Pronominal Features: How "Interpretable" are They?

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Introduction

Starting Point:

(1)   Minimalist Theorem:
      A morpho-syntactic feature must be checked by the computational system (=
      within syntax) iff it can not be interpreted outside the system.

(2)   Corollary:
      If a morpho-syntactic feature need not be checked within syntax, it has an
      interpretation at LF (= it has a semantic interpretation)

Problems:

- Syntacticians usually don't specify semantic interpretation
- We therefore don't have a precise account of what it means to be
  "interpretable" (in the minimalist's sense of the notion)
- In standard model theoretic semantics, many features that need not be
  checked by syntactic criteria (eg. Φ-features on DPs like 3rd person,
  singular) lack any reasonable interpretation

Introduction

The plan of today:

- Illustrate the connection between checking and interpretation
- Give some criteria for what it means to be an interpretable feature
- Illustrate some potential problems for the minimalist theorem
- Look for possible solutions
- Discuss the issue of compositionality of feature interpretation

We will focus on the features of pronouns in German (and English).

Feature Checking and Interpetation

Minimalist Feature Checking:

(3)   English: I   help   the children
       German: ich   helf-   -e   d-en Kind-er-n
                      [1.PS,SG,NOM] [*DAT*]   [1.PS,SG]   [DAT,3.PS,PL]
                                                    [*NOM*]
                                                    [*1PS,SG,NOM*]

- Case features must be checked (they are uninterpretable)

- Number features need not be checked (they are interpretable)

- Person features need not be checked (also interpretable)

- However, in order to get agreement straight, we need checking features
  on the verb, more precisely on the agreement morphology of the verb
  (also uninterpretable)

On Interpretation

Criteria for "interpretability":

C1   A feature F of a lexeme L is *essential* for the interpretation of L iff there is no other lexeme L′ without F but with the same meaning as L.

Claim: Only if F is essential, can it be interpreted.

- A counterexample to interpretabiltity:
  Wh-features of Wh-pronouns: the Wh-feature of *who* is uninterpretable, because there is another lexeme, namely *somebody/someone* (in Karttunen's 1977 theory) or *he* (in Groenendijk/Stokhof's 1982 theory) with the same meaning as *who* (cf. also Korean).

- An embarrassing consequence of the Minimalist Theorem:
  All Wh-items, even those left in situ, must be checked.

On Interpretation

C2   F is *non-trivial* iff the meaning representation of F contains (at least) one non-eliminalbe, non-logical constant.

Claim: Only if F is non-trivial, can it be interpreted.

Examples and a counterexample:

- Identity functions are uninterpretable
- type-shifting operations are uninterpretable
- Karttunen's Wh-Operator (the Q-operator that resides in COMP) is uninterpretable.

On Interpretation

A further condition on the use of interpretable features:

C3 *Uniformity* of feature interpretation:
There can't be two homophoneous lexemes that differ only with respect to presence or absence of interpretable features.

Example:

Assume a moved item α (eg. a wh-phrase in specC) has some feature F, whereas an-in-situ item β (eg. a wh-phrase in situ) lacks F. Then the interpretation of F cannot be uniform, if α and β are homophonous. We would say that the same word cannot have F in one context but lack F in another. Or at least, if it does, the feature is purely syntactic, ie. uninterpretable.

On Interpretation

C-I   Interpretability is *compositional* iff the meaning of a word W is a function of the
meaning of its features.

Assuming that functional application is a universal means for compositional
interpretation, features F_i have a compositional interpretation if:

(4) $[\![W]\!] = [\![F_1]\!] ([\![F_2]\!] (\ldots (F_n) \ldots))$, with F_i interpretable features of W.

We will see below that compositional interpretation is a problem for
Φ-features, ie., they do not have a compositional interpretation.
This calls into question the very idea of there being a feature that is to be
interpreted; in fact we interpret an entire *word* rather than a (grammatical)
feature.

