

## Resumption and Composition\*

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### 1 Introduction

- Modern theoretical linguistics in the broad generative tradition is based on three observations:
  1. Language is a mapping between form and meaning.
  2. Language must be learnable.
  3. Language is creative/productive.
- The basic formal mechanism that has been developed on the syntactic side to explain these properties is *recursion*.
- The semantic correspondent of recursion is *compositionality*.
- **Principle of Compositionality:**  
 The meaning of a linguistic expression is fully determined by the meanings of its parts and their arrangement.
- There are two approaches to compositionality and the syntax–semantics interface:
  1. **Parallel composition theories:** Syntax and semantics are built up in parallel.  
 Other common terms for this family of theories are *rule-by-rule theories* and *categorial theories*.
  2. **Interpretive composition theories:** Semantics interprets the output of syntax.  
 The most common exemplar of this kind of theory is Logical Form semantics.
- Modern theoretical semantics has grown out of the strongly model-theoretic tradition of Montague. Perhaps as a consequence, most semanticists view these two approaches as equivalent, except perhaps with respect to certain fine points of theory (e.g., Jacobson 1999, Barker and Jacobson 2007).

### 2 Main Claim

- Evidence from a class of grammatically licensed resumptive pronouns, which I call ‘syntactically inactive resumptives’, favours parallel composition theories over interpretive composition theories.
- Resumptive pronouns can thus provide an empirical basis for choosing between theories of composition.

### 3 Overview

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\*This talk expands on ideas first presented in Asudeh (2011b).

## 4 Background

### 4.1 Two Kinds of Grammaticized Resumption

#### 1. Syntactically active resumptives (SARS)

**Do not** display gap-like properties

Sample languages: Irish, Hebrew, varieties of Arabic, ...

- (1) an ghirseach a-r ghoid na síogaí í (Irish; McCloskey 2002: 189)  
 the girl COMP-PAST stole the fairies her  
 ‘the girl that the fairies stole away’

#### 2. Syntactically inactive resumptives (SIRS)

**Do** display gap-like properties.

Sample languages: Vata, Swedish

- (2) àló ò lē sáká lá (Vata; Koopman 1982: 128)  
 who he eat rice wh  
 ‘Who is eating rice?’

	Syntactically Active RPs	Syntactically Inactive RPs
Grammatically Licensed	Yes	Yes
Island-Sensitive	No	Yes
Weak Crossover Violation	No	Yes
Reconstruction Licensed	No	Yes
ATB Extraction Licensed	No	Yes
Parasitic Gap Licensed	No	Yes
Non-Specific/ <i>De Dicto</i> Interpretation	No	No
Pair-List Answers	No	No

Table 1: Some properties of SARS and SIRS

- Syntactic representation of SARS and SIRS (English used purely for exposition)

Target: [Who did Jane see *him*?]

RP is syntactically active

RP is syntactically inactive

PRED	‘see(SUBJ,OBJ)’	UDF	[ PRED ‘pro’ PRONTYPE Q ]	SUBJ	[ PRED ‘Jane’ ]	OBJ	[ PRED ‘pro’ PERSON 3 NUMBER SG GENDER MASC ]
PRED	‘see(SUBJ,OBJ)’	UDF	[ PRED ‘pro’ PRONTYPE Q PERSON 3 NUMBER SG GENDER MASC ]	SUBJ	[ PRED ‘Jane’ ]	OBJ	

### 4.2 McCloskey’s Generalization

- McCloskey (2006: 97):

A fundamental question, which has not often been explicitly addressed, but which lies behind much of the discussion is why resumptive elements have the form that they do. That is, resumptive pronouns simply *are* (formally) pronouns. I know of no report of a language that uses a morphologically or lexically distinct series of pronouns in the resumptive function. If we take this observation to be revealing, there can be no syntactic feature which distinguishes resumptive pronouns from ordinary pronouns, and any appeal to such a feature must be construed as, at best, an indication of the limits of understanding. (emphasis in original)

- Two direct consequences of McCloskey’s generalization are the following:

1. There can be no underlying lexical/morphological/featural distinction specific to only resumptive pronouns in a language *L*. Any pronoun of *L* that occurs resumptively must also occur in other environments.
2. There can be no process of syntactic insertion or semantic composition that is specific to only resumptive pronouns in a language *L*. Resumptives of *L* are inserted and composed just as non-resumptive pronouns of *L* are.

- This points to a division of theories of resumption into two kinds:

- (3) **Ordinary Pronoun Theory (of Resumption):**  
 No lexical/morphological/featural/syntactic difference between resumptive pronouns and referential or bound pronouns
- (4) **Special Pronoun Theory (of Resumption):**  
 Some lexical/morphological/featural/syntactic difference between resumptive pronouns and referential or bound pronouns

### 4.3 Lexical-Functional Grammar

- LFG is a declarative, constraint-based linguistic theory (Kaplan and Bresnan 1982).
- The motivation behind LFG is to have a theory that contributes in three ways to our understanding of language:
  1. Theory, including language universals and typology
  2. Psycholinguistics, including language acquisition
  3. Computational linguistics, including automatic parsing and generation, machine translation, and language modelling (typically known as ‘grammar engineering’)

#### 4.3.1 The Correspondence Architecture

- The grammatical architecture of LFG posits that different kinds of linguistic information are modelled by distinct data structures, all of which are present simultaneously.
- Structures are related by functions, called correspondence or projection functions., which map elements of one structure to elements of another.
- This architecture is a generalization of the architecture of Kaplan and Bresnan (1982) and is called the *Parallel Projection Architecture* or *Correspondence Architecture* (Kaplan 1987, 1989, Halvorsen and Kaplan 1988, Asudeh 2006, 2011a, Asudeh and Toivonen 2009).
- Syntax: constituent structure (c-structure) and functional structure (f-structure).
- C-structure is represented by phrase structure trees:
  1. Word order
  2. Dominance
  3. Constituency
  4. Syntactic categories
- F-structure is represented by feature structures (also known as attribute value matrices):
  1. Grammatical functions, such as SUBJECT and OBJECT
  2. Case
  3. Agreement
  4. Tense and aspect
  5. Local dependencies (e.g., control and raising)
  6. Unbounded dependencies (e.g., question formation, relative clause formation)
- There are two principal methods for capturing the relations between structures:
  1. Description by analysis
  2. Codescription
- Description by analysis: one structure is analyzed to yield another structure (Halvorsen 1983)
- Codescription: a single description simultaneously describes various structures (Fenstad et al. 1987, Halvorsen and Kaplan 1988)

