Ellipsis
Resource accounting at the syntax-semantics interface
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The basic data

(1) Ellipsis resolution:

a. John saw a flying saucer, and Bill did too.

b. = Bill saw a flying saucer.

(2) Strict and sloppy readings:

a. John loves his wife, and Bill does too.

b. Bill loves John's wife (strict)

c. Bill loves Bill's wife (sloppy)

Terminology:

John saw a flying saucer, and Bill did too.
SOURCE clause TARGET clause

1 Ellipsis resolution as a semantic relation between source and target

Dalrymple et al. (1991), Shieber et al. (1996): The equational analysis

(3) John saw a flying saucer, and Bill did too.

(4) a. John saw a flying saucer.

b. $saw(john, \textit{a flying saucer})$

(5) a. Bill did too.

b. $P(bill)$

(6) $P(john) = saw(john, \textit{a flying saucer})$

(7) $P \mapsto \lambda x.\, see(x, \textit{a flying saucer})$

(8) a. $P(t_1, t_2, \ldots, t_n)$

b. $P(s_1, s_2, \ldots, s_n) = s$

Strict and sloppy readings:

(9) John loves his wife, and Bill does too.

(10) Source: $love(\underline{john}, wife(john))$

Underlined occurrence of $john$ is a *primary occurrence*

(11) $P(john) = love(\underline{john}, wife(john))$

(12) a. $P \mapsto \lambda x.\, love(\underline{john}, wife(john))$

b. $P \mapsto \lambda x.\, love(\underline{john}, wife(x))$

c. $P \mapsto \lambda x.\, love(x, wife(john))$

d. $P \mapsto \lambda x.\, love(x, wife(x))$

Only solutions where the primary occurrence is abstracted over (a, b) are well-formed in ellipsis resolution.

(13) a. $love(bill, wife(john))$

b. $love(bill, wife(bill))$

Alternate strict/sloppy proposals

Kitagawa (1991), Lappin and McCord (1990): The antecedent of a reconstructed pronoun in the target is determined independently of its antecedent in the source.

(14) John$_i$ loves his$_i$ wife, and Bill does too. $\rightarrow$
John$_i$ loves his$_i$ wife, and Bill loves his wife. $\rightarrow$
John$_i$ loves his$_i$ wife, and Bill$_j$ loves his$_{i,j}$ wife.

(15) John$_i$ loves himself$_i$, and Bill does too. $\rightarrow$
John$_i$ loves himself$_i$, and Bill loves himself. $\rightarrow$
John$_i$ loves himself$_i$, and Bill$_j$ loves himself$_j$.

Problem: Incorrectly predicts that copied pronominals can have any indexing. (14) should have a reading like: John loves his wife, and Bill loves George's wife.

Problem: Predicts that reflexives have only a sloppy reading (if binding theory applies to copied structure).

(16) John defended himself better than his lawyer did.

Sag (1976), Williams (1977), Gawron and Peters (1990), Fiengo and May (1994): Encode strict/sloppy ambiguity in source.

(17) John$_i$ loves $\underset{\text{STRICT}}{\text{his}_i}$ wife, and Bill$_j$ does too. $\rightarrow$

John$_i$ loves $\underset{\text{STRICT}}{\text{his}_i}$ wife, and Bill$_j$ loves $\underset{\text{STRICT}}{\text{his}_i}$ wife.

(18) John$_i$ loves $\underbrace{\text{his}_i}_{\text{SLOPPY}}$ wife, and Bill$_j$ does too. $\rightarrow$

John$_i$ loves $\underbrace{\text{his}_i}_{\text{SLOPPY}}$ wife, and Bill$_j$ loves $\underbrace{\text{his}_j}_{\text{SLOPPY}}$ wife.

Problem: Cascaded ellipsis (Data from Dahl (1973), Scheibe (1973)).

(19) John realizes that he is a fool, but Bill does not, even though his wife does.

