balloon that John sa**
(entity antecedent)
'Bill saw something other than **a red balloon**.'
(kind antecedent)

LF-based approaches to implicit variables

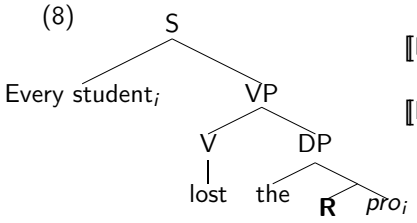
Two possible approaches to the problem of implicit variables in the standard LF-based theory:

- Cooper/Heim&Kratzer-style E-type analysis
- NP-deletion analysis (*à la* Elbourne 2005)

Cooper/Heim&Kratzer-style E-type analysis of paychec pronouns

(7) Every professor$_i$ deposited his$_i$ paycheck. Every student$_j$ lost *it* (= **his$_j$ paycheck**).

(8)



$[\![\mathbf{R}]\!] = \lambda x \lambda y.\mathbf{paycheck\text{-}of}(x)(y)$

$[\![\text{DP}]\!] = \iota y.\mathbf{paycheck\text{-}of}(\mathbf{b})(y)$

Paycheck readings of *something else*

(9) *else* (surface)
⇒ other than [the R pro$_i$] (LF)

(10) (Every Englishman gave a rose to his wife.)
Every American$_i$ gave a tulip to someone **else**$_{j \neq f(i)}$. (surface)
⇒ Every American$_i$ gave a tulip to someone **other than** the R *pro$_i$* (LF)

(11) $[\![\text{R}]\!] = \lambda x \lambda y.\mathbf{daughter\text{-}of}(x)(y)$

Problem: proliferation of lexical entries

Multiple quantifiers binding into *else*:

(12) Every novice instructor$_i$ thinks that every student$_j$ will complain about the grade that he$_i$ gives him$_j$, but every experienced instructor$_k$ knows that some students$_l$ will complain about *something else*$_{m \neq \mathbf{grade}(k,l)}$.

(13) *else* (surface)
⇒ other than [the R′ pro$_k$ pro$_l$] (LF)

(14) $[\![\text{R}']\!] = \lambda z \lambda y \lambda x.\mathbf{grade}\ (x)(y)(z)$
where **grade** (x)(y)(z) = 1 iff x is a grade that z gives to y

Interim summary

Problem for the Cooper/H&K-style E-type analysis:

- proliferation of lexical entries

Note: This problem is not unique to *(something) else*; exactly the same problem arises with ordinary pronouns (Jacobson 2000).

- not clear how the parallel between pronouns and implicit variables (in exhibiting complex functional readings) is captured

Elbourne (2005)

Elbourne's (2005) analysis of pronouns can be thought of as a sophistication of the Cooper/H&K-style E-type analysis.

- Uniform analysis of pronouns as disguised definite descriptions.
- All pronouns are translated as definite descriptions at LF.
- For a pronoun, the descriptive content of the definite description is deleted in the surface form.
- E-type interpretations arise by positing complex definite descriptions having hidden variables inside them as the LF translations of pronouns.

Paycheck interpretations come for free

(15) Every professor$_i$ deposited his$_i$ paycheck, but every student lost *it*. (surface)

⇒ Every professor$_1$ deposited [$_{DP}$ the [$_{NP}$ paycheck of him$_1$]] but every student$_2$ lost [$_{DP}$ THE [$_{NP}$ ~~paycheck of him$_2$~~]] (LF)

(16) Every novice instructor$_1$ thinks that every student$_2$ will complain about the grade that he$_1$ gives him$_2$, but every experienced instructor$_3$ knows that some students$_4$ will complain about **something other than** THE ~~grade that he$_3$ gives him$_4$~~ (LF)

The descriptive content that gets deleted can be arbitrarily complex.

⇒ Solves the lexical proliferation problem of the E-type analysis.

⇒ Also, pronouns and *something else* exhibit a parallel because the same NP-deletion mechanism is involved in each case.

Problems of the NP-deletion analysis (I): Kind antecedent anaphora

(6b) John saw a red balloon, but Bill saw *something else*.

There is simply no way to paraphrase the kind antecedent reading of (6b) with a definite description.

(17) Bill saw [something other than THE ??]

One could of course posit an indefinite article instead of the definite article for hosting the deleted NP:

(18) Bill saw [something other than A red balloon]

But then, why?:

- *Else* is compatible with definite and indefinite translations.
- Overt pronouns are always translated as definite descriptions.

