Resumption and Partial Interpretation

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Ungrammaticality and Interpretation

- How are ungrammatical utterances interpreted?
- Three hypotheses:

H1: Ungrammatical utterances are repaired to the closest grammatical utterance, then interpreted normally.

H2: Ungrammatical utterances are not interpreted using normal linguistic mechanisms of interpretation, but we apply general cognitive mechanisms of inference to them.

H3: Ungrammatical utterances are interpreted to the greatest extent possible using normal linguistic mechanisms of interpretation.

The Best Hypothesis?

- The problem for H1 is how ‘closest grammatical utterance’ is computed.
    - Until we have a theory of this, H1 is not explanatory.
- H2 suffers from two immediate problems:
    - It is rather implausible that the linguistic mechanisms for interpretation are switched off in their entirety, given that substructures of the utterance are likely grammatical and interpretable.
    - ‘General inference’ must apply to something and that something is surely the well-formed parts. Therefore H2 depends on H3 — H3 subsumes H2.
- The best initial hypothesis is **H3**.

The General Problem

- The standard interpretation of semantic compositionality is that an expression has a full compositional interpretation if and only if it has a valid syntactic structure.
  - Montague Grammar: syntax-semantics homomorphism
  - Type-Logical Grammar: syntax-semantics isomorphism
  - Interpretive Semantics: input to semantics is a syntactic structure

English Resumptives: Intrusive Pronouns

English ‘Resumptive’ Pronouns

- Apparent resumptive pronouns in English ameliorate island violations and other violations of constraints on extraction.

Weak Island

1. This is **a book** that Jens forgot if Sofia had read **it** before.

>

2. This is **a book** that Jens forgot if Sofia had read __ before.

3. This is **the book** that Jens forgot if Sofia had read **it** before.

>

4. This is **the book** that Jens forgot if Sofia had read __ before.

Strong Islands

1. I’d like to meet **a psychologist** who Peter knows somebody who recommended **her**.

>

2. I’d like to meet **a psychologist** who Peter knows somebody who recommended __.

3. I’d like to meet **the psychologist** who Peter knows somebody who recommended **her**.

>

4. I’d like to meet **the psychologist** who Peter knows somebody who recommended __.

ECP/COMP-Trace

1. This is **a donkey** that I wonder where **it** lives.

>

2. This is **a donkey** that I wonder where __ lives.

3. This is **the donkey** that I wonder where **it** lives.

>

4. This is **the donkey** that I wonder where __ lives.

Resumptive Pronouns and Intrusive Pronouns

- Resumptive pronouns are pronouns that occupy the foot of an unbounded dependency.
- A definitional characteristic of true resumptive pronouns is that they are interpreted as **bound variables/bound pronouns** (McCloskey 1979, 1990, 2002, Chao & Sells 1983, Sells 1984, Asudeh 2004).
- English resumptive pronouns are not bound variables and are therefore not true, grammaticized resumptive pronouns, but rather **‘intrusive pronouns’** (Sells, 1984).

No Bound Variable Reading 1: Quantifier Binding

1. * I'd like to meet **every linguist** that Mary couldn't remember if she had seen **him** before. (Chao & Sells, 1983:49,(5c))

2. * **No book** that Bill wonders whether he should read **it** is really interesting to **him**.

- In these cases, the version with the gap is, if anything, preferred:

3. ? I'd like to meet **every linguist** that Mary couldn't remember if she had seen __ before. (Chao & Sells, 1983:49,(5b))

4. ? **No book** that Bill wonders whether he should read __ is really interesting to him.

No Bound Variable Reading 2: List Answers

1. **Which of the linguists** do you think that if Mary hires __ then everyone will be happy?

   ✓ Chris

   ✓ Chris, Daniel or Bill

2. **Which of the linguists** do you think that if Mary hires **him** then everyone will be happy?

   ✓ Chris

   X Chris, Daniel or Bill

No Bound Variable Reading 3: Functional Answers

1. **Which exam question** does no professor believe __ will be tough enough?

   ✓ Question 2A.

   ✓ The one her students aced last year.

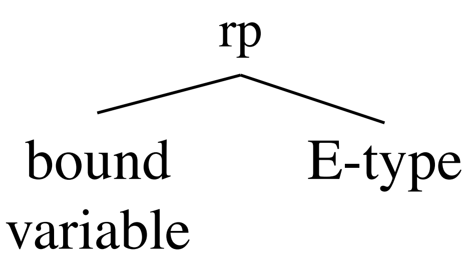
2. **Which exam question** does no professor even wonder if **it** will be tough enough?

   ✓ Question 2A.

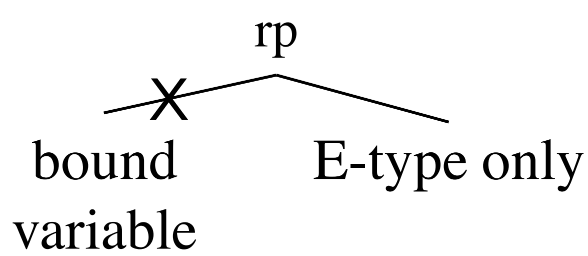
   X The one her students aced last year.

