On Presupposition and E-Type Anaphora

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Origins of Dynamic Semantics

- **Problem 1: Presupposition Projection**

  a. # The king of Moldavia is powerful.
  b. False: Moldavia is a monarchy and its king is powerful.

- **Problem 2: Donkey Anaphora**

  a. # The king of Moldavia is powerful.
  b. False: Moldavia is a monarchy and its king is powerful.

- **Plan: Towards an Alternative**
  a. Summarize a more explanatory account of presupposition projection
  b. Ask which 'E-type' account of donkey anaphora should be combined with our analysis of presupposition projection

The Projection Problem

- a. The king of Moldavia is powerful.
  b. Moldavia is a monarchy and its king is powerful.
  b'. Bucarest is in Moldavia and the king of Moldavia is powerful.
  c. If Moldavia is a monarchy, its king is powerful.

- **Lessons [to be disputed]**
  a. Sentences can be true, false, or #.
  b. Trivalent logic alone won't suffice.

Context Update I

- **Stalnaker's Analysis: a pragmatic solution**

  a. John is incompetent and he knows that he is.

  Step 1: Update the Context Set C with *J. is incompetent*

  C[John is incompetent]={w∈C: J. is incompetent in w}=C'

  Step 2: Update the intermediate Context Set C' with *he knows that he is incompetent*

  C'[he knows it]={w∈C: J. is incompetent in w and J. believes in w that J. is incompetent}

  b. #John knows that he is incompetent and he is.

- **Ideas:** (i) The assertion of a conjunction is a succession of two assertions. (ii) The analysis is pragmatic.

Context Update II

- **Problems with Stalnaker's Analysis**

  a. It is not clear that the notion of 'intermediate Context (Set)' makes sense (e.g. *None of my students is both rich and proud of it*).

  b. It is unclear how the analysis can extend, say, to disjunction or quantifiers (e.g. a disjunction cannot be equated with a succession of two assertions)

  c. Why should one update the Context Set anyway?

- **Heim's Analysis: a semantic solution**

  a. Rule: C[F and G] = (C[F])[G], unless C[F]=#

  b. Results: same as before, except that they can be extended.

Context Update III

- **Problem: is the account explanatory? (Soames 1989)**

  C[F and G] = (C[F])[G]
  C[F and* G] = (C[G])[F]

  When F and G are not presuppositional,
  C[F and G]=C[F and* G]={w∈C: F is true in w and G is true in w}

- **There are many ways to define the CCP of *or*...**
  C[F or^1 G] = C[F] ∪ C[G], unless one of those is #
  C[F or^2 G] = C[F] ∪ C[not F][G], unless one of those is #
  C[F or^3 G] = C[not G][F] ∪ C[G], unless one of those is #

Be Articulate!

- **Assumptions**
  (i) There are just two truth values
  (≈ local accommodation is the basic case)
  (ii) Meaning is not dynamic: there **is** a Context Set, but it **need not get modified** as a sentence is processed.

- **Be Articulate! [= primitive principle]**

  Under certain conditions, if *F* is contextually equivalent to *p and F*, *p* is considered as a 'pre-condition' of F and one should say **___ [p and F] ___**
  rather than **___ F ____**
  ... unless the full conjunction is ruled out by independent pragmatic constraints.
  Notation: we write F= pp' if p is the 'precondition' of F

Be Articulate!

- **Solution** (for d, d' of type t or <e, t>)
  Say _ d and dd' __ rather than __ dd' __ unless ...
  (i) one can be certain that **d and** does no work no matter what the end of the sentence is **[this derives Heim 1983]**
  [but don't rule out: **John resides in France and he lives in Paris**]
  (ii) one can be certain that **and dd'** does no work once the beginning of the sentence is heard **[new predictions]**

- **John knows that it's raining**
  Speaker should have said: **It's raining and John knows it**
  unless... the first conjunct **It's raining** was doing no work
  which happens if... **C |= It's raining**

- **If it's raining, John knows it**: ok without a presupposition because **#If it's raining, it's raining and John knows it**

Transparency

- Let d be of type t or <e, t>. If **for each c’ of the same type as d and for each acceptable sentence completion b’**

  C |= a (d and c’) b’ ⇔ a c’ b’

  d and should not have been uttered in the first place!