Some Problem Cases

(5) a. Man$_{sg}$ kennt$_{sg}$ einander
One knows each other

   b. Wie geht es Ihnen$_{3rd,pl}$?
how are (it) you?

   c. Komm er bitte her!
Come he please here!

   d. In this artcle we have shown that . . .

   e. The author$_{sg}$ themself probably knows no more of the language than exactly
this point which they$_{pl}$ have taken from a descriptive grammar (cited from
Featherston 2007)

   f. Only you are aware of your secrets
Semantic analysis: Everyone else except you is aware of his secrets

   g. John and Mary believe that they$_{pl}$ will win
Distributive reading: John believes that he$_{sg}$ will win and Mary believes that
she$_{sg}$ will win

Some Problem Cases

- The problem:
  Features of bound variable pronouns seem to be uninterpretable, whereas the same features of the same pronouns are assumed to be interpretable, when the pronoun is not bound

- By uniformity of interpretation, this should be impossible

- The solution proposed in the literature (Heim, Kratzer, v. Stechow unpublished):
  The offending features are either deleted on the way to LF or they are added on the way to PF.

- Objections:
  - Theoretical: Manipulation of features is a syntactic operation that should be local. Binding of pronouns is typically non-local.
  - The solution still violates the uniformity condition which should also hold at LF
  - Empirical: Manipulations of features is totally ad hoc when it comes to give an account of Rullmann's problem to be discussed further below

Solutions
Overview

5 components of our solution:

- a feature analysis of the **inflectional** system of German
- a semantic analysis of **plural pronouns**,
- a little bit of **pragmatics**,
- a **grammatical** restriction that governs coreference and binding,
- an appropriate definition of the **semantics of pronouns**.

Solutions
Morphology

(6)

			[+IND,+PRESENT]		other	
	[+1]	ich (=I)	glaub	e	glaub-te	Ø
	[+2]	du (=you)	glaub(te)			st
		er (=he)	glaub	t	glaub-te	Ø
[+PL]	[+1]	wir (=we)	glaub(te)			en
	[+2]	ihr (=you)	glaub(te)			t
		sie (=they)	glaub(te)			en

(7)   /t/   =   [+PL,+2]
      /en/ =   [+Pl]
      /st/ =   [+2]
      /e/   =   [+1,+IND,+PRESENT]
      /t/   =   [+IND,+PRESENT]
      /Ø/   =   []

Solutions
Morphology

Consequences:

- Claim: Nowhere in the morphology of German do we need features like [SINGULAR] or [3RD PERSON]

- Nowhere in the semantics do we need an interpretation of these features

- There is nothing wrong with standard model theoretical semantics, which gives cognitive preference to atomic reference (to 3rd person)

- Pronouns like *man* in (3-a), although being exceptional in allowing plural reference, are no longer contradictory: their morphological property of being singular is not encoded as a feature that would enforce such an interpretation!

  (3) a. Man kennt einander
         one knows each other

- 3rd person pronouns like *er* (='he') must not necessarily be interpreted as having 3rd person reference = different form addresse and speaker

Solutions
Plural Semantics

(8) John doesn't have children
     Correct paraphrase: It is not the case that John has more than zero children
     Wrong paraphrase: It is not the case that John has more than one child

Accordingly, the reference of plural terms also includes atoms/singularities
(as is usually assumed in plural semantics, cf. Schwarzchild)

Consequences:

- The choice between singular and plural forms is largely a matter of
  pragmatics, cf.:
  (9) a. Do you have a cigarette?   (asking a friend/#asking in a shop)
       b. Do you have cigarettes?   (asking in a shop/#asking a friend)

- Semantically, plural and singular variants may have identical
  interpretations; the preference for more indirect ways of conveying
  meaning is by and large conventionalized (politeness, distance,
  rudeness etc.)