Chao & Sells: The Resumptive Pronoun Parameter and E-type Readings

+RPP
Swedish
Hebrew



−RPP
English
Brazilian Portuguese



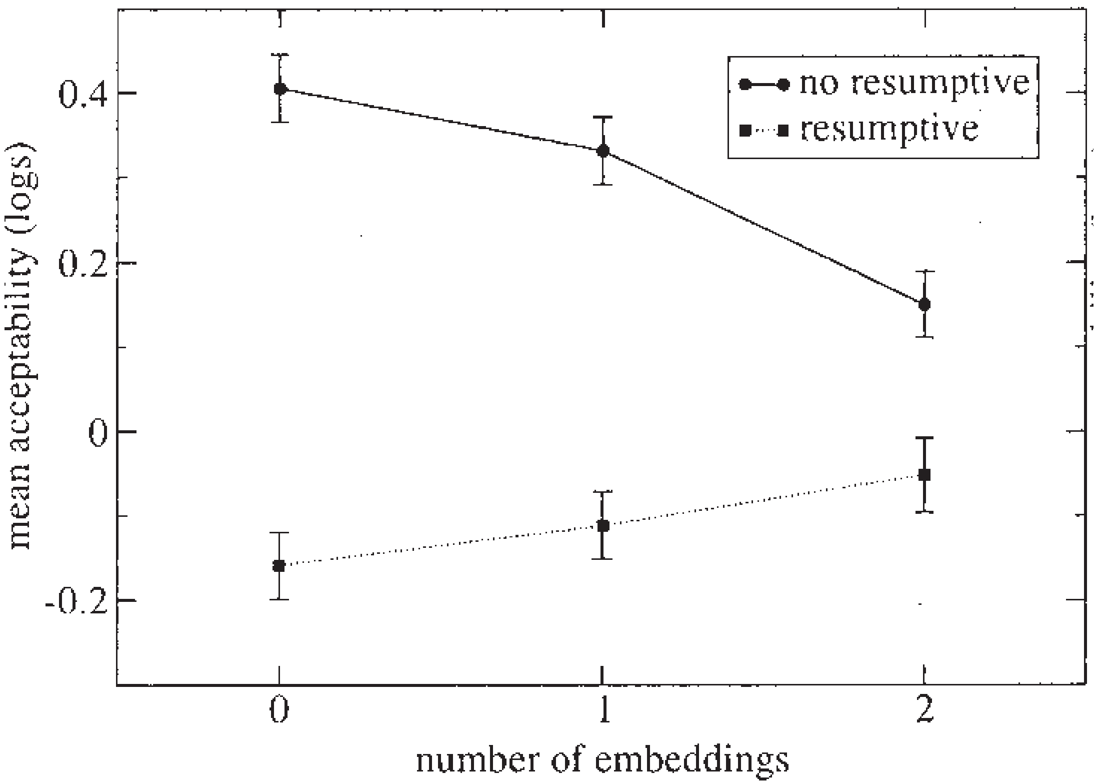
Resumptive Pronouns in English are Ungrammatical

- Ferreira & Swets (2005)
  1. [This is a] [donkey] [that] [I don′t know] [where it lives].
     RP Target
  2. [This is a] [donkey] [that] [doesn’t know] [where it lives].
     Control
- Asked for grammaticality judgements on a scale of
  1 (perfect) to 5 (awful)
- Written presentation: RP = 3.3, Control = 1.9
- Oral presentation: RP = 3.0, Control = 1.7

Resumptive Pronouns in English are Ungrammatical

- Alexopoulou & Keller (2007):
  - Gradient grammaticality judgement task
  - Summary of results:
    - Resumptive pronouns judged worse than gaps in all conditions except strong islands, where they were judged **only** as good as gaps.
    - Resumptive pronouns increased in grammaticality with level of embedding.

Resumptive Pronouns in English are Ungrammatical



a. Nonisland condition (bare clause).

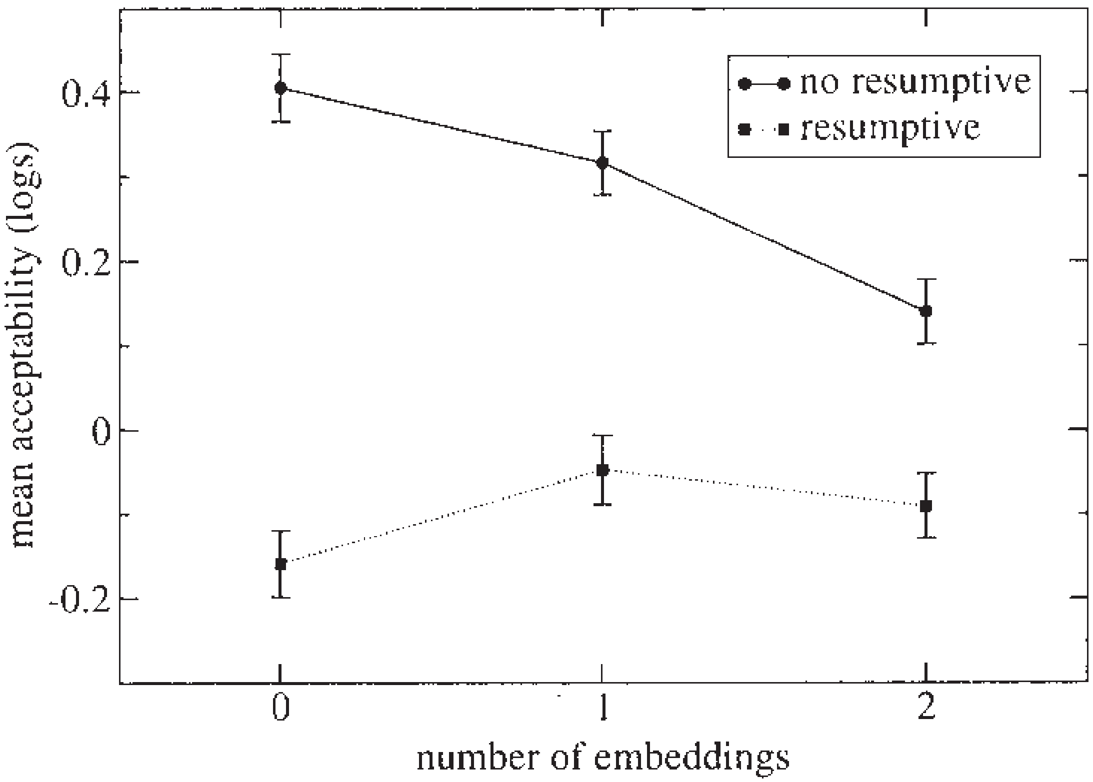
Graph & examples from Alexopoulou & Keller (2007)

a. Who will we fire Ø/him? (zero embedding)

b. Who does Mary claim we will fire Ø/him? (single)

c. Who does Jane think Mary claims we will fire Ø/him? (double)