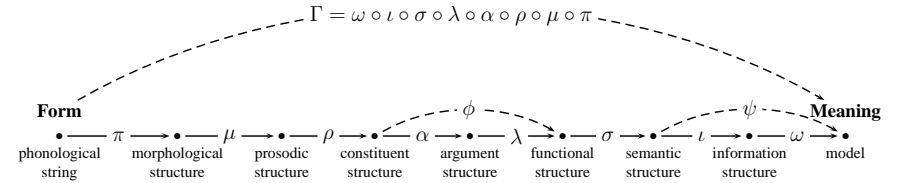
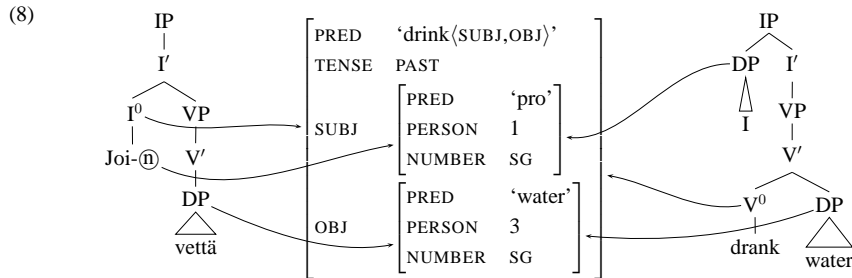
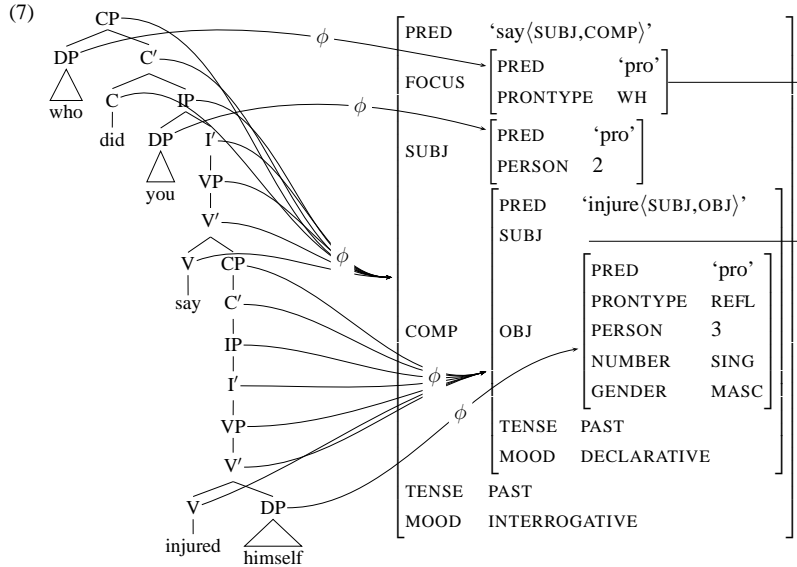


Figure 1: The Correspondence Architecture, pipeline version (Asudeh 2011a)

#### 4.3.2 Unbounded Dependencies

- There are versions of LFG that postulate traces/empty categories at the base of (at least some) unbounded dependencies (Bresnan 1995, 2001) and versions which eliminate traces entirely (Kaplan and Zaenen 1989, Dalrymple 2001).
- All else being equal, elimination of traces is more parsimonious: I assume the traceless variant.
- An unbounded dependency involves equations of one of the following two general forms:
  - (5)  $(\uparrow \mathbf{Top}) = (\uparrow \mathbf{Body} \mathbf{Base})$
  - (6)  $(\uparrow \mathbf{Top})_{\sigma} = ((\uparrow \mathbf{Base})_{\sigma} \text{ ANTECEDENT})$
- The top of the unbounded dependency is an unbounded dependency function, traditionally TOPIC or FOCUS (King 1995).
- I will instead assume a single function, UDF (UNBOUNDED DEPENDENCY FUNCTION).
- A UDF function must be properly integrated into the f-structure, in accordance with the Extended Coherence Condition (Zaenen 1980, Bresnan and Mchombo 1987, Asudeh and Toivonen 2009), which states that a UDF must either a) be functionally equal to or b) anaphorically bind another grammatical function.
- Functional equality involves equations of the form (5). Anaphoric binding involves equations of the form (6). The type of equation in (6) involves the  $\sigma$  projection to sem(antic)-structure, since it is assumed that the ANTECEDENT feature for anaphoric binding is represented at sem-structure (Dalrymple 1993).
- The crucial difference between syntactically active resumptives and syntactically inactive resumptives is whether the relation between the binder and the resumptive is anaphoric binding — appropriate for SARs — or functional equality — appropriate for SIRs. I thus follow McCloskey’s general suggestion that the two different kinds of grammaticized resumptives form different sorts of relations with their binders, but recast it in LFG-theoretic terms.
- This will allow the crux of the two kinds of resumption to be uniform and will allow McCloskey’s generalization to be upheld.

4.3.3 Examples



4.4 Glue Semantics

- Glue Semantics (Dalrymple 1999, 2001, Asudeh 2004, 2005, 2011a, Lev 2007, Kokkonidis 2008) is a theory of semantic composition and the syntax–semantics interface.

- Glue meaning constructors are obtained from lexical items instantiated in particular syntactic structures.

$$(9) \quad \mathcal{M} : G$$

$\mathcal{M}$  is a term from some representation of meaning, a *meaning language*, and  $G$  is a term of the Glue logic that sticks meanings together, i.e. performs composition. The colon is an uninterpreted pairing symbol.

