On Presupposition and E-type Anaphora

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Abstract: In the early 1980's, Dynamic Semantics became the standard solution to two problems: the analysis of presupposition projection, and the analysis of unbound anaphora (= 'donkey' anaphora). In both domains, however, the theory introduced powerful formal tools that made it possible to stipulate in the lexical entry of connectives what their anaphoric or projective potential was. This made it difficult to provide an explanatory and predictive analysis of the phenomena at hand. I will summarize a non-dynamic and predictive approach to the projection problem, and I will ask which variant of the 'E-type analysis' of pronouns should be combined with it to account for unbound anaphora. I will argue for a semantic variant of Parsons's 'pronouns as paraphrases' analysis[1], one that can deal in particular with pronouns whose antecedents are disjunctions.

(1) **Problem 1: Presupposition Projection**

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

(2) **Problem 2: Donkey Anaphora**

a. John has a donkey. He beats it.
b. Every man who has a donkey beats it.

(3) **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

1 Presupposition Projection

(4) 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.

[1] I believe that this semantic variant is close in spirit to the proposal in Evans 1977, but I leave a comparison for future research.

1.1 Dynamic Semantics

(5) **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.

(6) **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?

(7) **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.

(8) **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}

(9) **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 #

<u>Example</u>: This house has no bathroom or the bathroom is well hidden. (< Partee)

1.2 The Transparency Theory

(10) **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.

(11) **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= $\underline{p}$p' if $\underline{p}$ is the 'precondition' of F

(12) **Transparency**

• Let $\underline{d}$ 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 $\underline{d}$d' b is acceptable in C if
a (d and $\underline{d}$d') 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'

(13) **$\underline{p}$p'**

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.

(14) **(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

⇒ : 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

(15) **(p or qq')**

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

(16) **(if p. qq')**

If John is an idiot, he knows that he is incompetent

Prediction: C |= John is an idiot ⇒ John is incompetent

Transparency: for all syntactically acceptable b’, c’,

C |= (if p . (q and c’) b’ ⇔ (if p . c’ b’

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

[We treat conditionals as **material implications]**

⇐ : Straightforward

⇒ : Taking b’ =) and c’ to be some tautology, we get:

C |= (if p. (q and c’)) ⇔ (if p . c’), hence

C |= (if p. q)

(17) General Results

a. **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 pp' presupposes p
(p and qq') presupposes p ⇒ q
(p or qq') presupposes (not p) ⇒ q
(if pp'. q) presupposes p
(if p . qq') presupposes p ⇒ q

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

b. **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.

(18) 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, John came and q.

(19) 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

2 E-type Anaphora

2.1 Pronouns as Descriptions and Formal Link

♦ **First Attempt**

(20) he = the (one and only) man
she = the (one and only) woman
it = the (one and only) thing [or: the animal]

♦ **The Problem of Fine-Grainedness ⇒ situation / event semantics**

(21) Every man who has a car takes good care of it.

♦ **The Problem of the Formal Link**

-Presence vs. absence of an NP

(22) a. John has a wife. She is sitting next to him.
b. John is married. ?? She is sitting next to him. (Heim 1982, 1990)

-Agreement

(23) 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?)

(24) a. Most people who own a gun never use it.
b. Most people who own guns never use them.
c. ?? Most people who own a gun never use them.
d. *Most people who own guns never use it. (Heim 1990)

-*Former* and *latter, this* and *that*, *first* and *second*

(25) a. <> When a Democrat argues with a Republican, the former always mentions Iraq and the latter always mentions Monica.
b. Quand un démocrate discute avec un républicain, celui-ci parle de Monica, et celui-là parle de l'Irak.
When a Democrate agues with a Republican, this-one talks about Monica, and that-one talks about Iraq.
c. Quand un démocrate discute avec un républicain, le premier parle de Monica et le second parle de l'Irak.
When a Democrate agues with a Republican, the first talks about Monica and the second talks about Iraq.

2.2 Solution Strategies

♦ **NP Ellipsis (Elbourne 2005)**

(26) 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.

<u>Problem 1</u>: when the antecedent is in another disjunct

(27) Either John doesn't own a donkey or he keeps its very quiet (Evans 1977, Heim 1990)

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

(29) 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.

c. <T> No candidate will win with an overwhelming majority or else the candidate in question / that candidate will be 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?

• Potential solution (?)

Argue that *else* is obligatory, and that it means: *if not*.

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

(30) 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

(31) What an inconvenience! Whenever Max uses the fax or Oscar uses the Xerox, I can't.