- Thus **a dd' b** is acceptable in C if

  a (d and dd') b is **not** acceptable in C, i.e. if

  for each c’ of the same type as d and for each acceptable sentence completion b’

  C |= a (d and c’) b’ ⇔ a c’ b’

An Incorrect Alternative

- **Transparency* (WRONG!)**

  a dd' b is acceptable in C if
  C |= a (d and d') b ⇔ a d' b

- It is John who won
  a. Presupposition: Exactly one person won.
  b. Assertion: John won.

- **(Wrong) Prediction of Transparency***

  C |= Exactly one person won and John won ⇔John won
  i.e. C |= John won ⇒ Exactly one person won

pp'

Transparency: for all syntactically acceptable b', c',
C |= (p and c') b' ⇔ c' b'

Claim: ***Transparency*** **is satisfied** ⇔ **C |= p**

⇐ If C |= p, for any c', (p and c') and c' have the same contextual meaning, hence the result.

⇒ Take b' to be empty, and take c' to be a tautology.
Then Transparency requires that
C |= (p and c') ⇔ c'
hence C |= (p and c'), hence C |= p.

(p and qq')

- **John is an idiot and he knows that he is incompetent**
  Prediction: C |= John is an idiot ⇒ John is incompetent

Transparency: for all syntactically acceptable b', c',
C |= (p and (q and c') b' ⇔ (p and c' b'

Claim: ***Transparency*** **is satisfied** ⇔ **C |= p ⇒ q**

⇐ : Straightforward [note that b' must be:)]
⇒ : Taking b' =) and c' to be some tautology, we have:
C |= (p and (q and c')) ⇔ (p and c'), hence
C |= (p and q) ⇔ p, hence in particular
C |= p ⇒ q

(p or <u>q</u>q')

- **John is not an idiot or he knows that he is incompetent**
  Prediction: C |= John is an idiot ⇒ John is incompetent

Transparency: for all syntactically acceptable b', c',
C |= (p or (q and c') b' ⇔ (p or c' b'

***Claim: Transparency* is satisfied ⇔ C |= (not p) ⇒ q**

⇐ : Straightforward because *p or F* ⇔ *p or (not p and F)*
⇒ : Taking b' =) and c' to be some tautology, we have:
C |= (p or (q and c')) ⇔ (p or c'), hence
C |= (p or q), or in other words
C |= (not p) ⇒ q

(if p. <u>q</u>q')

- **If John is an idiot, he knows that he is incompetent**
  Prediction: C $\models$ John is an idiot $\Rightarrow$ John is incompetent

Transparency: for all syntactically acceptable b', c',
C $\models$ (if p . (q and c') b' $\Leftrightarrow$ (if p . c' b'

***Claim: Transparency* is satisfied** $\Leftrightarrow$ **C $\models$ p $\Rightarrow$ q**
[We treat conditionals as **material implications]**

$\Leftarrow$: Straightforward
$\Rightarrow$: Taking b' =) and c' to be some tautology, we get:
C $\models$ (if p. (q and c')) $\Leftrightarrow$ (if p . c'), hence
C $\models$ (if p. q)

General Results

- **Theorem 1**

  For a propositional logic (with *not*, *and*, *or* and *if*), this system is fully equivalent to Heim 1983, supplemented with the disjunction of Beaver 2001.

  not $\underline{p}p'$ presupposes p
  (p and $\underline{q}q'$) presupposes $p \Rightarrow q$
  (p or $\underline{q}q'$) presupposes (not p) $\Rightarrow q$
  (if $\underline{p}p'$. q) presupposes p
  (if p . $\underline{q}q'$) presupposes $p \Rightarrow q$

  (... but the result applies in full generality, not to just unembedded sentences).

General Results

- **Theorem 2**

  Under Conditions C1 and C2, **the equivalence can be extended to a system that includes any generalized quantifier** that satisfies Permutation Invariance, Extension and Conservativity.

  C1: Non-Triviality (any quantificational clause should 'have a chance' of a making a non-trivial contribution)

  C2: The domain has constant size and each restrictors is true of a constant number of individuals throughout C.