- Linear logic (Girard 1987) serves as the Glue logic (Dalrymple et al. 1993, 1999a,b).
- The meaning constructors are used as premises in a (linear logic) proof that consumes the lexical premises to produce a sentential meaning.
- A successful Glue proof for a sentence terminates in a meaning constructor of type  $t$ :

$$(10) \quad \Gamma \vdash \mathcal{M} : G_t$$

- Alternative derivations from the same set of premises  $\rightarrow$  semantic ambiguity (e.g., scope)
- Linear logic is a *resource logic*: each premise in valid linear logic proof must be used exactly once.

- As discussed in detail by Dalrymple et al. (1999a), Glue Semantics is essentially a type-logical theory and is thus related to type-logical approaches to Categorical Grammar (Morrill 1994, Moortgat 1997, Carpenter 1997, Jäger 2005).

- The key difference between Glue and Categorical Grammar concerns grammatical architecture, particularly the conception of the syntax–semantics interface (Asudeh 2004, 2005, 2006). Glue Semantics posits a strict separation between syntax and semantics, such that there is a syntax that is separate from the syntax of semantic composition. Categorical Grammar rejects the separation of syntax from semantic composition.

- I assume a small, rather weak fragment of linear logic, multiplicative intuitionistic linear logic (MILL; Asudeh 2004, 2005).

- Three proof rules of this fragment are of particular interest here: elimination for  $\otimes$  (multiplicative conjunction) and introduction and elimination for linear implication  $\multimap$ .

Application : Impl. Elim.      Abstraction : Impl. Intro.      Pairwise substitution : Conj. Elim.

$$\frac{\begin{array}{c} \vdots \\ a : A \end{array} \quad \begin{array}{c} \vdots \\ f : A \multimap B \end{array}}{f(a) : B} \multimap_{\varepsilon} \quad \frac{\begin{array}{c} [x : A]^1 \\ \vdots \\ f : B \end{array}}{\lambda x. f : A \multimap B} \multimap_{\varepsilon,1} \quad \frac{\begin{array}{c} \vdots \\ a : A \otimes B \end{array} \quad \begin{array}{c} [x : A]^1 \quad [y : B]^2 \\ \vdots \\ f : C \end{array}}{\text{let } a \text{ be } x \times y \text{ in } f : C} \otimes_{\varepsilon,1,2}$$

Figure 2: Linear logic proof rules with Curry-Howard correspondence

(11) Bo chortled.

$$(12) \frac{bo : b \quad chortle : b \multimap c}{chortle(bo) : c} \multimap_{\mathcal{E}}$$

- Anaphora in Glue Semantics are typically treated as functions on their antecedents (Dalrymple et al. 1999c, Dalrymple 2001). This is a kind of a variable-free treatment of anaphora, which has also been adopted in certain Categorical Grammar analyses (Jacobson 1999, Jäger 2005, among others), although the two variable-free traditions developed separately.

- A variable-free treatment of anaphora is quite natural in Glue, because the commutative linear logic allows anaphora to combine directly with their antecedents, in opposition to the kind of intervening operations that are necessary for variable-free anaphoric resolution in non-commutative Categorical Grammar.

- The meaning constructor for a pronominal has the following general form, where  $\uparrow$  is the f-structure of the pronoun and  $\uparrow_{\sigma}$  is its  $\sigma$ -projection in sem-structure:

$$(13) \lambda z.z \times z : (\uparrow_{\sigma} \text{ ANTECEDENT}) \multimap [(\uparrow_{\sigma} \text{ ANTECEDENT}) \multimap \uparrow_{\sigma}]$$

- The pronoun's type is therefore  $\langle \sigma, \langle \sigma, \tau \rangle \rangle$ , where  $\sigma$  is the type of the antecedent and  $\tau$  is the type of the pronoun. I here assume that both  $\sigma$  and  $\tau$  are type  $e$  (individuals).

(14) Bo fooled himself.

$$(15) \frac{\text{Bo} \quad \text{himself} \quad \frac{bo : b \quad \lambda z.z \times z : b \multimap (b \otimes p)}{bo \times bo : b \otimes p} \multimap_{\mathcal{E}} \quad \frac{\text{fooled} \quad \frac{[x : b]^1 \quad \lambda u \lambda v. fool(u, v) : b \multimap p \multimap f}{\lambda v. fool(x, v) : p \multimap f} \multimap_{\mathcal{E}} \quad [y : p]^2}{fool(x, y) : f} \multimap_{\mathcal{E}}}{\frac{let \ bo \times bo \ be \ x \times y \ in \ fool(x, y) : f}{fool(bo, bo) : f} \Rightarrow_{\beta} \otimes_{\mathcal{E}, 1, 2}} \multimap_{\mathcal{E}}$$

- Glue does not assume that every semantic ambiguity corresponds to a syntactic ambiguity.

(16) Someone recommended every book.

(17) **Surface scope proof**

$$\frac{\frac{\text{recommended} \quad \lambda x \lambda y. recommend(x, y) : [z : s]^1 \quad s \multimap b \multimap r}{\lambda y. recommend(z, y) : b \multimap r} \multimap_{\mathcal{E}} \quad \frac{\text{every} \quad \lambda R \lambda S. every(R, S) : (v \multimap r) \multimap \forall Y. (b \multimap Y) \multimap Y \quad \text{book} \quad \text{book} : v \multimap r}{\lambda S. every(\text{book}, S) : \forall Y. (b \multimap Y) \multimap Y} \multimap_{\mathcal{E}}}{\frac{every(\text{book}, \lambda y. recommend(z, y)) : r}{\lambda z. every(\text{book}, \lambda y. recommend(z, y)) : s \multimap r} \multimap_{\mathcal{E}, 1} \quad \forall_{\mathcal{E}, [rY]}}}{\frac{\text{someone} \quad \lambda S. some(\text{person}, S) : \forall X. (s \multimap X) \multimap X}{some(\text{person}, \lambda z. every(\text{book}, \lambda y. recommend(z, y))) : r} \multimap_{\mathcal{E}, [rX]}} \multimap_{\mathcal{E}}$$