(32) Mary needs a hammer or a mallet. She's hoping to borrow Bill's.

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

(33) Condition C effects between an elided VP and its antecedent (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.

• **Objection 2**: Sometimes no definite description provides an adequate paraphrase

(34) 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

(35) a. ? Si Jean achète un cheval ou un âne, il traitera bien le [cheval ou âne].
If Jean buys a horse or a donkey, he will treat well the-pl [horse-sg or donkey]
b. *Si Jean achète un cheval ou un âne, il traitera bien les [cheval ou âne].
If Jean buys a horse or a donkey, he will treat well the-pl [horse-sg or donkey]
c. *Si Jean achète un cheval ou un âne, il traitera bien les [cheval et âne].
If Jean buys a horse or a donkey, he will treat well the-pl [horse-sg or donkey]

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

(36) 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

(37) 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.

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

(38) a. Si Jean achète un cheval ou un âne, il les traitera bien.
b. Si Jean achète un cheval ou un âne, il les traitera bien.

(39) a. (?) Si Jean achète un cheval ou un âne, il traitera bien le [cheval ou âne].
If Jean buys a horse or a donkey, he will treat well the-pl [horse-sg or donkey]
b. *Si Jean achète un cheval ou un âne, il traitera bien les [cheval ou âne].
If Jean buys a horse or a donkey, he will treat well the-pl [horse-sg or donkey]
c. *Si Jean achète un cheval ou un âne, il traitera bien les [cheval et âne].
If Jean buys a horse or a donkey, 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)!

2.3 A semantic version of the 'pronouns as paraphrases' analysis

♦ **Another look at the problem of the formal link**

(40) Grammatical gender is crucial

Chaque fois qu'une personne de sexe masculin est amenée de force, elle / ?il insulte l'infirmière.
Each time a person-fem of masculine sex is brought forcibly, she / ? he insults the nurse.
'Each time a person of male gender is forcibly brought here, he insults the nurse'.

(41) E-type anaphora is possible with full disjunctions (... and this will be the basic case for us)

<> Mary will fire a star or she will hire a loser. Either way, he will cost a lot of money.

(42) An E-type pronoun must agree in gender features with the NP of each (relevant) disjunct

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'.

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

(44) Theta-roles are not enough

Chaque fois que je reçois un diplomate étranger ou qu'un journaliste local me téléphone, il est fiché.
Each time that I host a foreign diplomat or taht a local journal me phones, he is put on file.
'Each time I meet a foreign diplomat or a local journalist calls me, his name is put on file'

♦ **Analysis**

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

(45) **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.

(46) Example 1

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

(47) Example 2

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

(48) Example 3

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

<u>Notational conventions</u>

Let i an index of the form f, fx, fxy, fxyz, etc.

-We assume that there exists a single (non-pronominal) NP that carries the index i. We refer to it as: NP_i.

-We assume that the context specifies a constituent S_i of type t (or <s, t>) which contains NP_i.

-If S_i = __ D NP_i __ (with a possibly empty determiner D)
we define
S_i* = __ i __ and NP(i)

(49) Example 1

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)

(50) Example 2

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

S_f = at most 10 students$_f$ will show up

S_f* = f will show up and students(f)

(51) Example 3

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)

-Mereology: we assume a part-of relation on the object of the domain.

Semantics

(52) **Interpretation of functional indices [NOT standard!]**

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

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

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

(53) Interpretation of functional indices with arguments [standard]

$$[\![fx_1 \ldots x_n]\!]^s(w) \quad = \quad [\![f]\!]^s(w)(s(x_1)) \ldots (s(x_n))$$

(54) **Interpretation of pronouns**

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

(55) **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.

♦ **Examples**

(56) A simple donkey sentence

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: $[\![S_f{}^*]\!]^{s[f \to d]}(w) = 1$ if there is such a maximum
= 0 otherwise

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

(57) A plural donkey sentence

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.

(58) A donkey sentence with a quantifier

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

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

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

• 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).

Note: If *exactly one donkey* is replaced with *a donkey*, we obtain an unwanted uniqueness presupposition: for every man that has at least one donkey, there is exactly one donkey that this man has.

This problem has prompted situation- or event-theoretic accounts that are more fine-grained than the present one. Their machinery is compatible with the one posited here.

(59) A donkey sentence with a disjunction

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

• In sum,

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

• 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.

Prediction: If *she* is replaced with *they*, then it should NOT be presupposed that if I hire a golf star or a female singer, I hire exactly one of the two. (This seems right too).

Open Problems: 1. Unwanted uniqueness presuppositions. 2. Undistinguishable participants.

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