- **Additional Result**

  This system derives the projective behavior of connectives from their truth-conditional contribution, and hence it is predictive.

Unless

- Unless John didn't come, Mary will know that he is here.

- **a. Prediction of Heim 1983:** No prediction (*unless* is not discussed)

  b. Prediction of *Transparency*: There should be no presupposition (if: John came ⇒ John is here)
  This follows from the equivalence:

  Unless John didn't come, q
  ⇔ Unless John didn't come, <u>John came</u> and q.

While

- While John worked for the KGB, Mary knew that he wasn't entirely truthful about his professional situation.

- **a. Prediction of Heim 1983:** No prediction (*while* is not discussed)

  b. Prediction of *Transparency*: Given knowledge that a spy is not entirely truthful about his professional situation, there should be no presupposition.
  This follows from the equivalence:
  While John worked for the KGB, q
  ⇔ While John worked for the KGB, he worked for the KGB and q

E-type Anaphora

- Every man who has a car takes good care of it.

- **First Attempt:** **it = the thing**

- **a. Problem 1: too many cars**
  ☞ make the semantics more fine-grained by quantifying over ‘small’ events or situatitons.

  b. Problem 2: Formal Link

The Problem of the Formal Link

- a. John has a wife. She is sitting next to him.
  b. John is married. ?? She is sitting next to him. (Heim)

- a. Annette hat einen Wagen. Er ist rot.
  A. has a-masc car. He is red.
  b. Annette has ein Auto. Es ist rot.
  A. has a-neut car. It is red. (< Sauerland?)

- a. <> When a Democrat argues with a Republican, the former always mentions Iraq and the latter always mentions Monica.
  b. ... celui-ci parle de Monica, et celui-là parle de l'Irak.
  ... *this-one talks about M., and that-one talks about Iraq*.
  c. ... le premier parle de Monica et le second parle de l'Irak.
  .... *the first talks about M. and the second talks about Iraq*

Solution 1: NP Ellipsis (Elbourne 2005)

- NP Deletion + Quantification over very small situations to guarantee uniqueness

he = the NP, where NP has masculine features.

she = the NP, where NP has feminine features.

it = the NP, where NP has neuter features.

[[every [man [who [λ_6 [[a donkey] [λ_2 [t_6 owns t_2]]]]]]] [beats [it donkey]]]

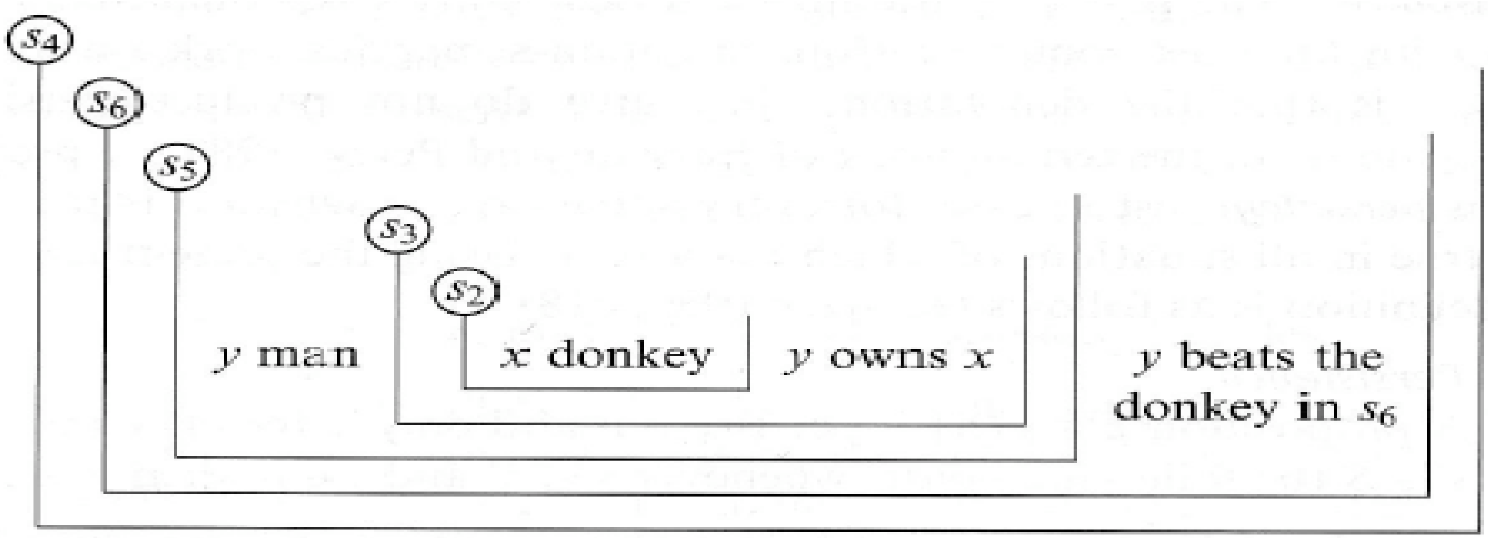
λs_4. for every individual y:

for every minimal situation s_5 such that

$s_5 \leq s_4$ and y is a man in s_5 and there is an individual x and a situation s_2 such that s_2 is a minimal situation such that $s_2 \leq s_5$ and x is a donkey in s_2, such that there is a situation s_3 such that $s_3 \leq s_5$ and s_3 is a minimal situation such that $s_2 \leq s_3$ and y owns x in s_3,

there is a situation s_6 such that

$s_6 \leq s_4$ and s_6 is a minimal situation such that $s_5 \leq s_6$ and y beats in s_6 ιz z is a donkey in s_6



Problem 1: Antecedent in another Disjunct

- a. No candidate will win with an overwhelming majority or (else) he will become a danger to the nation.

  b. <??> No candidate will win with an overwhelming majority or (else) the candidate will become a danger to the nation.

- **Difficulty**

  -How is uniqueness guaranteed? It seems that there are just too many candidates for *the candidate* to refer.

  • Potential solution: posit that disjunction somehow quantifiers over situations.

  • Problem: this leads the E-type approach towards the same kind of stipulations as the dynamic approach

  -How is the contrast obtained?

Problem 2: the Antecedent is a Disjunction

- a. If Mary sees a donkey or a horse, she waves to it.
  b. If Mary sees John or Bill, she waves to him.
  (Elbourne 2005; Stone 1992)

• Elbourne's Solution: Ellipsis displays the same properties as disjunct anaphora

- a. What an inconvenience! Whenever Max uses the fax or Oscar uses the Xerox, I can't.
  b. Mary needs a hammer or a mallet. She's hoping to borrow Bill's.

Problem 2: the Antecedent is a Disjunction

• **Objection 1**: Ellipsis has anaphoric properties to begin with!

■ Condition C effects (after Wasow 1972)

a. <> The president will resign after the prime minister does.
b. <> After the prime minister does, the president will resign.
c. <> After the prime minister resigns, the president will (as well).
d. *The president will after the prime minister resigns.

Problem 2: the Antecedent is a Disjunction

- **Objection 2**: when no description is adequate

- a. Si Jean achète un cheval ou un âne, il le traitera bien.
  If Jean buys a horse or a donkey, he it will-treat well
  b. Si Jean achète un cheval ou un âne, il les traitera bien.
  If Jean buys a horse or a donkey, he them will-treat well
  c. Si Jean achète un cheval et un âne, il les traitera bien.
  If Jean buys a horse and a donkey, he them will-treat well

- a. ? ... il traitera bien le [cheval ou âne].
  ... he will treat well the-pl [horse-sg or donkey]
  b. *... il traitera bien les [cheval ou âne].
  ... he will treat well the-pl [horse-sg or donkey]
  c. *... il traitera bien les [cheval et âne].
  ... he will treat well the-pl [horse-sg or donkey]

Pronouns as Paraphrases (Parsons 1979, Heim 1990, ...)

- a. Every man who owns a donkey beats it.
  b. Every man who owns a donkey beats the donkey that he owns.

<u>Problem 1:</u> when the antecedent is in another disjunct
⇒ better than the NP deletion analysis

- a. No candidate will win with an overwhelming majority or (else) he will be a danger to the nation.
  b. No candidate will win with an overwhelming majority or (else) the candidate who will win with an overwhelming majority will be a danger to the nation.