(18) **Inverse scope proof**

$$\frac{\frac{\text{someone} \quad \lambda S. some(\text{person}, S) : \forall X. (s \multimap X) \multimap X \quad \frac{\text{recommended} \quad \lambda y \lambda x. recommend(x, y) : [z : b]^1 \quad b \multimap s \multimap r}{\lambda x. recommend(x, z) : s \multimap r} \multimap_{\mathcal{E}}}{some(\text{person}, \lambda x. recommend(x, z)) : r} \multimap_{\mathcal{E}, [rX]} \quad \frac{\text{every} \quad \lambda R \lambda S. every(R, S) : (v \multimap r) \multimap \forall Y. (b \multimap Y) \multimap Y \quad \text{book} \quad \text{book} : v \multimap r}{\lambda S. every(\text{book}, S) : \forall Y. (b \multimap Y) \multimap Y} \multimap_{\mathcal{E}}}{\frac{\lambda z. some(\text{person}, \lambda x. recommend(x, z)) : b \multimap r}{every(\text{book}, \lambda z. some(\text{person}, \lambda x. recommend(x, z))) : r} \multimap_{\mathcal{E}, 1} \quad \forall_{\mathcal{E}, [rY]}} \multimap_{\mathcal{E}}$$

## 4.5 The Resource Management Theory of Resumption

- The Resource Management Theory of Resumption (RMTR) is based on the following two claims, one of which we have already discussed.

### 1. The Resource Sensitivity Hypothesis (RSH):

Natural language is resource-sensitive.

### 2. McCloskey's Generalization:

Resumptive pronouns are ordinary pronouns.

- RSH stems from the resource-logical perspective on semantic composition in Glue Semantics (Dalrymple 1999, 2001), which uses the resource logic linear logic (Girard 1987) to assemble meanings.

- RSH is equivalent to the claim of Linguistic Resource Sensitivity, which is in turn derived from Logical Resource Sensitivity:

### (19) Logical Resource Sensitivity:

In a resource logic, premises in proofs cannot be freely *reused* or *discarded*.

### (20) Linguistic Resource Sensitivity:

Natural language is resource-sensitive: elements of combination in grammars cannot be freely *reused* or *discarded*.

- The upshot of RSH is that compositional semantics is constrained by resource accounting, such that component meanings cannot go unused or be reused.

- For example, in the following sentence, the adverb *slowly* contributes a single lexical meaning resource which cannot be used twice to derive the unavailable meaning that the plummeting was also slow.

(21) John slowly rolled over the edge and plummeted to the ground.

- RSH fulfills a similar role to Full Interpretation, but is a consequence of the logic of composition, not a separate principle (Asudeh 2004: 97–99).

- Returning to RMTR, the logic behind the theory is as follows. If a resumptive pronoun is an ordinary pronoun, then it constitutes a surplus resource. If Resource Sensitivity is to be maintained, then there must be an additional consumer of the pronominal resource present.

- The resource surplus constituted by a resumptive pronoun can be demonstrated by an example from English, which does not have grammatically licensed resumptives in majority dialects (Chao and Sells 1983, Sells 1984):

(22) \*Every clown who Mary tickled him laughed.

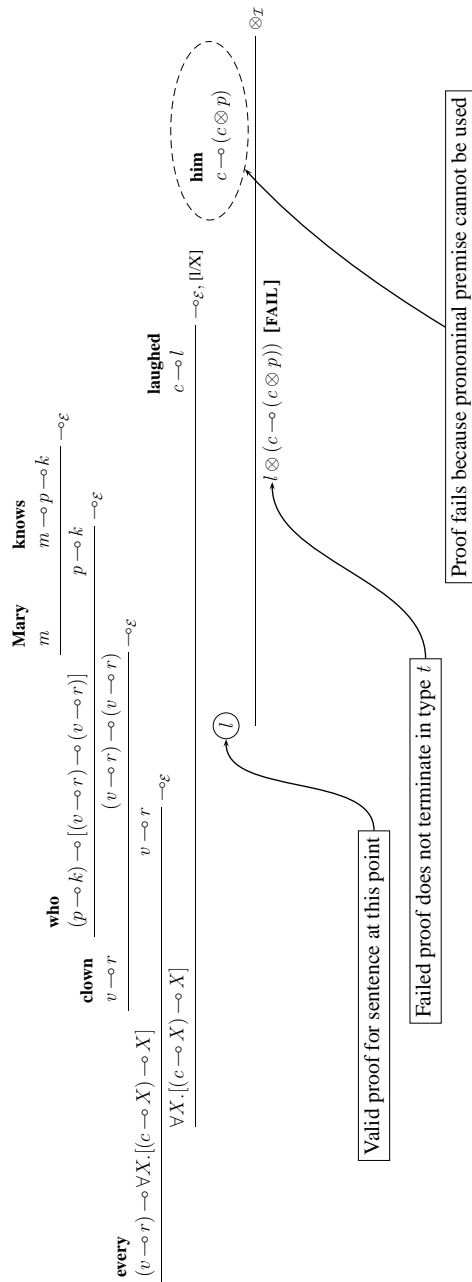


Figure 3: Proof failure due to a surplus resumptive pronoun resource

- What about resumptives in languages in which RPs are properly grammatically licensed?
  - If a resumptive pronoun is surplus to the basic compositional requirements of its sentence, but the sentence is nonetheless grammatical, then RSH entails that there must be a consumer of the resumptive pronoun’s resource.
  - The resumptive consumer is a further resource that consumes a pronominal resource. These resources are called *manager resources*, because they manage an otherwise un-consumable pronominal resource.
  - A resumptive pronoun language has such manager resources in the portion of its lexical inventory or grammar that concerns unbounded dependencies.
  - A language which does not license resumptive pronouns in unbounded dependencies lacks manager resources in its grammar.

