

Pronominal Features: How “Interpretable” Are They?*

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1 Introduction and Overview

Within Chomsky’s Minimalist Program it is assumed that morpho-syntactic features divide into two types: interpretable and non-interpretable. The latter must be checked within the Computational System, that is, within core syntax, whereas the former need not be checked. This seems to follow from the Minimalist assumption that uninterpretable features may not survive at an interface and that therefore some sort of erasure by checking is needed to prevent a derivation from crashing.

In view of the fact that interpretability means something like “having a semantic interpretation”, this view seems to provoke a number of hitherto unanswered questions: One problem is that standard model theoretic semantics does not provide us with any interpretation of pronominal features like singular or third person, although these features need not be checked when attached to an NP (or DP). The reason is that singular atomic reference to 3rd person is given “cognitive preference” in standard semantics, so that within this theory there is no way to interpret the respective features.

Another problem is this: there are numerous examples showing that the features that need not be checked do not have the semantic interpretation one might expect. For example, the German pronoun “man” (=some-one) exhibits generic plural reference, but its morphology is clearly singular. Moreover, it is well-known that person features of bound pronouns have no semantic interpretation at all (contrary to the fact that they need not be checked) as soon as the pronoun is used as a bound variable pronoun. An example for this would be “Only I hate my car” with the intended meaning: *Everyone else except me hates his car*. The problem is that “my” must be translated into Logical Form as a bound variable pronoun (corresponding to “his” in the paraphrase) without referring to the speaker.

In order to overcome these problems, I propose that a combination of five different modules of grammar yields the desired results: We must resort to (a) assumptions about unmarkedness in morphology; (b) assumptions about the semantics of pluralization; (c) pragmatic assumptions on the choice between singular and plural; (d) grammatical restrictions on feature agreement; and (e) a certain way of interpreting pronominal features.

As part of the solution we first observe that offending features like 3rd person or singular are in fact dispensable in the grammar of German (and hopefully all languages) because they encode or represent the default. This is discussed in some detail w.r.t. the inflectional system of German verbs. Having established that these features are dispensable in a well-behaved language, the issue of interpretability of such features simply does not arise.

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Next we take a closer look at the semantics of the plural. It is standardly assumed that singular reference should not be excluded from plural semantics, and therefore plural forms may well have a semantic interpretation as singularities. Assuming that the distribution between singular and plural is to some extent a matter of pragmatics, this solves, inter alia, the problem of uninterpretable plural features on bound variable pronouns; in fact these features are not un-interpretable, they merely do not refer to pluralities.

There remains the problem of uninterpretable first or second person features on bound variable pronouns. I propose that the alleged uninterpretability of these features should be built directly into the semantics of these features. Assuming a semantic system with only partial assignment functions for variables, such a function is only defined if an antecedent has already introduced a variable into the domain of the discourse (cf. the textbook by Heim and Kratzer). This way, the semantics “knows” whether a pronoun is bound or free. Then a feature like 1st person on a pronoun x_i can be interpreted as: refers to $g(x_i)$ if the assignment function g is defined for x_i and otherwise to the speaker in context c . This way, 1st person is still part of the meaning, but only in a conditionalized manner.

We finally address the issue of compositionality of feature interpretation by discussing Rullmann’s problem: A sentence like “Only I wanted us to marry” has a reading where the interpretation of “us” has to split up into two parts, namely one where the 1st person part is interpreted as a bound variable — crucially without reference to first person —, and a second part that is determined by context, — crucially without evoking a plurality interpretation for this second component of meaning. It is shown that this interpretation exactly mirrors the make-up of morpho-syntactic features and follows from our basic assumption without additional stipulation.

2 The Minimalist Challenge

According to the Minimalist Program morpho-syntactic features must be checked by the computational system if and only if they cannot be interpreted at an interface. By interface interpretability, Minimalists normally mean something like LF-interpretation, *ie.* relevance for semantics.¹ Thus, the starting point of our investigation can be formulated as in (1) and (2):

- (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 an interface (= it has a **semantic interpretation**).

What I want to discuss in this essay is a number of problems with this claim, inter alia the following:

- Syntacticians usually don’t specify semantic interpretations
- We therefore don’t have a precise account of what it means to be “interpretable” (in the Minimalist’s sense of the notion)

¹This way of interpreting interpretability seems to be standard practice; it also transpires from inspecting textbooks on Minimalism, eg. David Adger’s *Core Syntax*. Using the abbreviation I-Feature for interpretable features, Adger (2004) states that “I-Features are preserved for the conceptual interface where they participate in the process of semantic interpretation”. Note that “conceptual interface” is the current term for LF, which strictly speaking cannot exist in Minimalist theorizing as a separate level of representation. Nonetheless I will occasionally use the term LF without theoretical commitment.