Problems of the NP-deletion analysis (II): Split antecedent sentences

(6) Every instructor$_i$ made sure that every TA$_j$ communicated clearly to the students that they can talk with either him$_i$ or her$_j$ about questions they have on homework assignments but that they are not allowed to discuss homework assignments with *anyone else*$_{k\neq i\oplus j}$. (surface)

⇒ Every instructor made sure that every TA communicated to the students clearly that . . . they are not allowed to discuss homework assignments with anyone other than [**THE** [~~instructor and TA~~]]. (LF)

Problem:
The NP deletion involved here is illicit since there is no overt NP that is string-identical to the deleted material in (6).

Summary of LF-based approaches

- The Cooper/Heim&Kratzer-style E-type analysis suffers from the lexical proliferation problem.
- There are two cases that the Elbourne-style NP-deletion analysis cannot handle straightforwardly:
  - kind anaphora
  - split antecedence

Variable-Free Semantics (VFS) (Jacobson 1999)

VFS is a non-representational theory which does not admit variables as part of the semantic machinery.

Underlying intuition:

- The meanings of expressions containing anaphoric expressions are dependent on the meanings of antecedents (of type e in the case of pronouns).
- Thus, we treat expressions containing pronouns as functions of type $\langle e, \sigma \rangle$.

Example:

(19) $[\![\text{him}]\!] = \lambda x.x : \langle e, e \rangle$

(20) $[\![\text{Mary met him}]\!] = \lambda x.\mathbf{met}(\mathbf{m})(x) : \langle e, t \rangle$

G rule for passing up anaphoric dependence

(21) $h \Rightarrow_{\mathsf{G}} \lambda f \lambda x.h(f(x))$

- An application of G makes *met* take an argument f of type $\langle e, e \rangle$.
- The dependence on a type e meaning is inherited from the argument f to the resultant function.

(22)

$$\dfrac{\dfrac{\dfrac{\textit{Mary}}{\mathbf{m}}}{\lambda P.P(\mathbf{m})}\,\mathsf{T}}{\lambda f \lambda x.f(x)(\mathbf{m})}\,\mathsf{G} \quad \dfrac{\dfrac{\textit{met}}{\lambda x \lambda y.\mathbf{met}(x)(y)}}{\lambda f \lambda x \lambda y.\mathbf{met}(f(x))(y)}\,\mathsf{G} \quad \dfrac{\textit{him}}{\lambda x.x}}{\lambda x.\mathbf{met}(x)(\mathbf{m})}\,\mathsf{A}_{>}\,\mathsf{A}_{>}$$

Z rule for 'binding'

(23) $h \Rightarrow_{\mathsf{Z}} \lambda f \lambda x.h(f(x))(x)$

By applying Z to a function:

- We obtain a new function that terminates the anaphoric dependence originating from its argument.
- Z(**love**) combined with an identity function (pronoun) as its first argument returns a one-place self-**love** predicate.

(24)

$$\dfrac{\dfrac{\textit{John}}{\mathbf{j}} \quad \dfrac{\dfrac{\dfrac{\textit{loves}}{\lambda x \lambda y.\mathbf{love}(x)(y)}}{\lambda f \lambda x.\mathbf{love}(f(x))(x)}\,\mathsf{Z} \quad \dfrac{\textit{himself}}{\lambda x.x}}{\lambda x.\mathbf{love}\ (x)(x)}\,\mathsf{A}_{>}}{\mathbf{love}(\mathbf{j})(\mathbf{j})}\,\mathsf{A}_{<}$$

Paycheck pronouns

Paycheck sentences can be analyzed as mixed cases of discourse anaphora and 'binding' with Z.

(25) John$_i$ deposited his$_i$ paycheck, but Bill$_j$ lost *it* (= his$_j$ paycheck).

Paycheck pronouns can be derived by applying G to an ordinary pronoun. (Jacobson 2000)

(21) $f \Rightarrow_{\mathsf{G}} \lambda g \lambda x.f(g(x))$

(26) $\mathsf{G}\ (\llbracket \text{it} \rrbracket) = \mathsf{G}\ (\lambda x.x) = \lambda f_{\langle e,e \rangle} \lambda x.f(x)$

G makes a pronoun dependent on a functional variable of type $\langle e, e \rangle$, in addition to an individual variable of type e.

- The individual variable is 'bound' with Z.
- The value of the functional variable is determined contextually (e.g., as the function **paycheck-of**).

Paycheck pronouns (overt)

G makes a pronoun dependent on a functional variable of type $\langle e, e \rangle$, in addition to an individual variable of type e.

- The individual variable is 'bound' with Z.
- The functional variable is inherited with G to the top S level so that its value is contextually determined.