- Manager resources have the following general compositional schema, where  $P$  is some pronoun that the lexical contributor of the manager resource can access and  $A$  is the antecedent or binder of  $P$ :

$$(23) \quad (A \multimap A \otimes P) \multimap (A \multimap A)$$

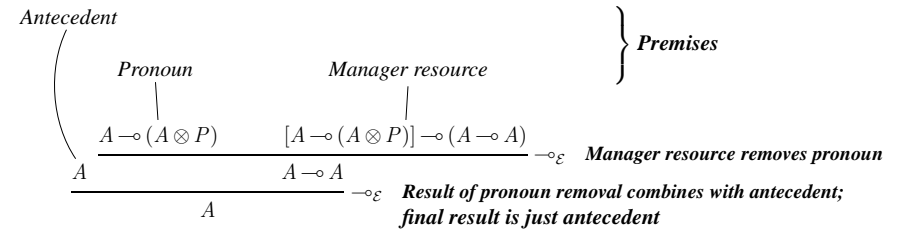


Figure 4: A manager resource in action (binder of lower type)

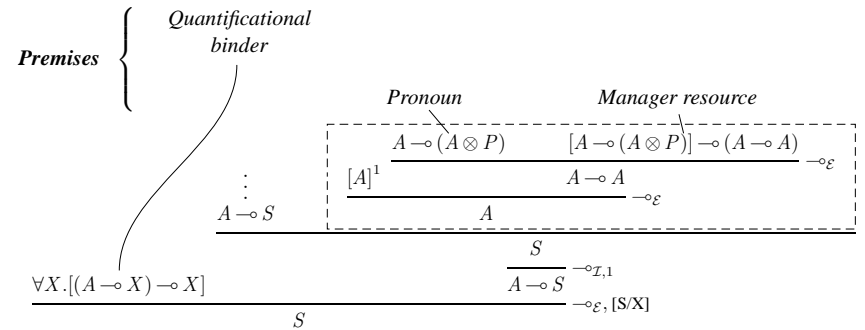


Figure 5: A manager resource in action (quantificational binder)



- b. d'inis siad cén turas a raibh siad air  
told they what journey COMP be.PAST they on.3SG.MASC  
'they told what journey they were on (it)'  
(McCloskey 1990: 238, (98a))

(28) **Clefts**

- Is tú a bhfuil an deallramh maith ort.  
COP.PRES you COMP is the appearance good on.2SG  
'It is you that looks well.'  
(McCloskey 1990: 239, (99a))

(29) **Reduced Clefts**

- Teach beag seascair a-r mhair muid ann.  
house little snug COMP-PAST lived we in.it  
'It was a snug little house that we lived in.'  
(McCloskey 2002: 189, (11b))

(30) **Comparatives**

- Do fuair sé leaba chó math agus a-r lui sé riamh uirthi.  
get PAST he bed as good as COMP lie.PAST he ever on.3SG.FEM  
'He got a bed as good as he ever lay on (it).'  
(McCloskey 1990: 239, (100b))

- Gaps in Irish are island-sensitive.

(31) **Complex NP Islands**

- a. \* an fear aL phóg mé an bhean aL phós  
the man COMP kissed I the woman COMP married  
'the man who I kissed the woman who married'  
(McCloskey 1979: 30, (78))
- b. \* Cén fear aL phóg tú an bhean aL phós?  
which man COMP kissed you the woman COMP married  
'Which man did you kiss the woman who married?'  
(McCloskey 1979: 30, (80))

(32) **Wh-Islands**

- a. \* fear nachN bhfuil fhios agam cén cineál mná aL phósfadh  
a man COMP.NEG I know what sort of a woman COMP would marry  
'a man who I don't know what woman would marry'  
(McCloskey 1979: 32, (87))
- b. \* Cén sagart nachN bhfuil fhios agat caidé aL dúirt?  
which priest COMP.NEG you know what COMP said  
'Which priest don't you know what said?'  
(McCloskey 1979: 32, (88))
- c. \* Cén sagart aL d'fhiafraigh Seán diot arL bhuaíl tú?  
which priest COMP asked John of you QUEST  
'Which priest did John ask you if you hit?'  
(McCloskey 1979: 32, (89))

- Irish resumptives are not island-sensitive.

(33) **Complex NP Island**

- Sin teanga aN mbeadh meas agam ar duine ar bith aL tá ábalta i a labhairt  
that a.language COMP would be respect at me on person any COMP is able it to speak  
'That's a language that I would respect anyone who could speak it.'  
(McCloskey 1979: 34, (95))

(34) **Wh-Island**

- Sin fear nachN bhfuil fhios agam cén cineál mná aL phósfadh é  
that a man COMP.NEG I know what sort of a woman COMP would marry him  
'That's a man who I don't know what kind of woman would marry him.'  
(McCloskey 1979: 33, (91))

- Gaps in Irish are subject to weak crossover effects:

- (35) a. \* fear a d'fhág a bhean — (McCloskey 1990: 237, (95a–b))  
man COMP left his wife  
'a man that his wife left'
- b. \* an fear so a mhairbh a bhean féin —  
this man COMP killed his own wife  
'this man that his own wife killed'

- Resumptive pronouns in Irish are not subject to weak crossover effects:

- (36) a. fear ar fhág a bhean é (McCloskey 1990: 236–7, (94a–b))  
man COMP left his wife him  
'a man that his wife left'
- b. an fear so ar mhairbh a bhean féin é  
this man COMP killed his own wife him  
'this man that his own wife killed'



## 5.2 Swedish

### 5.2.1 Syntax

- In *Rikssvenska* — the Swedish spoken in Sweden as opposed to on mainland Finland or the Åland Islands — resumptive pronouns are obligatory following overt material in the left periphery of CP (Engdahl 1982).
- (37) **Left-peripheral *wh*-phrase**  
 [Vilket ord]<sub>i</sub> visste ingen [<sub>CP</sub> [hur många *M*]<sub>j</sub> [<sub>C'</sub> det<sub>i</sub> stavas med \_\_\_]<sub>j</sub>]?  
 which word knew nobody how many *M*s it is.spelled with \_\_\_  
 ‘Which word did nobody know how many *M*s (it) is spelled with?’  
 (Engdahl 1985: 8, ~ (11))
- (38) **Complementizer**
- [Vilket ord]<sub>i</sub> visste ingen [<sub>CP</sub> [<sub>C'</sub> om det<sub>i</sub> stavas med ett *M*]]?  
 which word knew nobody if it is.spelled with an *M*?  
 ‘Which word did nobody know if (it) is spelled with an *M*?’  
 (Engdahl 1985: 8, ~ (11))
  - [Vilken elev]<sub>i</sub> trodde ingen att han<sub>i</sub> skulle fuska?  
 which student thought no one that he would cheat  
 ‘Which student did no one think that (he) would cheat?’  
 (Engdahl 1982: 166, ~ (65c))