Solutions
Plural Semantics

Consequences:

- Auctorial *we* can be used as referring to a singleton precisely because the context already specifies the author

- Politeness forms like $Sie_{3rd,pl}$ can be used in the same way for the same reason, namely because the context already specifies the addressee (addresse compatible with both 3rd person and plural)

- Because of the built-in semantics of atomic reference in the model theory, singular pronouns like 'he' must still refer to singularities (cf. below)

- We fully subscribe to Horn's division of pragmatic labor: (morphologically) unmarked form = unmarked semantics

Solutions
Pragmatics

Pragmatics conforms to the Strongest Meaning Hypothesis, unless the strongest meaning is incompatable with context (knowledge, common ground etc.)

- singular form interpreted as "Atom" is stronger than plural form interpreted as "Sum+Atom" (inclusive plural)
- plural form interpreted as "Sum" (exclusive plural) is stronger than interpreted as "Sum+Atom"
- (10) a. There are children in the garden
    b. Are there children in the garden?
    c. #Do you have M.A.-degrees?

  Weakening in (b.) justified as a consequence of ignorance, weakening in (c.), however, is disallowed.

Solutions
Feature Sharing: A Grammatical Restriction

- (11) a. [John and Paul]$_i$ believe that they$_i$ will win
  - b. Paraphrase: Each of John and Paul believes that he will win
  - c. *[John and Paul]$_i$ believe that he$_i$ will win

The Strongest Meaning Hypothesis implies that, if a distributive reading is intended, the singular most explicitly expresses this meaning and should be used, yet (11-c) is ungrammatical.

- **G** *Grammatical restriction:*
  Failure of agreement of ϕ-features must, if possible, be interpreted as disjoint reference.

- (12)   *Only you$_i$ are aware of his$_i$ secrets

A problem:

- (13)   Sind Sie$_{pl}$ es, der$_{sg}$ meine Rechte verletzt hat?
        Is   you it   who my   rights   violated has

Bound Variable Pronouns
The Solution in a Nutshell

- The problem of bound variable pronouns:
  The Φ-features of pronouns must be ignored (ie. cannot receive a semantic interpretation) iff the pronoun is interpreted as a bound variable.

- The solution (sketch of an idea):
  This property seems to be part of the semantics of (bound variable) pronouns and therefore has to be accounted for in a purely semantic way.

- This entirely semantic approach necessitates a purely semantic treatment of binding (as provided by the textbook of Heim/Kratzer) that allows a semantic way of saying that a pronoun is bound or free.

Bound Variable Pronouns
Discussion

- Execution of this idea:
  In H&K, variable assignment functions g operate on finite domains D in such a way that g is defined for a b.v.p. x_i only if an antecedence (a binder) has enlarged a previous assignment function g' so that $x_i \in D(g)$, but $x_i \notin D(g')$.

- Formally:
  $[\![\forall x_i p]\!]_g = 1$ iff $x_i \notin D(g)$ and $[\![p]\!]_{g'} = 1$ for all minimal extensions g' of g such that $x_i \in D(g')$.
  $[\![x_i]\!]_g = g(x_i)$ iff $x_i \in D(g')$, undefined otherwise

Accordingly, the semantics "knows" whether or not a pronoun is bound:

- A pronoun is bound iff its translation x_i is in the domain of an assignment function.

- Otherwise (ie., if there is no antecedent), x_i can only be interpreted by the context c: c is defined for x_i iff g is undefined for x_i.

Bound Variable Pronouns
Definition

Pronouns cannot be interpreted without an index. We thus get the following definitions for singular pronouns:

- $[\![\text{er}_i]\!]_{g,c} = [\![[\text{PRON}, i]]\!]_{g,c} = g(x_i)$, if g is defined for x_i, and the most salient singularity in c otherwise

- $[\![\text{ich}_i]\!]_{g,c} = [\![[\text{PRON}, +1, i]]\!]_{g,c} = g(x_i)$, if g is defined for x_i, and the speaker in c otherwise

- $[\![\text{du}_i]\!]_{g,c} = [\![[\text{PRON}, +2, i]]\!]_{g,c} = g(x_i)$, if g is defined for x_i, and the hearer in c otherwise

Question: Can +1 and +2 be given a compostitional interpretation?
Formally, this is impossible in the present framework!
Compositionality can be regained, however, if indeces become part of the object language, a matter we cannot discuss here (cf. Sternefeld 2001).
Another option is duplication or spreading of the index, to which I'll return below.