Resumptive Pronouns in English are Ungrammatical



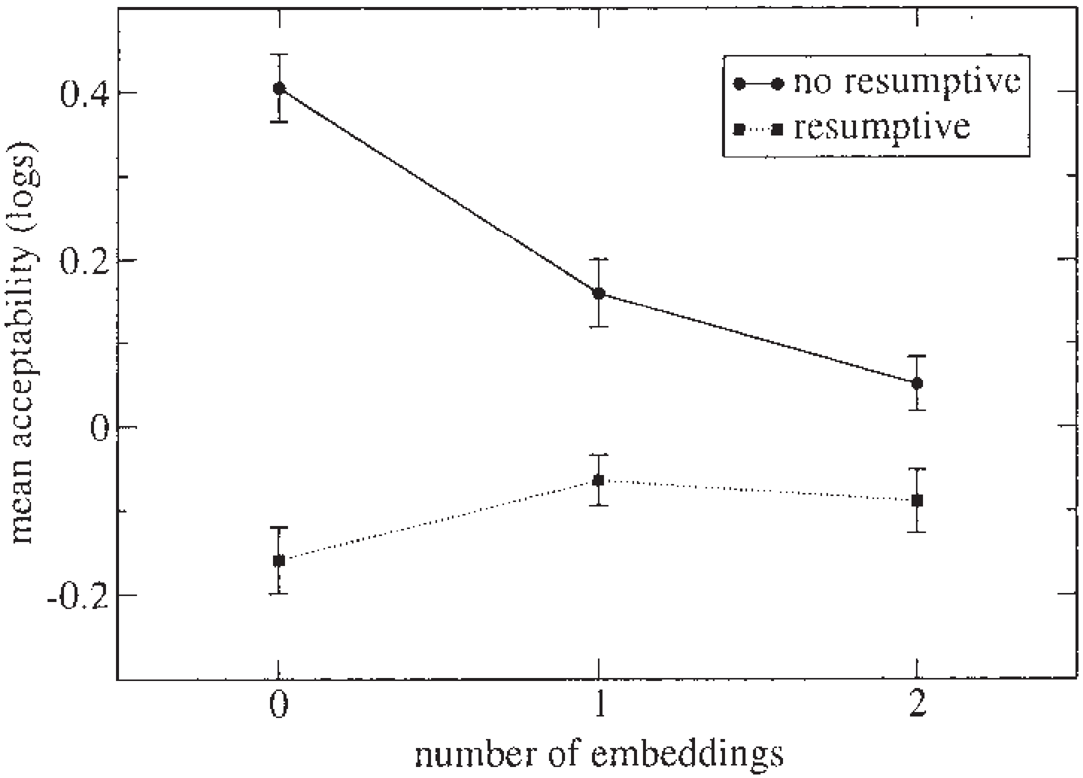
Graph & examples from Alexopoulou & Keller (2007)

b. Nonisland condition (*that*-clause).

a. Who does Mary claim that we will fire Ø/him? (single)

b. Who does Jane think that Mary claims that we will fire Ø/him? (double)

Resumptive Pronouns in English are Ungrammatical



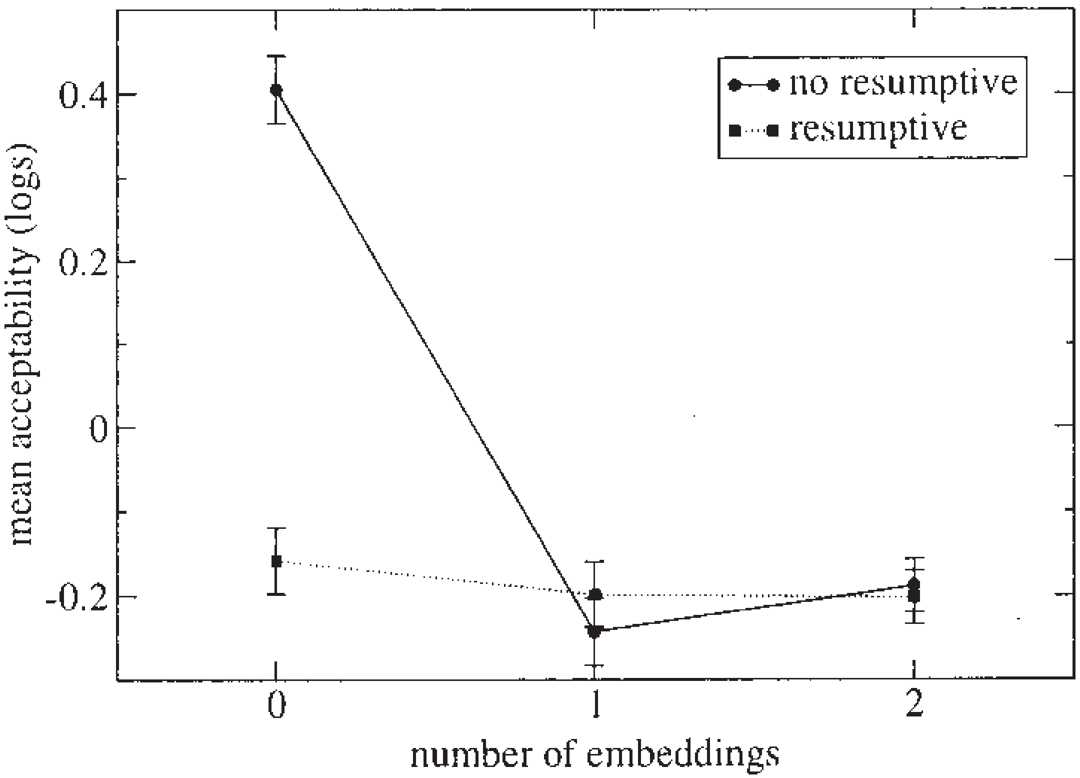
c. Weak-island condition (*whether*-clause).