Grammatically Licensed	Yes
Island-Sensitive	Yes?
Weak Crossover Violation	%
Licenses Reconstruction	No
Licenses ATB Extraction	Yes
Licenses Parasitic Gaps	Yes

Table 2: Some properties of Swedish resumptives

- Swedish resumptive pronouns allow Across the Board Extraction.
- (39) Där borta går en man som jag ofta träffar \_\_\_ men inte minns vad han heter.  
 There goes a man that I often meet \_\_\_ but not remember what he is called  
 ‘There goes a man that I often meet but don’t remember what he is called.’  
 (Zaenen et al. 1981: 681, (9))
- Swedish resumptive pronouns license parasitic gaps.
- (40) Det var den fången<sub>i</sub> som läkarna inte kunde avgöra om han<sub>i</sub> verkligen var sjuk utan  
 it was that prisoner that the.doctors not could decide if he really was ill without  
 att tala med p<sub>i</sub> personligen.  
 to talk with \_\_\_ in person  
 ‘(This is the prisoner that the doctors couldn’t determine if he really was ill without talking to in person.)’  
 (Engdahl 1985: 7, (8))

- Weak crossover judgements are subtle, as usual, but some speakers definitely allow weak crossover with resumptives:

- (41) % Vilken elev<sub>i</sub> undrar hans<sub>i</sub> lärare om han<sub>i</sub> fuskar?  
 which student wonders his teacher if he cheats  
 ‘Which student does his teacher wonder if (he) cheats?’
- (42) % Vilken elev<sub>i</sub> undrar hans<sub>i</sub> lärare varför han<sub>i</sub> fuskar?  
 which student wonders his teacher why he cheats  
 ‘Which student does his teacher wonder why (he) cheats?’
- (43) % Jag känner en elev som hennes lärare undrar om hon fuskar.  
 I know a student that her teacher wonders if she cheats  
 ‘I know a student who her teacher wonders if (she) cheats.’

### 5.2.2 Semantics

- Swedish resumptive pronouns do not support non-specific/*de dicto* readings.

- (44) Kalle letar efter en bok som han inte vet hur den slutar.  
 Kalle looks for a book that he not knows how it ends  
 ‘Kalle is looking for a book that he does not know how (it) ends.’

- In contrast, a gap does support a non-specific reading.

- (45) Kalle kommer att hitta boken som han letar efter \_\_\_.  
 Kalle comes to find book.DEF that he looks for \_\_\_  
 ‘Kalle will find the book that he is looking for.’

- *Ålandssvenska* (the dialect of Swedish spoken on the Åland Islands, Finland): allows gaps in post-*wh*-phrase subject positions and the minimal pair to (44) with a gap allows both non-specific and specific readings.

- (46) Kalle letar efter en bok som han inte vet hur \_\_\_ slutar.  
 Kalle looks for a book that he not knows how \_\_\_ ends  
 ‘(Kalle is looking for a book that he does not know how ends.)’

- Swedish resumptive pronouns do not support pair-list answers to functional questions.

- (47) Vilken elev undrar varje lärare om han fuskar?  
 Which student wonders every teacher if he cheats  
 ‘Which student does every teacher wonder if (he) cheats?’
- Pelle
  - Hans mest begåvade elev  
*His most gifted student*
  - \* Andersson, Alfons; Boberg, Benny; Cornelius, Conny

- In contrast, a gap does support a pair-list answer.
- (48) Vilken elev tror varje lärare \_ fuskar?  
Which student tror every teacher \_ cheats  
'Which student does every teacher think cheats?'
- Pelle
  - Hans mest begåvade elev  
*His most gifted student*
  - Andersson, Alfons; Boberg, Benny; Cornelius, Conny
- A post-complementizer gap in *Ålandsvenska* allows all three answers:
- (49) Vilken elev undrar varje lärare om \_ fuskar?  
Which student wonders every teacher if \_ cheats  
'Which student does every teacher wonder if (he) cheats?'
- Pelle
  - Hans mest begåvade elev  
*His most gifted student*
  - Andersson, Alfons; Boberg, Benny; Cornelius, Conny

## 6 Emergent Generalizations

- There are languages in which resumptive pronouns *do not* pattern like gaps; e.g., Irish.
  - Syntactically Active Resumptive Pronouns
- There are languages in which resumptive pronouns *do* pattern like gaps; e.g., Vata, Swedish.
  - Syntactically Inactive Resumptive Pronouns
- *Even when RPs pattern syntactically like gaps, they are not interpreted semantically purely equivalently to gaps.*

## 7 Informal Analysis

- Grammaticized resumptive pronouns of *both kinds* (SARs and SIRs) are licensed by lexically contributed manager resources.
- The resumptive contributes an ordinary pronominal meaning, which the manager resource consumes, thus removing the problem of saturation which the pronoun would otherwise cause.
- Syntactically inactive resumptive pronouns require an additional, *syntactic* mechanism to remove the pronoun from syntax.
- In LFG-theoretic terms, this mechanism is *restriction* (Kaplan and Wedekind 1993), which allows removal of specified features from f-structures.

$$(50) \quad (\uparrow \text{UDF}) \backslash \text{PRED} = (\uparrow \text{GF}^* \text{SUBJ}) \backslash \text{PRED}$$

- *Irish, Vata and Swedish all equally have manager resources in their lexicons, which allows them to deal with the problem of semantic composition constituted by resumptive pronouns, but Vata and Swedish have an additional mechanism that inactivates the pronoun in the syntax.*

Target: [Who did Jane see him?]