Bound Variable Pronouns
Discussion of an example

(14)   Only I knew that I would win

    a. noone else knew that I would win   (referential reading of 2nd occurance of I)

    b. noone else knew that he would win   (bound variable reading of 2nd I)

If j as the referential index of "I" and k its binding index, the amgiguity is presented by (15):

(15) a. Only $I_{j,k}$ knew that I_j would win

    b. Only $I_{j,k}$ knew that I_k would win

Following Rooth 1992, the first occurance of "I" is the focus of *only*

(16) a. $Only_C$ ($[\,I_j\,]_{\text{FOCUS}} \in \{x_k: x_k$ knew that I_j would win$\}$)   (I interpreted as $c(x_j)$)

    b. $Only_C$ ($[\,I_j\,]_{\text{FOCUS}} \in \{x_k: x_k$ knew that I_k would win$\}$)   (I interpreted as $g(x_k)$)

Rooth's focus semantics of "only":

(17)   For none of the contextually relevant alternative y to I_j in C it holds that $y \in$ $\{x_k: x_k$ knew that I_j/x_k would win$\}$)

Bound Variable Pronouns
Evidence from East Asian Languages

The solution proposed here is not ad hoc; the ambiguity is in fact a lexically desambiguated in the East Asian Languages:

(18)   Only John hates himself
    a.   There is no x except John who$_x$ hates x (bound variable reading BVR)
    b.   There is no x except John who$_x$ hates John (referential reading RR)

Japanese:

(19) a.   Jiro-dake-ga   zibun-o nikunde-iru ($\sqrt{}$:BVR, ?*:RR)
      Jiro-only-NOM self-acc hates
    b.   Jiro-dake-ga kare-zisin-o   nikunde-iru ($\sqrt{}$:RR, ?*:BVR)
      Jiro-nur-Nom er-selbst-Acc hasst

Korean:

(20) a.   Fritz-man caki-lul sillehanta ($\sqrt{}$:BVR, ?*:RR)
    b.   Fritz-man ku casin-ul sillehanta ($\sqrt{}$:RR, ?*:BVR)

Compositionality and Decomposition
Plural and Compositionality

Notational convention:

- $g(x_i)$ and $c(x_i)$ denote singularities in the domain of entities D_e,
  $g(X_i)$ and $c(X_i)$ denote pluralities in $D_{\langle e,t \rangle}$ (sets or singletons)

- for each index i either $g(\alpha_i)$ or $c(\alpha_i)$ is defined.

(21) Definition for plural pronouns:
      [PL, PRON, i] denotes $g(X_i)$, if g is defined for X_i, and $c(X_i)$ (= the most salient
      entity in c) otherwise.

Above we argued that +1,+2 can not be interpreted compositionally unless
one has access to an index. Assume now that the index can spread, ie. can
be duplicated, so that

(22) a. [+1,PL,PRON,I] = [+1,I] ∪ [PL,PRON,I]
      b. [+2,PL,I] = [+2,I] ∪ [PL,PRON,I]

Here is a more compositional semantics for +1 and +2:

(23) a. [+1, i] presupposes that if c is defined for i and that the speaker at c is equal or
          included in $c(\alpha_i)$
      b. [+2, i]: same for the hearer.

Compositionality and Decomposition
Rullmann's Problem

Evidence for spreading:

(24)   Only I_i wanted $us_{i,j}$ to marry

 a. No x_i except me wanted me and x_j (x_j = my wife) to marry

(referential reading)

 b. No x_i except me wanted x_i and x_j (x_j = my wife) to marry

(bound variable reading)

Bound variable reading splits the interpretation of *us* into a plural meaning and a bound variable meaning!