- In standard model theoretic semantics, many features that need not be checked according to syntactic criteria (eg. Φ -features on DPs like 3rd person, singular) lack any explicit interpretation
- features, if interpretable at all, may not always have the interpretation one might expect

Our discussion of these problems is organized as follows:

- First, I will illustrate the connection between checking and interpretation by way of an example
- Next, I will give some criteria for what it means to be an interpretable feature
- I then go on to illustrate some potential problems for the Minimalist theorem, pointing to examples where features do not have the expected interpretation
- In order to solve this problem, a number of proposals concerning the use and interpretation of features will be combined
- Finally, as a testing ground for the proposals made in this paper, I'll discuss a particularly challenging case of compositionality of feature interpretation, namely the problem of partial binding (which I will call Rullmann's problem in the remainder)

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

3 Feature Checking and Interpretation

Let us illustrate the connection between interpretation and checking with a simple example from German:

- (3) $[\text{DP Ich}_{1ps,sg,nom}]$ *helf*- $e_{1ps,sg}$ $[\text{DP den}_{3ps,pl,dat}$ *Kind-er* $_{pl-n,dat}]$
 I help the children

Following the tradition of GB-theory, the Case feature of a DP has to be “checked” or “assigned”. Accordingly, *den Kindern* has to be checked for dative Case by the verb *helfen*. Following Minimalist assumptions, Case is uninterpretable, which means that all Case features must be checked. This is consistent with the fact that *helfen* governs dative Case, where government involves some kind of checking. We represent this by assuming that there are two types of features $[\alpha]$ and $[\ast\alpha\ast]$ that enter a checking relation to each other within an appropriate syntactic configuration (traditionally something like government, m-command or spec-head agreement). Thus, checking of the dative is to be represented by an appropriate feature on the stem of the verb:

- (4) $[\text{DP Ich}_{1ps,sg,nom}]$ *helf* $_{\ast\text{dative}\ast}$ - $e_{1ps,sg}$ $[\text{DP:dative den}_{3ps,pl}$ *Kind-er* $_{pl-n}]$
 I help the children

The checking of dative within the DP is a kind of agreement relation that will not concern us here (cf. Sternefeld (2006), chapter II, section 2).

As with all structural Cases, nominative is also uninterpretable, ie. has to be checked. The traditional assumption here is that Tense/INFL determines the distribution of nominative Case; accordingly, it is assumed that INFL checks nominative.

- (5) $[\text{DP Ich}_{1ps,sg,nom}]$ *helf* $_{\ast\text{dative}\ast}$ - $e_{1ps,sg,\ast\text{nom}\ast}$ $[\text{DP}_{\text{dative}} \text{den}_{3ps,pl}$ *Kind-er* $_{pl-n}]$
 I help the children

Turning now to number features, it is standardly assumed that plural morphology on a noun is an I-feature. If this property is inherited by the entire DP, as seems natural, then it follows

that the plural feature of the dative-object need not be checked, which is consistent with the generalization that the number marking is irrelevant for the syntactic distribution of the object. On the other hand, this seems not to be the case for the number marking of the subject, which agrees with the number marking on the verb. Given that the number feature on a subject has the same status w.r.t. interpretability as the number feature on the object, there is no need to check these features, and something additional has to be said about agreement and the agreement features of the verb. A plausible assumption here is that the plural feature on the verb is an uninterpretable feature. From this we can immediately derive the agreement facts, because the plural marking on the verb needs to be checked, and this is achieved by entering into a checking relation with the subject. This can be implemented by reinterpreting the features of the verbal morphology as features of type $[\ast\alpha\ast]$; agreement can then be seen as a “concomitans” of Case checking, as already proposed in Chomsky (1981):

- (6) $[\text{DP Ich}_{1\text{ps,sg,nom}}]$ help _{$\ast\text{dative}\ast$ -e $\ast 1\text{ps,sg,nom}\ast$} $[\text{DP}_{\text{dative,pl}}$ den Kind-er-n]
 I help the children

Checking takes place in a very local checking configuration, basically sisterhood, and features are allowed to project along their projection lines. Furthermore it is assumed that morpho-syntactic features are either interpretable or uninterpretable, tertium non datur. Within the system developed in Sternefeld (2006), all features of the form $[\ast\alpha\ast]$ are uninterpretable, whereas there is a fundamental choice concerning features of the form $[\alpha]$ —these may be uninterpretable, as with Case features illustrated above, or may be interpretable, as with the number features of the DPs.