(27)

$$\dfrac{\dfrac{\dfrac{\textit{Bill}}{\mathbf{b}}}{\lambda P.P(\mathbf{b})}\,\mathsf{T}}{\lambda f \lambda g.f(g)(\mathbf{b})}\,\mathsf{G} \quad \dfrac{\dfrac{\dfrac{\textit{lost}}{\lambda x \lambda y.\mathbf{lost}(x)(y)}}{\lambda f \lambda x.\mathbf{lost}(f(x))(x)}\,\mathsf{Z}}{\lambda g \lambda h \lambda x.\mathbf{lost}(g(h)(x))(x)}\,\mathsf{G} \quad \dfrac{\dfrac{\textit{it}}{\lambda x.x}}{\lambda f \lambda x.f(x)}\,\mathsf{G}}{\lambda h \lambda x.\mathbf{lost}(h(x))(x)}\,\mathsf{A}_{>}}{\lambda g.\mathbf{lost}(g(\mathbf{b}))(\mathbf{b})}\,\mathsf{A}_{>}$$

The translation of *someone else*

Just like other expressions involving anaphoric dependencies, the meaning of *someone else* is a function from a type e meaning to an 'ordinary-type' meaning (that is, a quantifier meaning of type $\langle et, t \rangle$ in this case).

(28) $\llbracket \text{someone else} \rrbracket = \lambda x \lambda Q.\exists y[y \neq x \wedge Q(y)]$

⇒ *something else* is no different from ordinary pronouns in depending on an extra type e argument

⇒ G and Z automatically take care of its binding behaviors parallel to overt pronouns.

Discourse anaphora with *someone else*

- G lets functions inherit the anaphoric dependence originating from *something else*.
- As a result, the whole sentence ends up denoting a function of type $\langle e, t \rangle$.

(29)

$$\dfrac{\dfrac{\textit{Every American}}{\lambda P.\forall y[\mathbf{Am}(y) \rightarrow P(y)]}}{\lambda f \lambda z.\forall y[\mathbf{Am}(y) \rightarrow f(z)(y)]}\,\mathsf{G} \quad \dfrac{\dfrac{\dfrac{\textit{loves}}{\lambda f \lambda y.f(\lambda z.\mathbf{love}(z)(y))}}{\lambda g \lambda z \lambda y.g(z)(\lambda x.\mathbf{love}(x)(y))}\,\mathsf{G} \quad \dfrac{\textit{someone else}}{\lambda y \lambda Q.\exists x[x \neq y \wedge Q(x)]}}{\lambda z \lambda y.\exists x[x \neq z \wedge \mathbf{love}(x)(y)]}\,\mathsf{A}_{>}}{\lambda z.\forall y[\mathbf{Am}(y) \rightarrow \exists x[x \neq z \wedge \mathbf{love}(x)(y)]]}\,\mathsf{A}$$

'Binding' into *someone else*

- Z(**love**) combined with *someone else* as its first argument returns a one-place 'love-someone-other-than-self' predicate.

(30)

$$\dfrac{\textit{Every American}}{\lambda P.\forall x[\mathbf{Am}(x) \rightarrow P(x)]} \quad \dfrac{\dfrac{\overline{\textit{loves}}}{\lambda f\lambda y.f(\lambda z.\mathbf{love}(z)(y))}}{\lambda g\lambda z.g(z)(\lambda x.\mathbf{love}(x)(z))}\,\mathrm{Z} \quad \dfrac{\overline{\textit{someone else}}}{\lambda y\lambda Q.\exists x[x \neq y \wedge Q(x)]}\,\mathrm{A}_{>}$$
$$\lambda z.\exists x[x \neq z \wedge \mathbf{love}(x)(z)]$$
$$\forall x[\mathbf{Am}(x) \rightarrow \exists y[y \neq x \wedge \mathbf{love}(y)(x)]]$$

Paycheck reading of *someone else*

G makes *someone else* dependent on a functional variable of type $\langle e, e\rangle$, in addition to an individual variable of type e.

- The individual variable is 'bound' with Z.
- The functional variable is inherited with G to the top S level so that its value is contextually determined.

(31)

$$\dfrac{\dfrac{\textit{Every American}}{\lambda P.\forall x.[\mathbf{Am}(x) \rightarrow P(x)]}}{\lambda f\lambda g.\forall x.[\mathbf{Am}(x) \rightarrow f(g)(x)]}\,\mathrm{G} \quad \dfrac{\dfrac{\dfrac{\overline{\textit{loves}}}{\lambda f\lambda y.f(\lambda z.\mathbf{love}(z)(y))}}{\lambda g\lambda z.g(z)(\lambda x.\mathbf{love}(x)(z))}\,\mathrm{Z}}{\lambda f\lambda g\lambda z.f(g)(z)(\lambda x.\mathbf{love}(x)(z))}\,\mathrm{G} \quad \dfrac{\dfrac{\overline{\textit{someone else}}}{\lambda x\lambda Q.\exists y[y \neq x \wedge Q(y)]}}{\lambda f\lambda y\lambda Q.\exists x[x \neq f(y) \wedge Q(x)]}\,\mathrm{G}$$
$$\lambda g\lambda z.\exists y[y \neq g(z) \wedge \mathbf{love}(y)(z)] \quad \mathrm{A}_{>}$$
$$\lambda g.\forall x[\mathbf{Am}(x) \rightarrow \exists y[y \neq g(x) \wedge \mathbf{love}(y)(x)]]$$