(20) *John realizes that John is a fool but*
Bill does not realize that Bill is a fool, even though
Bill's wife realizes that Bill is a fool

(21) a. John$_i$ realizes $\underbrace{\text{he}_i}_{\text{SLOPPY}}$ is a fool, but

Bill$_j$ doesn't [realize $\underbrace{\text{he}_j}_{\text{SLOPPY}}$ is a fool]

b. Bill$_j$ doesn't [realize $\underbrace{\text{he}_j}_{\text{STRICT}}$ is a fool], even though

his wife$_k$ does [realize $\underbrace{\text{he}_j}_{\text{STRICT}}$ is a fool].

Solution in equational approach:

(22) $realize(\underline{john}, fool(john))$

(23) $P_1(john) = realize(\underline{john}, fool(john))$

(24) $P_1 \mapsto \lambda x.realize(x, fool(x))$

(25) $realize(\underline{bill}, fool(bill))$

(26) $P_2(bill) = realize(\underline{bill}, fool(bill))$

(27) $P_2 \mapsto \lambda x.realize(x, fool(bill))$

(28) $realize(wife(bill), fool(bill))$

Problem: Missing readings (Data from Sag (1976, p. 131))

(29) John$_i$ said Mary hit him$_i$ and Bill$_j$ said she hit him$_{i,\ j}$ too.

(30) John$_i$ said Mary hit him$_i$ and Bill$_j$ did too (said Mary hit him$_{i,\ j}$).

(31) a. Source: $say(john, hit(mary, john))$

b. Target: $P(bill)$

c. $P(john) = say(john, hit(mary, john))$

d. $P \mapsto \lambda x.\, say(x, hit(mary, john))$
$P \mapsto \lambda x.\, say(x, hit(mary, x))$

(32) John$_i$ said Mary hit him$_i$, and Bill$_j$ said she did too (hit him$_{i,\ *j}$).

(33) a. Source: $hit(mary, john)$

b. Target: $P(mary)$

c. $P(mary) = hit(mary, john)$

d. $P \mapsto \lambda x.\, hit(x, john)$

2 Syntactic vs. semantic treatments of ellipsis resolution

(Syntactic) reconstruction: copying syntactic structure from source to target to resolve ellipsis. The meaning of the elided part of the target is the same as the corresponding portion of the source because their syntactic structures are the same.

In support of a syntactic treatment

Anaphoric violations in the reconstructed target clause:

(34) a. Fred defended himself, and George did too. (no strict reading)

b. *Fred defended him$_i$, and he$_i$ did too [defended him$_i$].

c. *Fred defended George$_i$, and he$_i$ did too [defended George$_i$].

Lappin (1996): VP ellipsis involves syntactic copying because syntactic constraints also hold in ellipsis.

(35) Subjacency: Gap is "too far away"

a. John read everything which Mary believes that he {read/did}.

b. *John read everything which Mary believes the claim that he {read/did}.

c. *John read everything which Mary wonders why he {read/did}.

(36) Parasitic gaps: Second gap must appear in proper relation to main gap

a. This is the book which Max read before knowing that Lucy {read/did}.

b. *This is the book which Max read before hearing the claim that Lucy {read/did}.

c. This is the book which Max read before knowing why Lucy {read/did}.

Against a syntactic treatment

Some examples (including cases of VP ellipsis) have no syntactic source:

(37) a. A lot of this material can be presented in a fairly informal and accessible fashion, and often I do. (Chomsky, 1982, page 41)

b. The formalisms are thus more aptly referred to as information- or constraint-based rather than unification-based, and we will do so here. (Shieber, 1989, page 2)

c. It is possible that this result can be derived from some independent principle, but I know of no theory that does so. (Mohanan, 1983, page 664)

(38) Avoid getting shampoo in eyes—if it does, flush thoroughly with water. (instructions on a bottle of Agree shampoo)

(39) Just to set the record straight, Steve asked me to send the set by courier through my company insured, and it was. (Kehler, 2002)

Lappin (1996): Bare argument ellipsis does not involve syntactic copying because syntactic constraints do not hold in ellipsis.

(40) John enjoyed reading the articles which appeared in the New York Times last week, but not the Daily Telegraph.

Synthesis: Syntactic vs. semantic resolution

Kehler (2002): Difference correlates with discourse relations. Parallel/resemblance cases induce syntactic reconstruction, other cases do not.