The same considerations that hold for number also apply to person: as there is no syntactic reason to check person features on an object, these are assumed to be interpretable, as also seems natural with the first person feature of the subject in (6).

In what follows, I will concentrate on features of entire DPs. This restriction avoids certain further complications that may arise from DP-internal agreement (or lack thereof), eg. the question of where exactly plural morphology has a direct effect on semantic interpretation: either on the determiner of a DP, or on the NP, or on both.²

4 Conditions on Interpretable Features

Given the one-to-one correspondence stated in (1) and the fact that Minimalists are syntacticians, the main (empirical) criterion for interpretability is syntactic. This leaves the question of whether the semantic impact of (1) or (2) can be substantiated in an interesting way; in particular, we have to ensure that the claim is not circular or empirically void of any content. This might indeed happen, if one were to interpret a feature as some kind of identity function; such an “interpretation” has of course to be excluded, since it would amount to saying that the feature has no interpretation at all. What we want to exclude is technical tricks which tend to undermine the empirical strength of the Minimalist Theorem. As it turns out, excluding nonsense in a precise way is not at all straightforward; one proposal I have to offer towards that end is the following:

²Eg., it has been claimed that number has no semantic effect on the determiner “the” in English, which has a uniform semantics for both singular and plural DPs. This would give priority to number interpretation on the noun. On the other hand, there are languages like Hungarian where number words (like “five”) would combine with a singular (as in: five child, rather than five children), giving semantic priority to the determiner (or, for that matter, the number expression). I leave it open what the consequences of these observations should be, ignoring the internal make-up of DPs and restricting myself on pronouns, ie. intransitive DPs.

- (7) An interpretable feature *F* must be *non-trivial*, ie. the meaning representation of *F* in standard logical notation must contain (at least) one non-eliminable, non-logical constant.

Our aim is to ensure that a feature has real semantic content, that is, some sort of descriptive rather than merely grammatical content. Given that identity is part of logic (with identity), the copula in Montague's PTQ has a very complicated but trivial meaning, and so have various type-shifting operations proposed in the literature. A well-known counterexample to interpretability is Karttunen's Wh-operator (the Q-operator that resides in COMP), which is trivial (ie. uninterpretable) in the sense of (7) because its main purpose is to type shift a proposition *p* to the set {*p*}. This "uninterpretability" in the narrow sense is consistent with the syntactic claim that the Q-operator must be checked against some wh-phrase in SpecC.

Turning next to wh-pronouns themselves, it is undeniable that these pronouns need a feature, say +W, to distinguish them from other pronouns. But is this feature interpretable? This seems to be a non-trivial question. An answer is provided by the following conditions on "interpretable" features:

- (8) An interpretable feature *F* of a lexeme *L* must be *essential* for the interpretation of *L*, ie. there is no other lexeme *L'* without *F* but with the same meaning as *L*.

Somewhat surprisingly, this condition is not met by wh-pronouns. In the standard semantics of Karttunen (1977), the word *who* bears the same meaning as *someone*, see (9-a). The descriptive meaning might still be something like "person". But if *who* carries a wh-feature, but *someone* does not, while the meaning of the two is the same, the wh-feature is not interpretable according to (8), as the wh-feature cannot contribute anything to the meaning of the word. The same holds if one were to interpret the wh-word as a definite term as in (9-b):

- (9) a. *who* = wh + *someone*; *what* = wh + *something*; see Chomsky (1964), §2.2 semantics = *who* = *someone*; *what* = *something*; see Karttunen (1977)
 b. *who* = wh + *he* (or German: *wer* = w + *er*); cf. Chomsky (1955), pp. 435ff and Chomsky (1957), p. 69;
 Semantics: *wer* = *er/who* = *he* in Groenendijk and Stokhof (1982)

Due to the violation of (8) it has to be concluded that the wh-feature of wh-words are not interpretable in standard semantics. And even in certain non-standard semantics, this still holds true: In the categorical grammars of Shan (2002) or Barker (2007), a question word like *who* does not have any meaning at all, or just a trivial meaning as an identity function: a wh-element defines a hole within an open proposition. Thus, it follows, that within such an interrogative theory, a wh-feature does not have any meaning either, because its only contribution to the meaning is void, formally the identity function $\lambda x.x$.³

This result is consistent with the observation that has often been made since Ross (1967), namely that not only has there to be an intimate relation between a moved wh-phrase in SpecC and the head C of an interrogative clause, but also must there be restrictions on wh-in-situ. This was still part and parcel of the ECP, but has, under the influence of Reinhart (1992), been largely ignored in Minimalist phase theory. I take non local but grammatical wh-in-situ (as exemplified

³Another non-standard theory is Beck (2006) who factually interprets wh-words as focus alternatives. The wh-interpretation thus becomes identical to the focus interpretation, which means that it introduces "alternatives". Here again one might ask whether this is a trivial operation in the sense of (7). My tendency is an affirmative answer, as the actual semantically relevant operation for the interpretation of focus is not anchored in the focus feature itself (or, for that matter, in a wh-feature), but in focus operators, which are interpreted as the lexical content of totally different morphemes, namely as part of focus sensitive operators.

by Reinhart) as a challenge for Minimalism that has to be taken up rather than be ignored.