Paycheck pronouns bound by multiple quantifiers

Our VFS analysis doesn't suffer from the lexical proliferation problem.
The appropriate entries for *something else* in complex paycheck sentences such as (12) are obtained by applying G recursively.

(12) Every experienced instructor$_k$ knows that some students$_l$ will complain about *something else*$_{m\neq\mathbf{grade}(k,l)}$.

(32) G (*something else*) $= \lambda f\lambda y\lambda Q.\exists x[x \neq f(y) \wedge Q(x)]$

(33) G (G (*something else*)) $=$
$\lambda g\lambda z\lambda y\lambda Q.\exists x[x \neq g(z)(y) \wedge Q(x)]$

- The value of the functional variable g of type $\langle e, ee\rangle$ is identified in the discourse context.
- The two individual variables y and z will be bound by the higher quantifiers in the usual manner.

Split antecedent sentences as instances of paycheck sentences

(6′) Every instructor$_i$ made sure that every TA$_j$ told the students that they can talk to *no one else*$_{k\neq i\oplus j}$.

- Implicit variables are compatible with both singular and plural antecedents since they are not marked for grammatical number.
- We generalize the translation for *(no one) else* for a treatment of plurality:

(34) $[\![\text{no one else}]\!] = \lambda x\lambda Q.\neg\exists y[y \not\leq x \wedge Q(y)]$

Split antecedent sentences as instances of paycheck sentences (cont.)

We make *no one else* dependent on two individual variables by applying G twice.

(34) $[\![\text{no one else}]\!] = \lambda x\lambda Q.\neg\exists y[y \not\leq x \wedge Q(y)]$

(35) G (G ($[\![\text{no one else}]\!]$)) $= \lambda f\lambda z\lambda x\lambda P.\neg\exists y[y \not\leq f(z)(x) \wedge P(y)]$

Then by:

- binding z and x by higher quantifiers with Z, and
- supplying the value for f with (36)

we get the desired translation in (37):

(36) $\lambda x\lambda y.x\oplus y$

(37) $\forall y[\mathbf{inst}(y) \rightarrow \mathbf{make\text{-}sure}(\forall x[\mathbf{TA}(x) \rightarrow \mathbf{tell\text{-}students}(\neg\exists z[z \not\leq y\oplus x \wedge \mathbf{can\text{-}talk\text{-}to}(z)(\mathbf{st})])(x)])(y)]$

Entity/kind antecedent ambiguity

(6b) John saw a red balloon, but Bill saw *something else*.

The sentence itself is analyzed as involving a discourse anaphora, as usual.
By assuming the standard analysis of kind reference due to Carlson (1977), the ambiguity in (6b) falls out.

- Entity-antecedent reading:
  Arises when the implicit variable in *something else* takes as its antecedent an ordinary entity-denoting expression (of type e).
- Kind-antecedent reading:
  Arises when the implicit variable in *something else* takes as its antecedent a kind-denoting expression (of type e).

Entity/kind antecedent ambiguity (cont.)

Saw is a stage-level predicate:

(38) $[\![\text{saw}]\!] = \lambda f \lambda x.f(\lambda y.\exists z[R(y)(z) \wedge \mathbf{saw}(y)(x)])$
(R: 'realization of' relation)

(39) [Bill saw something else]
$= \lambda z.\exists y[y \neq z \wedge \exists w[R(y)(w) \wedge \mathbf{saw}(w)(\mathbf{b})]]$

Two possible antecedents for z:

(i) the actual red balloon that John saw
⇒ gives rise to a reading that denies token-identity

(ii) the kind 'red balloon'
⇒ gives rise to a reading that denies kind-identity

Conclusion

- Common wisdom (cf., e.g., Stanley (2000), Culicover and Jackendoff (1995)):

  (40) Expressions containing 'implicit variables' show that we need to posit variables in abstract semantic representations (such as LF).

- We have shown that (40) doesn't follow—at least not from the binding behaviors of *something else*.
- On the contrary, dispensing with representational devices leads to a better analysis both empirically and conceptually.

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