Graph & examples from Alexopoulou & Keller (2007)

a. Who does Mary wonder whether we will fire Ø/him? (single)

b. Who does Jane think that Mary wonders whether we will fire Ø/him? (double)

Resumptive Pronouns in English are Ungrammatical



d. Strong-island condition (relative clause).

Graph & examples from Alexopoulou & Keller (2007)

a. Who does Mary meet the people that will fire Ø/him? (single)

b. Who does Jane think that Mary meets the people that will fire Ø/him? (double)

Dilemma: Intrusive Pronouns and Compositionality

1. If English lacks true resumptive pronouns, then intrusive pronoun examples do not have fully well-formed syntactic structures, since there is no way to syntactically relate the relative operator to its base position (which is occupied by a non-bindable pronoun).

   The standard interpretation of semantic compositionality is that an expression has a full compositional interpretation if and only if it has a valid syntactic structure.

   i. How, then, do we compute meanings for sentences with intrusive pronouns?

   ii. Do we have to give up compositionality to do so?

Dilemma: Intrusive Pronouns and Compositionality

2. Intrusive pronoun examples apparently do have interpretations. Compositionality is a deep property of language, so we could assume that English does have grammaticized resumptives and the expressions in which they occur have compositional interpretations.
   i. If intrusive pronouns are in fact grammatical, what explains the contrast in grammaticality based on the antecedent of the pronoun?
      1. This is **a/the book** that Jens forgot if Sofia had read **it** before.
      2. * Jens recognized **every man** who Ola forgot if Sofia had seen **him** before.
   ii. Why does a growing body of empirical evidence show that speakers judge intrusive pronoun examples as ungrammatical or of degraded grammaticality?

Proposal

Asudeh (2004):

1. English intrusive pronouns are not fully grammatical.
2. Intrusive pronoun examples receive a *partial interpretation*, but one which is fully compositional (in the parts).
3. The partial interpretation is *informative* if the antecedent of the pronoun has a lower nominal type (individual type, *e*), but not if the antecedent has higher nominal types (quantified NP type, <<*e*,*t*>,*t*>).

➡ Introduction of new theoretical notion:
Informative partial interpretations for non-fully-well-formed syntactic structures

Glue Semantics

Glue Semantics

- Glue Semantics is a type-logical semantics that can be tied to any syntactic formalism that supports a notion of headedness.
- Glue Semantics can be thought of as *categorial semantics without categorial syntax.*
- The independent syntax assumed in Glue Semantics means that the logic of composition is *commutative*, unlike in Categorial Grammar.
- Selected works:
  Dalrymple (1999, 2001), Crouch & van Genabith (2000),
  Asudeh (2004, 2005a,b, in prep.), Lev 2007, Kokkonidis (in press)

Glue Semantics

- Lexically-contributed *meaning constructors* :=

Meaning language term $\mathcal{M} : G$ Composition language term

- Meaning language := some lambda calculus
  - Model-theoretic
- Composition language := linear logic
  - Proof-theoretic
- Curry Howard Isomorphism between formulas (meanings) and types (proof terms)
- Successful Glue Semantics proof:

$$\Gamma \vdash \mathcal{M} : G_t$$

Key Glue Proof Rules with Curry-Howard Terms

Application : Implication Elimination

$$\dfrac{\begin{array}{c}\vdots\\ a : A\end{array} \qquad \begin{array}{c}\vdots\\ f : A \multimap B\end{array}}{f(a) : B} \multimap_{\mathcal{E}}$$

Abstraction : Implication Introduction

$$\dfrac{\begin{array}{c}[x : A]^1\\ \vdots\\ f : B\end{array}}{\lambda x.f : A \multimap B} \multimap_{\mathcal{I},1}$$

Pairwise Substitution : Conjunction Elimination

$$\dfrac{\begin{array}{c}\vdots\\ a : A \otimes B\end{array} \qquad \begin{array}{c}[x : A]^1 \quad [y : B]^2\\ \vdots\\ f : C\end{array}}{\textsf{let } a \textsf{ be } x \times y \textsf{ in } f : C} \otimes_{\mathcal{E},1,2}$$

Beta reduction for let:

$$\textsf{let } a \times b \textsf{ be } x \times y \textsf{ in } f \quad \Rightarrow_\beta \quad f[a/x, b/y]$$

Example: *Mary laughed*

1. $mary : \uparrow_{\sigma_e}$
2. $laugh : (\uparrow \text{SUBJ})_{\sigma_e} \multimap \uparrow_{\sigma_t}$

$$f\begin{bmatrix} \text{PRED} & \text{`laugh}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & g\begin{bmatrix}\text{PRED} & \text{`Mary'}\end{bmatrix} \end{bmatrix}$$