In Korean, the ambiguity is nicely resolved by using referential and bound variable pronouns:

(25) a. na-man-i   [wuli-ka   kyelhonhay-ya   ha-n-ta-ko]   sayngkakha-n-ta
     I-only-Nom   we-Nom   marry   should-Pres-Dec-C believe-Pres-Dec
     'I'm the only person who believes that I and someone else should marry.'

 b. na-man-i   [caki-tul-i   kyelhonhay-ya   ha-n-ta-ko]   sayngkakha-n-ta
     I-only-Nom self-PL-Nom marry   should-Pres-Dec-C believe-Pres-Dec
     'I'm the only person who_i believes that he_i and someone else should marry.'

Compositionality and Decomposition
Rullmann's Problem

How can we account for this?

(26) Splitting the meaning of *us* = Union of interpreted features
    [+1, +PL, PRON, i, j] =

                               [+1, PRON, i]   (= x_i = bound variable)
                  ∪   [+PL, PRON, j]   (= X_j = free variable)

    Semantik interpretation:
    $[\![$[+1, PRON, i] ∪ [+PL, PRON, j]$]\!]$ = $[\![$[+1, PRON, i]$]\!]$ ∪ $[\![$[+PL, PRON, j]$]\!]$

This works because the plural needs not be interpreted as a plurality, only the
resulting interpretation must be (which must be added as an additional
restriction for the semantics of ∪).
This works systematically with all other feature combinations, cf.

(27) a. Nur du$_i$ wolltest, dass ihr$_{i,j}$ heiratet
      Only you$_{sg}$ wanted that you$_{pl}$ marry
      Meaning: You$_{sg}$ are the only x, who wanted that x+y marry
  b. Nur er$_i$ wollte, dass ihr$_{i,j}$ heiratet
      Only he wanted that you$_{pl}$ marry
      Meaning: He is the only x, who wanted that x+you marry
  c. Only he$_i$ wanted them$_{i,j}$ to marry
      Meaning: He is the only x, who wanted that x+y marry

Thanks for listening
and
for your hospitality!

Some Residual Problems

Problem 1: How dependent is this kind of analysis on arbitrary features of the underlying morphology? Consider English, where only the unmarked form 3.sg.pl. has survived in history! Perhaps, we should assume a new kind of feature ("unmarked(α)") for a dimension α (person, number, tense etc.) which may count as checked iff there is no feature counterpart in the dimension of α. Does this overgenerate?

Problem 2: What about **gender** as an (un)interpretable feature?

(28)   Der **Mann**$_i$ schläft. *Er*$_i$ schnarcht.

Gender is a feature that is subject to principle G.

(29) $[\![$gender:α, pronomen, i$]\!]$:= λx. x the property described by a noun N having the gender α, which determines the kind of givenness ("Art der Gegebenheit") of x in c: x.

Locality of G:

(30)   Der Physiotherapeut$_i$ ist eine Person$_i$, die ihre$_i$/#seine$_i$ Leistung auf ärztliche Anordnung hin erbringt und daher selber keine Diagnose stellen darf.

Locality is not sufficient for Anaphora to work:

(31)   Hier ist ein Löffel, hier eine Gabel. *Sie ist größer als er.

Some Residual Problems

Problem 3: What about *tense* — Does (un)interpretabilty work as with pronouns?

(32) a. Hallo Ede! Ich **wollte** mir von dir bis morgen 10 Euro leihen!
  b. Hallo Fritz! **Wollte** dich nur kurz dran erinnern, dass du mir 10 Euro schuldest!

Problem 4: The *syntax von Wh-in-situ* — The analysis predicts that the distribution of wh-in-situ is not totally free. A correct result?

Problem 5: An empirical problem for condition G:

(33) a. *Some student* left **their** umbrella (zitiert aus Johnson 2004)
  b. The author *themself* probably knows no more of the language than exactly this point which **they** have taken from a descriptive grammar (zitiert aus Featherston 2008)

Here the effect of domain widening must be stronger than G. (Does this call for an OT-analysis?)

Problem 6: Where is the borderline between semantics and pragmatics?

(34) a. Wenn du Erfolg haben willst. . .
  b. Wenn du denkst es geht nicht mehr (kommt von irgendwo ein Lichtlein her)

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