Pronouns as Paraphrases

<u>Problem 2:</u> when the antecedent is a disjunction ⇒ still a problem

- a. ? ... il traitera bien le [cheval ou âne].
  ... he will treat well the-pl [horse-sg or donkey]
  b. *... il traitera bien les [cheval ou âne].
  ... he will treat well the-pl [horse-sg or donkey]
  c. *... il traitera bien les [cheval et âne].
  ... he will treat well the-pl [horse-sg or donkey]

<u>Problem 3:</u> there is no other syntactic rule that can turn a description into a pronoun (or vice versa)!

A Semantic Version of the Pronouns as Paraphrases Analysis

- a. Je vais embaucher un homme allemand ou une femme italienne. *Il / *Elle / Cette person sera efficace.
  *I will hire a man German or a woman Italian. *He / *She / This person will be effective.*
  'I will hire a German man or an Italian woman. This person will be effective'.

  b. Je vais embaucher une star du golf ou je vais licencier une chanteuse. **Il / Elle va me coûter cher.
  *I will hire a star-fem of golf or I will fire a female singer. **He / She will cost me a lot of money.*
  'I will hire a golf star or I will fire a femal singer. This person will cost me a lot of money'.

A Semantic Version of the Paraphrase Analysis

- **Generalization:** A singular pronoun that is anaphoric to a disjunction must be morphologically congruent with the (relevant) NP in each disjunct.

- **Idea**

  -Donkey pronouns carry functional indices (with their arguments).

  -The values of these functional indices are Skolem functions recovered from the antecedent of the donkey pronoun.

  -Donkey pronouns may be multiply indexed. A pronoun with a disjunctive antecedent carries one index for each antecedent (and it denotes the sum of their values).

Syntax

- **a. Index** (freely) a pronoun with an NP.
  b. Agreement condition: A pronoun must agree in gender features with each NP it is coindexed with.

- The index may be of the form: f, fx, fxy, fxyz, etc., where:
  • f is a variable over Skolem functions.
  • x, y, z, ... are individual variables.

- No candidate$_f$ won with a an overwhelming majority or he$_f$ will be a danger to the nation.

- At most 10 students$_f$ will show up or (else) they$_f$ won't all fit in this classroom.

- Every man who$_x$ x owns a donkey$_{\mathbf{fx}}$ beats it$_{\mathbf{fx}}$.

Notational Conventions

If S_i = __ D NP_i __ (with a possibly empty determiner D)

S_i* = __ i __ and NP(i)

- No $candidate_f$ won with a an overwhelming majority or he_f will be a danger to the nation.
  S_f = no $candidate_f$ won with a an overwhelming majority
  S_f* = f won with an overwhelming majority and candidate(f)

- Every man who_x x owns a $donkey_{\mathbf{fx}}$ beats $it_{\mathbf{fx}}$.
  S_{fx} = x own a $donkey_{fx}$
  S_{fx} = x owns and donkey(fx)

Semantics

If f is a functional index that appears on a pronoun with n arguments $x_1 \ldots x_n$,

$$[\![f]\!]^s(w) = \lambda d_1 \ldots \lambda d_n . \begin{cases} \text{Max } d\text{: } [\![S_{fx_1 \ldots x_n} *]\!]^{s[fx_1 \ldots x_n \rightarrow d][x_1 \rightarrow d_1] \ldots [x_n \rightarrow d_n]}(w) = 1 \text{ if there is such a maximum} \\ 0 \text{ otherwise} \end{cases}$$

where in the notation $s[fx_1 \ldots x_n \rightarrow d]$, $fx_1 \ldots x_n$ is treated as a 'fresh' variable (otherwise the notation would be meaningless).

Semantics

- **Interpretation of pronouns**

  If i, j, k, ... are (possibly complex) functional indices, $[[\ pro_{i,j,\ k,\ ...}\ ]]^{s}(w)$ = the mereological sum of $[[\ i\ ]]^{s}(w)$, $[[\ j\ ]]^{s}(w)$, $[[\ k\ ]]^{s}(w)$...

- **Interpretation of number features [after Sauerland]**

  -Put a singular feature on a pronoun if it is presupposed that its denotation is singular.

  -Put a plural feature on a pronoun if it is NOT presupposed that its denotation singular.