1′. $mary : g_{\sigma_e}$

2′. $laugh : g_{\sigma_e} \multimap f_{\sigma_t}$

1″. $mary : m$

2″. $laugh : m \multimap l$

Proof

1.	$mary : m$	Lex. **Mary**
2.	$laugh : m \multimap l$	Lex. **laughed**
3.	$laugh(mary) : l$	E $\multimap$, 1, 2

$\equiv$

Proof

$$\frac{mary : m \qquad laugh : m \multimap l}{laugh(mary) : l} \multimap \mathcal{E}$$

Example: *Most presidents speak*

1. $\lambda R \lambda S.most(R,S) : (v \multimap r) \multimap \forall X.[(p \multimap X) \multimap X]$ Lex. **most**
2. $president^* : v \multimap r$ Lex. **presidents**
3. $speak : p \multimap s$ Lex. **speak**

$$\dfrac{\dfrac{\begin{array}{c}\lambda R \lambda S.most(R,S) : \\ (v \multimap r) \multimap \forall X.[(p \multimap X) \multimap X]\end{array} \quad \begin{array}{c} president^* : \\ v \multimap r \end{array}}{\begin{array}{c}\lambda S.most(president^*, S) : \\ \forall X.[(p \multimap X) \multimap X]\end{array}} \quad \begin{array}{c} speak : \\ p \multimap s \end{array}}{most(president^*, speak) : s} \multimap_{\mathcal{E}}, [s/X]$$

Example:
Most presidents speak at least one language

$$\begin{bmatrix} \text{PRED} & \text{`speak}\langle\text{SUBJ, OBJ}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`president'} \\ \text{SPEC} & \begin{bmatrix} \text{PRED} & \text{`most'} \end{bmatrix} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`language'} \\ \text{SPEC} & \begin{bmatrix} \text{PRED} & \text{`at-least-one'} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Single parse

➡

Multiple scope possibilities (Underspecification through quantification)

1. $\lambda R \lambda S.most(R, S)$: $(v1 \multimap r1) \multimap \forall X.[(p \multimap X) \multimap X]$ — Lex. **most**
2. $president^*$: $v1 \multimap r1$ — Lex. **presidents**
3. $speak$: $p \multimap l \multimap s$ — Lex. **speak**
4. $\lambda P \lambda Q.at\text{-}least\text{-}one(P, Q)$: $(v2 \multimap r2) \multimap \forall Y.[(l \multimap Y) \multimap Y]$ — Lex. **at least one**
5. $language$: $v2 \multimap r2$ — Lex. **language**

Most presidents speak at least one language
Subject wide scope

$$\dfrac{\lambda R \lambda S.most(R,S) : (v1 \multimap r1) \multimap \forall X.[(p \multimap X) \multimap X] \qquad president^{*} : v1 \multimap r1}{\lambda S.most(president^{*}, S) : \forall X.[(p \multimap X) \multimap X]}$$

$$\dfrac{\lambda P \lambda Q.a\text{-}l\text{-}o(P,Q) : (v2 \multimap r2) \multimap \forall Y.[(l \multimap Y) \multimap Y] \qquad lang : v2 \multimap r2}{\lambda Q.a\text{-}l\text{-}o(lang, Q) : \forall Y.[(l \multimap Y) \multimap Y]}$$

$$\dfrac{\lambda x \lambda y.speak(x,y) : p \multimap l \multimap s \qquad [z : p]^{1}}{\lambda y.speak(z,y) : l \multimap s}$$

$$\dfrac{\dfrac{\dfrac{\lambda Q.a\text{-}l\text{-}o(lang, Q) : \forall Y.[(l \multimap Y) \multimap Y] \qquad \lambda y.speak(z,y) : l \multimap s}{a\text{-}l\text{-}o(lang, \lambda y.speak(z,y)) : s}\,[s/Y]}{\lambda z.a\text{-}l\text{-}o(lang, \lambda y.speak(z,y)) : p \multimap s}\multimap_{\mathcal{I},1} \qquad \lambda S.most(president^{*}, S) : \forall X.[(p \multimap X) \multimap X]}{most(president^{*}, \lambda z.a\text{-}l\text{-}o(lang, \lambda y.speak(z,y))) : s}\,[s/X]$$

Most presidents speak at least one language

Object wide scope

$$\dfrac{\lambda R \lambda S.most(R,S) : (v1 \multimap r1) \multimap \forall X.[(p \multimap X) \multimap X] \qquad president^{*} : v1 \multimap r1}{\lambda S.most(president^{*}, S) : \forall X.[(p \multimap X) \multimap X]}$$

$$\dfrac{\lambda y \lambda x.speak(x,y) : l \multimap p \multimap s \qquad [z : l]^{1}}{\lambda x.speak(x,z) : p \multimap s}$$

$$\dfrac{\lambda S.most(president^{*}, S) : \forall X.[(p \multimap X) \multimap X] \qquad \lambda x.speak(x,z) : p \multimap s}{most(president^{*}, \lambda x.speak(x,z)) : s}\;[s/X]$$

$$\dfrac{most(president^{*}, \lambda x.speak(x,z)) : s}{\lambda z.most(president^{*}, \lambda x.speak(x,z)) : l \multimap s}\;\multimap_{\mathcal{I},1}$$

$$\dfrac{\lambda P \lambda Q.a\text{-}l\text{-}o(P,Q) : (v2 \multimap r2) \multimap \forall Y.[(l \multimap Y) \multimap Y] \qquad lang : v2 \multimap r2}{\lambda Q.a\text{-}l\text{-}o(lang, Q) : \forall Y.[(l \multimap Y) \multimap Y]}$$

$$\dfrac{\lambda Q.a\text{-}l\text{-}o(lang, Q) : \forall Y.[(l \multimap Y) \multimap Y] \qquad \lambda z.most(president^{*}, \lambda x.speak(x,z)) : l \multimap s}{a\text{-}l\text{-}o(lang, \lambda z.most(president^{*}, \lambda x.speak(x,z))) : s}\;[s/Y]$$