<i>Syntax</i>	RP is syntactically active	RP is syntactically inactive
	$\left[ \begin{array}{l} \text{PRED} \quad \text{'see(SUBJ,OBJ)'} \\ \text{UDF} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'pro'} \\ \text{PRONTYPE} \quad \text{Q} \end{array} \right] \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'Jane'} \end{array} \right] \\ \text{OBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'pro'} \\ \text{PERSON} \quad 3 \\ \text{NUMBER} \quad \text{SG} \\ \text{GENDER} \quad \text{MASC} \end{array} \right] \end{array} \right]$	$\left[ \begin{array}{l} \text{PRED} \quad \text{'see(SUBJ,OBJ)'} \\ \text{UDF} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'pro'} \\ \text{PRONTYPE} \quad \text{Q} \\ \text{PERSON} \quad 3 \\ \text{NUMBER} \quad \text{SG} \\ \text{GENDER} \quad \text{MASC} \end{array} \right] \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'Jane'} \end{array} \right] \\ \text{OBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'pro'} \end{array} \right] \end{array} \right]$
	<i>Semantics</i> Resumptive licensed by MR	Resumptive licensed by MR

Table 3: Syntax and semantics of SARs and SIRs

## 8 Theoretical Consequences

- Two approaches to compositionality and the syntax–semantics interface:
  1. **Parallel composition theories:** Syntax and semantics are built up in parallel.
  2. **Interpretive composition theories:** Semantics interprets the output of syntax.
- The unification of resumption achieved by RMTR depends on the parallel composition view. On the alternative view, in the case of syntactically inactive resumptives, there is no real pronoun in the part of syntax that feeds meaning (f-structure) and there is therefore no pronominal resource for a manager resource to consume.
  - *RMTR gives theoretical support for the parallel composition view, because that view supports a unification of otherwise heterogeneous resumptive phenomena.*
- Perhaps even more interestingly, the empirical evidence that resumptives are not interpreted like gaps points in the same direction.
  - The syntax of syntactically inactive resumptives is explained if they are treated as absent from the part of syntax that models unbounded dependencies (f-structure).
  - If SIRS are syntactically like gaps and composition is interpretive, then resumptives should be interpreted like gaps, contrary to fact.
  - If composition is parallel to syntactic construction, then a resumptive pronoun contributes syntactic and semantic information simultaneously. Operations on the syntax do not necessarily affect operations on the semantics, so the pronoun can have the syntax of a gap, yet retain pronominal interpretation.

## 9 Conclusion

- A unified theory of resumption (RMTR) is possible based on semantic composition.
- Resumptive pronouns are ordinary pronouns in RMTR (McCloskey’s generalization).
- The theory supports parallel composition theories over interpretive composition theories of the syntax–semantics interface.
- This dovetails with empirical evidence that resumptives that behave syntactically like gaps nevertheless do not behave semantically like gaps. This fact would be puzzling on an interpretive approach to composition in which resumptives are ordinary pronouns.

	Morpholexical	Syntax		Semantics	
		C-structure	F-structure	Interface/Composition	Type
SARS	Ordinary Pronoun	Present	Present (Active)	Removed Compositionally	Ordinary Pronoun
SIRS	Ordinary Pronoun	Present	Absent (Inactive)	Removed Compositionally	Ordinary Pronoun

Table 4: Summary: properties of grammaticized resumptive pronouns

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## A Formal Analysis

### A.1 Irish

(51) an ghirseach a-r ghoid na síogaf í (McCloskey 2002: 189, (9b))  
 the girl COMP-PAST stole the fairies her  
 ‘the girl that the fairies stole away’

(52) í, D (↑ PERSON) = 3  
 (↑ NUMBER) = SG  
 (↑ GENDER) = FEM  
 @PRONOUN

(53) @PRONOUN = (↑ PRED) = ‘pro’  
 (↑<sub>σ</sub> ANTECEDENT) → [(↑<sub>σ</sub> ANTECEDENT) ⊗ ↑<sub>σ</sub>]

(54) an fear a dtabharann tú an tairgead dó (McCloskey 1979: 6, (3))  
 the man COMP give you the money to.him  
 ‘the man to whom you give the money’

(55) dó, P (↑ PRED) = ‘to(OBJ)’  
 (↑ OBJ PRED) = ‘pro’  
 (↑ OBJ PERSON) = 3  
 (↑ OBJ NUMBER) = SG  
 (↑ OBJ GENDER) = MASC

(56) [<sub>CP</sub> aL ... [<sub>CP</sub> aL ... [<sub>CP</sub> aL ... — ... ]]]  
 a. an t-ainm a hinnseadh dúinn a bhi — ar an áit (McCloskey 2002: 190, (13a))  
 the name aL was-told to-us aL was — on the place  
 ‘the name that we were told was on the place’

(57) [<sub>CP</sub> aN ... [<sub>CP</sub> go ... [<sub>CP</sub> go ... Rpro ... ]]]  
 a. fir ar shíl Aturnae an Stáit go rabh siad díleas do’n Rí  
 men aN thought Attorney the State go were they loyal to-the King  
 ‘men that the Attorney General thought were loyal to the King’  
 (McCloskey 2002: 190, (16))

(58) [<sub>CP</sub> aN ... [<sub>NP</sub> N [<sub>CP</sub> aL ... — ... ]]] **Pattern 1**  
 a. rud a raibh coinne agam a choimhlfónfadh — an aimsir  
 thing aN was expectation at-me aL fulfill.COND — the time  
 ‘something that I expected time would confirm’  
 (McCloskey 2002: 196, ~ (28))

(59) [<sub>CP</sub> aL ... [<sub>CP</sub> aN ... Rpro ... ]]] **Pattern 2**

a. Cé is dóigh leat a bhfuil an t-airgead aige?  
 who aL.COP.PRES likely with-you aN is the money at-him  
 ‘Who do you think has the money?’  
 (McCloskey 2002: 198, (35))

(60) [<sub>CP</sub> aN ... [<sub>CP</sub> aN ... Rpro ... ]]] **Pattern 3**

a. na cuasáin thiorma ar shíl sé a mbeadh contúirt ar bith uirthi tuitim  
 the holes dry aN thought he aN would-be danger any on-her fall.[-FIN]  
 síos ionnta  
 down into-them  
 ‘the dry holes that he thought there might be any danger of her falling down into them’  
 (McCloskey 2002: 199, (44))

Role Relative to Position				
	Not bottom	Bottom	Method	Cyclic?
aL	Passing	Grounding	Functional equality	Yes
aN	Passing	Grounding	Anaphoric binding	No

Table 5: The role of the Irish complementizers *aL* and *aN* in unbounded dependencies