(41) a. The lawyer defended Bill$_i$ better than he$_i$ could have [*defended Bill$_i$].

b. *The lawyer defended Bill$_i$, and he$_i$ did too/defended Bill$_i$ too.

(42) a. Bill$_i$ defended himself$_i$ better than his lawyer could have [*defended himself$_i$].

b. *Bill$_i$ defended himself$_i$, and John did too/defended himself$_i$.

3 Ellipsis and quantification

Scope parallelism in source and target

(43) John gave every student a test, and Bill did too.

not:

$$\begin{array}{ll} & every(x, student(x), exists(y, test(y), give(j, x, y))) \\ \wedge & exists(y, test(y), every(x, student(x), give(b, x, y))) \end{array}$$

Quantifier(s) are discharged before ellipsis is resolved:

(44) $P(j) = every(x, student(x), exists(y, test(y), give(\underline{j}, x, y)))$

(45) $P = \lambda z.\, every(x, student(x), exists(y, test(y), give(z, x, y)))$

(46)
$$\begin{array}{ll} & every(x, student(x), exists(y, test(y), give(j, x, y))) \\ \wedge & every(x, student(x), exists(y, test(y), give(b, x, y))) \end{array}$$

Quantifier(s) are discharged after ellipsis is resolved:

(47) $\langle every\ x\ student(x)\rangle \vdash exists(y, test(y), give(j, x, y))$

(48) $P(j) = exists(y, test(y), give(\underline{j}, x, y))$

(49) $P = \lambda z.\, exists(y, test(y), give(z, x, y))$

(50)
$$\begin{array}{lll} every(x, student(x), & & exists(y, test(y), give(j, x, y)) \\ & \wedge & exists(y, test(y), give(b, x, y))) \end{array}$$

Indefinites and strict/sloppy readings

Gawron and Peters (1990)

(51) Alice recommended a book she hated before Mary did.

(52) $exists(x, book(x) \wedge hate(alice, x),$
$recommend(alice, x)$ *before* $recommend(mary, x))$

(Alice and Mary recommend the same book, which Alice hates)

(53) $exists(x, book(x) \wedge hate(alice, x), recommend(alice, x))$ *before*
$exists(x, book(x) \wedge hate(alice, x), recommend(mary, x))$

(different books that Alice hates are involved)

(54) $exists(x, book(x) \wedge hate(alice, x), recommend(alice, x))$ *before*
$exists(x, book(x) \wedge hate(mary, x), recommend(mary, x))$

(Alice recommends a book Alice hates, and Mary recommends a book Mary hates)

(55) Unavailable reading:

$exists(x, book(x) \wedge hate(alice, x),$
$recommend(alice, x)$ *before* $book(x) \wedge hate(mary, x) \wedge recommend(mary, x))$

(Alice and Mary recommend the same book, which Alice and Mary both hate)

(56) $\langle exists, x, book(x) \wedge hate(alice, x))\rangle \ \vdash\ recommend(alice, x)$

(57) Resolve ellipsis before discharging quantifier:

$P(alice) = recommend(\underline{alice}, x)$
$P \mapsto \lambda y.\, recommend(y, x)$

$\langle exists, x, book(x) \wedge hate(alice, x))\rangle \ \vdash$
$recommend(alice, x)$ *before* $recommend(mary, x)$

(58) Discharge quantifier before resolving ellipsis:

$$P(alice) = exists(x, book(x) \wedge hate(\underline{alice}, x), recommend(alice, x))$$
$$P \mapsto \lambda y.\, exists(x, book(x) \wedge hate(alice, x), recommend(y, x)) \text{(strict reading)}$$
$$P \mapsto \lambda y.\, exists(x, book(x) \wedge hate(y, x), recommend(y, x)) \text{ (sloppy reading)}$$

Wide-scope VP quantification

Hirshbühler (1982), Kempson and Cormack (1983)

(59) Someone hit everyone, and then Bill did.

(60) A Canadian flag was hanging in front of each window, and an American flag was too.