Anaphora in Glue Semantics

- Variable-free: pronouns are functions on their antecedents (Jacobson 1999, among others)
- Commutative logic of composition allows pronouns to compose **directly** with their antecedents.
    - No need for otherwise unmotivated additional type shifting (e.g. Jacobson's *z*-shift)

Anaphora in Glue Semantics

1. Joe said he bowls.

- Pronominal meaning constructor:

$$\lambda z.z \times z : A \multimap (A \otimes P)$$

$$\dfrac{\dfrac{\dfrac{\begin{array}{l} joe : \\ j \end{array} \quad \begin{array}{l} \lambda z.z \times z : \\ j \multimap (j \otimes p) \end{array}}{joe \times joe : j \otimes p} \qquad \dfrac{\dfrac{[x : j]^1 \quad \begin{array}{l} \lambda u \lambda q.say(u, q) : \\ j \multimap b \multimap s \end{array}}{\begin{array}{l} \lambda q.say(x, q) : \\ b \multimap s \end{array}} \quad \dfrac{[y : p]^2 \quad \begin{array}{l} \lambda v.bowl(v) : \\ p \multimap b \end{array}}{\begin{array}{l} bowl(y) : \\ b \end{array}}}{say(x,\ bowl(y)) : s}}{\text{let } joe \times joe \text{ be } x \times y \text{ in } say(x, bowl(y)) : s} \otimes_{\mathcal{E},1,2}}{say(joe, bowl(joe)) : s} \Rightarrow_{\beta}$$

Further Points of Interest

- Glue Semantics can be understood as a *representationalist* theory, picking up on a theme from Wednesday's semantics workshop.
    - Proofs can be reasoned about as representations (Asudeh & Crouch 2002a,b).
    - Proofs have strong identity criteria: normalization, comparison
- Glue Semantics allows recovery of a non-representationalist notion of *direct compositionality* (Asudeh 2005, 2006).
    - ➡ Flexible framework with lots of scope for exploration of questions of compositionality and semantic representation

Partial Interpretation

Premises:
I met the linguist who Kate forgot if Thora had seen him

1. $s : i$ — Lex. **I**
2. $meet : i \multimap l \multimap m$ — Lex. **met**
3. $\lambda P.\iota y[P(y)] : (v \multimap r) \multimap l$ — Lex. **the**
4. $linguist : v \multimap r$ — Lex. **linguist**
5. $\lambda Q \lambda P \lambda x.P(x) \wedge Q(x) : (l \multimap f) \multimap [(v \multimap r) \multimap (v \multimap r)]$ — Lex. **RelOp**
6. $kate : k$ — Lex. **Kate**
7. $forget : k \multimap s \multimap f$ — Lex. **forgot**
8. $thora : t$ — Lex. **Thora**
9. $see : t \multimap h \multimap s$ — Lex. **seen**
10. $\lambda z.z \times z : l \multimap (l \otimes h)$ — Lex. **him**

Informative Partial Interpretation: Antecedent in type *e*

- Desired interpretation:

$$meet(s, \iota y[linguist(y) \ \wedge \ forget(kate, see(thora, y))]) : m$$

- Derived partial interpretation (corresponds to sub-proof):

$$meet(s, \iota y[linguist(y)]) \times forget(kate, see(thora, \iota y[linguist(y)])) : m \otimes f$$

- Full derived interpretation (corresponds to full proof):

$$(meet(s, \iota y[linguist(y)]) \times forget(kate, see(thora, \iota y[linguist(y)]))) \times \mathbf{RelOP} : m \otimes f \otimes \mathbf{RelOp}$$

Sub-Proof for Informative Partial Meaning

$$\dfrac{\dfrac{\dfrac{\overset{\textbf{the}}{(v \multimap r) \multimap l} \quad \overset{\textbf{linguist}}{v \multimap r}}{l} \quad \overset{\textbf{him}}{l \multimap (l \otimes h)}}{l \otimes h} \quad \dfrac{\dfrac{\dfrac{\overset{\textbf{I}}{i} \quad \overset{\textbf{met}}{i \multimap l \multimap m}}{l \multimap m} \quad [l]^1}{m} \quad \dfrac{\dfrac{\overset{\textbf{kate}}{k} \quad \overset{\textbf{forgot}}{k \multimap s \multimap f}}{s \multimap f} \quad \dfrac{\dfrac{\overset{\textbf{thora}}{t} \quad \overset{\textbf{seen}}{t \multimap h \multimap s}}{h \multimap s} \quad [h]^2}{s}}{f}}{m \otimes f}\otimes_{\mathcal{I}}}{m \otimes f}\otimes_{\mathcal{E},1,2}$$

Full Proof

$$\dfrac{\dfrac{\textbf{the}}{(v \multimap r) \multimap l} \quad \dfrac{\textbf{linguist}}{v \multimap r}}{l}$$

$$\dfrac{\dfrac{\dfrac{\textbf{I}}{i} \quad \dfrac{\textbf{met}}{i \multimap l \multimap m}}{l \multimap m} \quad [l]^1}{m}$$

$$\dfrac{\dfrac{\textbf{kate}}{k} \quad \dfrac{\textbf{forgot}}{k \multimap s \multimap f}}{s \multimap f}$$

$$\dfrac{\dfrac{\dfrac{\textbf{thora}}{t} \quad \dfrac{\textbf{seen}}{t \multimap h \multimap s}}{h \multimap s} \quad [h]^2}{s}$$

$$\dfrac{s \multimap f \quad s}{f}$$

$$\dfrac{m \quad f}{m \otimes f}\ \otimes_{\mathcal{I}}$$

$$\dfrac{l \quad \dfrac{\textbf{him}}{l \multimap (l \otimes h)}}{l \otimes h}$$

$$\dfrac{l \otimes h \quad m \otimes f}{m \otimes f}\ \otimes_{\mathcal{E},1,2}$$

$$\dfrac{m \otimes f}{m \otimes f \otimes \mathbf{RelOP}}\ \otimes_{\mathcal{I}}$$