(61) a. [<sub>CP</sub> aL ... pass ... [<sub>CP</sub> aL ... ground ... ]]] **Core aL multi-clause pattern**

b. [<sub>CP</sub> aN ... pass ... [<sub>CP</sub> aL ... ground ... ]]] **Pattern 1**

c. [<sub>CP</sub> aL ... pass ... [<sub>CP</sub> aN ... ground ... Rpro ... ]]] **Pattern 2**

d. [<sub>CP</sub> aN ... pass ... [<sub>CP</sub> aN ... ground ... Rpro ... ]]] **Pattern 3**

(62) aL, C ...  
 (↑ UDF) = (↑ CF\* GF)  
 (→ UDF) = (↑ UDF)

(63) aN, C ...  
 %Bound = (↑ GF\* { UDF | [GF — UDF] })  
 @MR(→)  
 (↑ UDF)<sub>σ</sub> = (%Bound)<sub>σ</sub> ANTECEDENT

(64) @MR(*f*) = λPλy.y : [(↑ UDF)<sub>σ</sub> → ((↑ UDF)<sub>σ</sub> ⊗ *f*<sub>σ</sub>)] → ((↑ UDF)<sub>σ</sub> → (↑ UDF)<sub>σ</sub>)

(65) go, C ...  
 ¬(↑ UDF)

## A.2 Swedish

$$(66) \quad +\text{COMP}: C^0 \left( \begin{array}{l} \%RP = (\uparrow \text{SUBJ}) \\ (\uparrow \text{UDF})_\sigma = (\%RP)_\sigma \text{ ANTECEDENT} \\ @MR(\%RP) \end{array} \right)$$

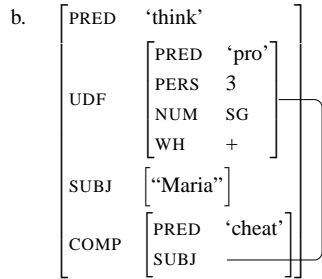
$$(67) \quad @MR(f) = \lambda P \lambda y. y : [(\uparrow \text{UDF})_\sigma \multimap ((\uparrow \text{UDF})_\sigma \otimes f_\sigma)] \multimap ((\uparrow \text{UDF})_\sigma \multimap (\uparrow \text{UDF})_\sigma)$$

$$(68) \quad \emptyset + \text{COMP}: C^0 \quad (\uparrow \text{UDF})_\sigma =_c ((\uparrow \text{SUBJ})_\sigma \text{ ANTECEDENT})$$

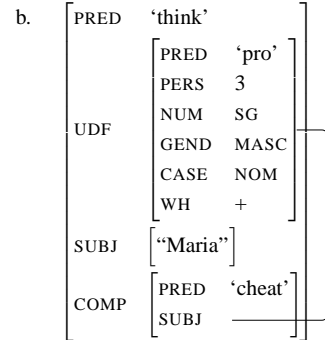
$$(69) \quad (\uparrow \text{UDF}) \backslash \text{PRED} = \begin{array}{c} (\uparrow \text{GF}^* \quad \quad \quad \text{GF} \quad \quad \quad ) \backslash \text{PRED} \\ ((\rightarrow \text{PRED}) = (\uparrow \text{UDF} \text{ PRED})) \end{array}$$

$$(70) \quad \text{han}: D^0 \quad \begin{array}{l} (\uparrow \text{PRED}) = \text{'pro'} \\ (\uparrow \text{PERSON}) = 3 \\ (\uparrow \text{NUMBER}) = \text{SG} \\ (\uparrow \text{GENDER}) = \text{MASC} \\ (\uparrow \text{CASE}) = \text{NOM} \\ (\uparrow_\sigma \text{ ANTECEDENT}) \multimap ((\uparrow_\sigma \text{ ANTECEDENT}) \otimes \uparrow_\sigma) \end{array}$$

(71) a. Vem<sub>i</sub> trodde Maria    <sub>i</sub> skulle  
who thought Maria     would  
fuska?  
cheat  
'Who did Maria think would  
cheat?'



(72) a. Vem<sub>i</sub> trodde Maria att han<sub>i</sub>  
who thought Maria that he  
skulle fuska?  
would cheat  
'Who did Maria think that (he)  
would cheat?'



## A.3 Restriction

- F-structures are sets of attribute-value pairs (attribute-value matrices).
- The restriction of some f-structure  $f$  by an attribute  $a$ , designated  $f \setminus a$ , is the f-structure that results from deleting the attribute  $a$  and its value  $v$  from f-structure  $f$  (Kaplan and Wedekind 1993: 198): the pair  $\langle a, v \rangle$  is removed from the set of pairs that constitutes the f-structure in question.

(73) **Restriction** (Kaplan and Wedekind 1993: 198)

$$\begin{array}{l} \text{If } f \text{ is an f-structure and } a \text{ is an attribute:} \\ f \setminus a = f \setminus \text{Dom}(f) - \{a\} = \{ \langle s, v \rangle \in f \mid s \neq a \} \end{array}$$

- The restriction of an f-structure is itself an f-structure, so the operation can be iterated, but the outcome is not order-sensitive; restriction is associative and commutative in its attribute argument:  $[f \setminus a] \setminus b = [f \setminus b] \setminus a = f \setminus \{a \ b\}$  (Kaplan and Wedekind 1993: 198).
- Restriction is defined in terms of set complementation: restriction of an f-structure by an attribute that the f-structure does not contain vacuously succeeds.

$$(74) \quad \begin{array}{l} \text{a. } f = \left[ \begin{array}{l} \text{PRED} \quad \text{'pro'} \\ \text{CASE} \quad \text{NOM} \end{array} \right] \\ \text{b. } f \setminus \text{PRED} = \left[ \begin{array}{l} \text{CASE} \quad \text{NOM} \end{array} \right] \end{array}$$

- $f \setminus a$  subsumes  $f$  ( $f \setminus a \sqsubseteq f$ )
- As an operation on f-structures, restriction can be combined with usual function-application as follows (Kaplan and Wedekind 1993: 198):

(75) If  $f$  and  $g$  are f-structures, then  $f \setminus a = g \setminus a$  is true if and only if  $f$  and  $g$  have all attributes and values in common other than  $a$ ; they may or may not have values for  $a$  and those values may or may not be identical.