  -We must probably add a presupposition that a pronoun with a plural feature is presupposed not to have an empty denotation.

Exactly one girl$_f$ came to the party. She$_f$ had a good time.

a. **Syntax**

The agreement condition is met, since *she* agrees in gender features with each of its antecedents.

b. **Conventions**

$S_f{}^* =$ f came and girl(f)

c. **Semantics**

• f appears on the pronoun *she*, hence $[\![f]\!]^s(w) = \max d\colon [\![S_f{}^*]\!]^{s[f \to d]}(w) = 1$ if there is such a maximum
$= 0$ otherwise

$[\![f]\!]^s(w) = \max d\colon [\![$ f came and girl(f) $]\!]^{s[f \to d]}(w) = 1$ if at least one girl came
$= 0$ otherwise

• By the interpretation of number features, this pronoun triggers a presupposition that...

in each world in which exactly one girl comes to the party, there is exactly one girl that comes to the party.

This is trivially satisfied.

Less than five girls$_f$ came to the party. They$_f$ had a good time.

a. **Syntax**

The agreement condition is vacuously met [since gender is not expressed on plural pronouns].

b. **Conventions**

$S_f^* =$ f came and girls(f)

c. **Semantics**

• f appears on the pronoun *they*, hence $[\![f]\!]^s(w) = \max d$: $[\![S_f^*]\!]^{s[f \to d]}(w) = 1$ if there is such a maximum

$= 0$ otherwise

$[\![f]\!]^s(w) \;\; = \max d$: $[\![$ f came and girls(f) $]\!]^{s[f \to d]}(w) = 1$

• By the interpretation of number features, this pronoun triggers a presupposition that...

in each world in which less than five girls came to the party, at least one girl came to the party.

Every man who$_x$ x has exactly one donkey$_{fx}$ beats it$_{fx}$.

a. **Syntax**

The agreement condition is met.

b. **Conventions**

$S_f{}^* =$ x has fx and donkey(fx)

c. **Semantics**

• f appears on the pronoun *it*, hence

$$[\![f]\!]^s(w) = \lambda d_1 . \begin{cases} \text{Max } d\text{: } [\![S_{fx_1 \ldots x_n}{}^*]\!]^{s[fx_1 \to d][x_1 \to d_1]}(w) = 1 \text{ if there is such a maximum} \\ 0 \text{ otherwise} \end{cases}$$

$$[\![f]\!]^s(w) = \lambda d_1 . \begin{cases} \text{Max } d\text{: } [\![\text{x has fx and donkey(fx)}]\!]^{s[fx_1 \to d][x_1 \to d_1]}(w) = 1 \text{ if this maximum exists} \\ 0 \text{ otherwise} \end{cases}$$

• By the interpretation of number features, this pronoun triggers a presupposition that...
for every man that has exactly one donkey, there is exactly one donkey that this man has (trivially true).

I will hire a [golf star-fem]$_f$ or I will hire a [female singer]$_g$. She$_{f,g}$ will be very famous. [French]

a. **Syntax**

The agreement condition is met, since *she* agrees in gender features with each of its antecedents.

b. **Conventions**

S_f^* = I will hire f and [golf star](f)

S_g^* = I will hire g and [golf star](g)

c. **Semantics**

• f appears on the pronoun *she*, hence $[\![f]\!]^s(w)$ = max d: $[\![S_f^*]\!]^{s[f \to d]}(w) = 1$ if there is such a maximum
= 0 otherwise

$[\![f]\!]^s(w)$ = max d: $[\![$I will hire f and [golf star](f)$]\!]^{s[f \to d]}(w) = 1$ if I hire at least one golf star in w
= 0 if I don't hire any golf star in w

• Similarly,

$[\![g]\!]^s(w)$ = max d:$[\![$I will hire g and [female singer](g)$]\!]^{s[f \to d]}(w) = 1$ if I hire at least one female star in w
= 0 if I don't hire any female singer in w

• In sum,

$[\![she_{f,g}]\!]^s(w) = [\![f]\!]^s(w) + [\![g]\!]^s(w)$

• By the interpretation of number features, this pronoun triggers a presupposition that...

in each world in which I hire a golf star or a female singer, I hire *exactly one* of the two.

This seems right.