Bound Pronoun Readings in Glue Semantics

- In order to receive a bound reading, a pronoun must make an **assumption on its antecedent that is discharged within the scope of a scope-taking element.**
- To be discharged within the scope of a scope-taking element means to be discharged in **a contiguous sub-proof that extends from the assumption to the point at which the scope dependency is discharged** (cf. *audit trails* of Crouch & van Genabith 1999:160ff.).

Every girl said ***Kim*** *thinks John likes* ***her***

$$
\dfrac{k \qquad \dfrac{\dfrac{\dfrac{\dfrac{\dfrac{\dfrac{[k]^1 \quad k \multimap l \multimap t}{l \multimap t} \qquad \dfrac{[h]^2 \quad \dfrac{j \quad j \multimap h \multimap l}{h \multimap l}}{l}}{t} \qquad \dfrac{[k]^3 \quad k \multimap (k \otimes h)}{k \otimes h}}{t}\otimes_{\mathcal{E},1,2} \qquad t \multimap g \multimap s}{g \multimap s} \qquad \text{with } \forall X.[(g \multimap X) \multimap X]}{s}}{k \multimap s}\multimap_{\mathcal{I},3}}{s}
$$

$$
\dfrac{\forall X.[(g \multimap X) \multimap X] \qquad g \multimap s}{s}
$$

Every girl *said Kim thinks John likes* ***her***

$$
\dfrac{\forall X.[(g \multimap X) \multimap X] \qquad \dfrac{\dfrac{\dfrac{[g]^1 \qquad \dfrac{\dfrac{\dfrac{k \qquad k \multimap l \multimap t}{l \multimap t} \qquad \dfrac{[h]^2 \qquad \dfrac{j \qquad j \multimap h \multimap l}{h \multimap l}}{l}}{t} \qquad t \multimap g \multimap s}{g \multimap s}}{s} \qquad \dfrac{[g]^3 \qquad g \multimap (g \otimes h)}{g \otimes h}}{s}\otimes_{\mathcal{E},1,2}}{g \multimap s}\multimap_{\mathcal{I},3}}{s}
$$

Premises:
I met every linguist who Kate forgot if Thora had seen him

1. $s : i$ — Lex. **I**
2. $meet : i \multimap l \multimap m$ — Lex. **met**
3. $\lambda P \lambda Q.every(P, Q) : (v \multimap r) \multimap \forall X.[(l \multimap X) \multimap X]$ — Lex. **every**
4. $linguist : v \multimap r$ — Lex. **linguist**
5. $\lambda Q \lambda P \lambda x.P(x) \wedge Q(x) : (l \multimap f) \multimap [(v \multimap r) \multimap (v \multimap r)]$ — Lex. **RelOp**
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9. $see : t \multimap h \multimap s$ — Lex. **seen**
10. $\lambda z.z \times z : l \multimap (l \otimes h)$ — Lex. **him**

Uninformative Partial Interpretation: Antecedent in type <<*e*,*t*>,*t*>

- Desired interpretation:

  $every(linguist, \lambda x.(meet(s,x) \wedge forget(kate, see(thora, x)))$

- Derived partial interpretation (corresponds to sub-proof):

  $meet(s,x) \times forget(kate, see(thora, x)) : m \otimes f$

- Derived full interpretation (corresponds to full proof):

  $((\lambda x.meet(s,x) \times forget(kate, see(thora,x))) \times (\lambda P \lambda Q.every(P,Q))) \times \mathbf{RelOP} :$
  $((l \multimap m \otimes f) \otimes \forall X.[(l \multimap X) \multimap X]) \otimes \mathbf{RelOP}$

Sub-Proof for Uninformative Partial Meaning

I: i **met**: $i \multimap l \multimap m$ **kate**: k **forgot**: $k \multimap s \multimap f$ **thora**: t **seen**: $t \multimap h \multimap s$ **him**: $l \multimap (l \otimes h)$

$$\frac{t \qquad t \multimap h \multimap s}{h \multimap s}$$

$$\frac{h \multimap s \qquad [h]^2}{s}$$

$$\frac{i \qquad i \multimap l \multimap m}{l \multimap m}$$

$$\frac{l \multimap m \qquad [l]^1}{m}$$

$$\frac{k \qquad k \multimap s \multimap f}{s \multimap f}$$

$$\frac{s \multimap f \qquad s}{f}$$

$$\frac{m \qquad f}{m \otimes f}\otimes_{\mathcal{I}}$$

$$\frac{[l]^3 \qquad l \multimap (l \otimes h)}{l \otimes h}$$

$$\frac{l \otimes h \qquad m \otimes f}{m \otimes f}\otimes_{\mathcal{E},1,2}$$

Sub-Proof: Discharge Antecedent Assumption

$$
\dfrac{
  \dfrac{
    \dfrac{[l]^3 \qquad \overset{\textbf{him}}{l \multimap (l \otimes h)}}{l \otimes h}
    \qquad
    \dfrac{
      \dfrac{
        \dfrac{\overset{\textbf{I}}{i} \qquad \overset{\textbf{met}}{i \multimap l \multimap m}}{l \multimap m}
        \qquad [l]^1
      }{m}
      \qquad
      \dfrac{
        \dfrac{\overset{\textbf{kate}}{k} \qquad \overset{\textbf{forgot}}{k \multimap s \multimap f}}{s \multimap f}
        \qquad
        \dfrac{
          \dfrac{\overset{\textbf{thora}}{t} \qquad \overset{\textbf{seen}}{t \multimap h \multimap s}}{h \multimap s}
          \qquad [h]^2
        }{s}
      }{f}
    }{m \otimes f}\,\otimes_{\mathcal{I}}
  }{m \otimes f}\,\otimes_{\mathcal{E},1,2}
}{l \multimap (m \otimes f)}\,\multimap_{\mathcal{I},3}
$$