(61) $each(w, window(w), some(f, \textit{can-flag}(f), hang(f, w)))$

(62)
$$\begin{aligned} &P(\lambda S.\, some(f, \textit{can-flag}(f), S(f))) \\ &\quad = each(w, window(w), some(f, \textit{can-flag}(f), hang(f, w))) \end{aligned}$$

(63) $P \mapsto \lambda Q.\, each(w, window(w), Q(\lambda x.\, hang(x, w)))$

(64) $\lambda S.\, some(f, \textit{am-flag}(f), S(x))$

(65)
$$\begin{aligned} &\lambda Q.\, (each(w, window(w), Q(\lambda x.\, hang(x, w))))(\lambda S.\, some(f, \textit{am-flag}(f), S(f))) \\ &\quad = each(w, window(w), \lambda S.\, some(f, \textit{am-flag}(f), S(f))(\lambda x.\, hang(x, w))) \\ &\quad = each(w, window(w), some(f, \textit{am-flag}(f), \lambda x.\, hang(x, w)(f))) \\ &\quad = each(w, window(w), some(f, \textit{am-flag}(f), hang(f, w))) \end{aligned}$$

Bound target subjects

(66) Madeline$_i$ revised [her$_i$ mother]$_j$'s paper before she$_j$ did.

(67) a. Madeline revised her mother$_i$'s paper before she$_i$ revised it.

b. Madeline revised her mother$_i$'s paper before she$_i$ revised her$_i$ paper. (same with uniqueness assumption)

c. no reading: Madeline revised her mother$_i$'s paper before she$_i$ revised her$_i$ mother's paper.

Before resolution and assumption discharge:

$$\begin{aligned} &\langle the\ m\ mother.of(m, madeline)\rangle, \\ &\qquad \langle the\ p\ paper.of(p, m)\rangle \quad \vdash \textit{before}(revise(madeline, p), \\ &\qquad\qquad\qquad\qquad\qquad\qquad P(m)) \end{aligned}$$

- Resolving before assumption discharge:

$$P(madeline) = revise(\underline{madeline}, p)$$
$$P \mapsto \lambda x.\, revise(x, p)$$

- Resolved meaning after discharge:

$$\begin{array}{l} the(m, mother.of(m, madeline), \\ \quad\quad the(p, paper.of(p, m), \\ \quad\quad\quad\quad \mathit{before}(revise(madeline, p), revise(m, p)))) \end{array}$$

One assumption discharged before resolution:

- After discharge imposed by assumption dependency:

$$\begin{array}{l} \langle the\ m\ mother.of(m, madeline)\rangle \vdash \\ \quad\quad \mathit{before}(the(p, paper.of(p, m), revise(madeline, p)), P(m)) \end{array}$$

- Resolution:

$$\begin{array}{l} P(m) = the(p, paper.of(p, m), revise(\underline{\mathit{madeline}}, p)) \\ P \mapsto \lambda x.\, the(p, paper.of(p, m), revise(x, p)) \end{array}$$

- Resulting meaning:

$$\begin{array}{l} the(m, mother.of(m, madeline), \\ \quad\quad \mathit{before}(the(p, paper.of(p, m), revise(madeline, p)), \\ \quad\quad\quad\quad the(p, paper.of(p, m), revise(m, p)))) \end{array}$$

Equivalent to previous one with uniqueness presupposition.

Blocked sloppy reading:

- Source clause meaning:

$$\begin{array}{l} the(m, mother.of(m, madeline), \\ \quad\quad the(p, paper.of(p, m), revise(madeline, p))) \end{array}$$

- Lacks binding assumption for target clause subject!

$$\begin{array}{l} \mathit{before}(the(m, mother.of(m, madeline), \\ \quad\quad\quad\quad the(p, paper.of(p, m), revise(madeline, p))), \\ \quad\quad P(\boxed{\textbf{?}})) \end{array}$$

- *But*, what about cases with possible sloppy readings?

(68) a. Ronnie$_i$ criticized [his$_i$ predecessor]$_j$'s policies just as he$_j$ did when he$_j$ assumed office.

b. Mary$_i$ heard about the layoffs from [her$_i$ manager]$_j$ shortly after he$_j$ did.

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