Full Proof:
Conjoin Remaining Lexically Contributed Premises

$$\dfrac{\overset{\textbf{thora}}{t} \qquad \overset{\textbf{seen}}{t \multimap h \multimap s}}{h \multimap s}$$

$$\dfrac{h \multimap s \qquad [h]^2}{s}$$

$$\dfrac{\overset{\textbf{I}}{i} \qquad \overset{\textbf{met}}{i \multimap l \multimap m}}{l \multimap m}$$

$$\dfrac{l \multimap m \qquad [l]^1}{m}$$

$$\dfrac{\overset{\textbf{kate}}{k} \qquad \overset{\textbf{forgot}}{k \multimap s \multimap f}}{s \multimap f}$$

$$\dfrac{s \multimap f \qquad s}{f}$$

$$\dfrac{m \qquad f}{m \otimes f}\otimes_{\mathcal{I}}$$

$$\dfrac{[l]^3 \qquad \overset{\textbf{him}}{l \multimap (l \otimes h)}}{l \otimes h}$$

$$\dfrac{l \otimes h \qquad m \otimes f}{m \otimes f}\otimes_{\mathcal{E},1,2}$$

$$\dfrac{m \otimes f}{l \multimap (m \otimes f)}\multimap_{\mathcal{I},3}$$

$$\dfrac{l \multimap (m \otimes f)}{\overset{\textbf{every linguist}}{(l \multimap (m \otimes f)) \otimes \;\; \forall X.[(l \multimap X) \multimap X]}}\otimes_{\mathcal{I}}$$

$$\dfrac{(l \multimap (m \otimes f)) \otimes \;\; \forall X.[(l \multimap X) \multimap X]}{\overset{\textbf{every linguist}}{(l \multimap (m \otimes f)) \otimes \;\; \forall X.[(l \multimap X) \multimap X] \;\; \otimes \mathbf{RelOP}}}\otimes_{\mathcal{I}}$$

Summary

- If we maintain the traditional view of compositionality, then intrusive pronoun sentences cannot receive a full interpretation, because they do not have a well-formed syntactic structure.
- Nevertheless, these non-fully-well-formed syntactic structures may receive *informative partial interpretations*.
- Informative partial interpretations are derived from the compositional type system:
  - Intrusive pronoun antecedents in the lowest nominal type, type *e* — such as names, definites and indefinites — yield informative partial descriptions.
  - Intrusive pronoun antecedents in higher nominal types — such as quantified NPs in type $<<e,t>,t>$ — do not yield informative partial descriptions.

Interpretation of
Quantified Antecedents of Intrusive Pronouns

Interpretation of Quantified Antecedents

- Partial interpretations for quantified antecedents of intrusive pronouns are uninformative if the pronoun is treated as a bound pronoun.
- What, if any, alternative interpretation can the intrusive pronoun receive that is consistent with a quantified antecedent, or at least certain quantified antecedents?

➡ E-type (Evans 1980)

1. Few congressmen admire Kennedy, and **they** are very junior.

⟦**they**⟧ = ⟦**the congressman who admire Kennedy**⟧

E-type Interpretation and Intrusive Pronouns

1. a. * Every congressman admires Kennedy, and he is very junior.
   b. * I met every linguist who Kate forgot if Thora had seen him.

2. a. * No congressmen admire Kennedy, and they are very junior.
   b. * I met no linguists who Kate forgot if Thora had seen them.

3. a. Few congressmen admire Kennedy, and they are very junior.
   b. I met few linguists who Kate forgot if Thora had seen them.

- In dialects that allow binding of *they* as 3rd person **singular** (with indeterminate gender):

4. a. Every congressman admires Kennedy, and they are very junior.
   b. I met every linguist who Kate forgot if Thora had seen them.

Agüero-Bautista’s Examples

- Agüero-Bautista (2001) rejects the view that distinction between acceptable intrusive pronoun antecedents and degraded intrusive pronoun antecedents rests on a distinction between referential/non-referential antecedents (or a type-theoretic distinction).
- His arguments rest on contrasts like the following:

1. I'd like to suggest **any witness** that the defense doesn't even suspect that putting him on the stand would be a mistake.
2. ?* I'd like to suggest **every witness** that the defense doesn't even suspect that putting him on the stand would be a mistake.

Any X Allows E-type Reference

1. If any congressman admires Kennedy, then he is very junior.
2. I'm surprised if I meet any linguist who Kate forgot if Thora had seen him before.

Conclusion

- Introduced notion of *informative partial interpretations for non-fully-well-formed syntactic structures.*
- Partial interpretations are compositional interpretations, but not full interpretations.
- Certain partial interpretations are more informative than others.
- Lower-type antecedent of intrusive pronouns: informative partial interpretation with bound pronoun pronominal semantics
- Higher-type antecedent of intrusive pronouns: informative partial interpretation only with E-type pronominal interpretation
- Maintains traditional view of compositionality as depending on syntactic well-formedness

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