One way out of the dilemma would be the claim that the same words might be ambiguous between one version with and one version without a (potentially offending) feature. In the case at hand one might claim that certain *wh*-in-situ phrases might have interpretable features, but other occurrences of the phrase don't. I think that this is cheating again, and some principle should be formulated to block such a strategy. I therefore propose to adopt the following *Uniformity Condition* on feature use and interpretation:

- (10) There can't be two homophonous lexemes that differ only with respect to presence or absence of interpretable features.

Intuitively, we would not allow for the same word having *F* in one syntactic context but lacking *F* in another. Or, if it does, the feature is purely syntactic, ie. uninterpretable.

A final issue concerns compositionality. Here the question might arise whether it would be possible to interpret a feature isolated from the interpretation of the entire word to which the feature is attached. This is the issue of compositionality. We might therefore define:

- (11) Interpretability is *compositional* iff the reference/meaning of a word *W* is a function of the meaning of its features (and the mode of their composition).

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

- (12) $\llbracket W \rrbracket = \llbracket F_1 \rrbracket (\llbracket F_2 \rrbracket (\dots (F_n) \dots))$, with F_i being interpretable features of *W*.

We will see below that compositional interpretation is a problem for Φ -features. (One might thus call 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 alone.)

As an illustration, we might look at *wh*-features again. As Irene Heim (1994 in an unpublished script on interrogative semantics) has shown, the *wh*-feature of a question word can be interpreted compositionally; the required division is shown in (13):

- (13) which student = [Wh-Operator [a student]]

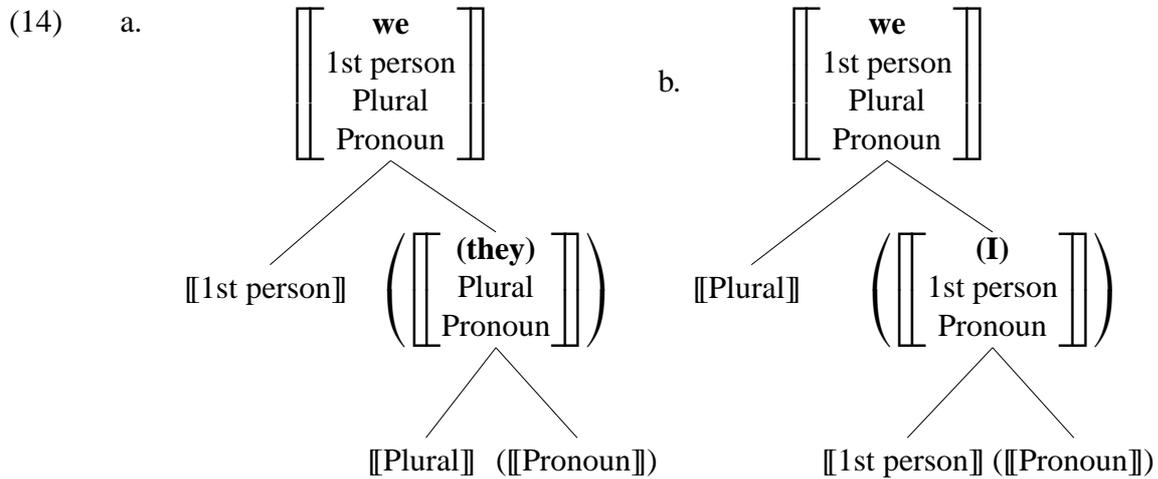
Note that we have separated the *wh*-feature from its origin *which*, attaching it to a phrase rather than to a word. In what follows, I will ignore such matters of Logical Form entirely, assuming that features can be inherited by phrases, and having reached that level, phrases should behave exactly on a par with words.

Given this, Heim interprets the *wh*-operator in (13) as a function carrying out a semantic raising operation on *a student* which converts the meaning of *a student* into a type theoretic entity that allows *a student* to apply to sets of propositions (the meaning of a proto-question in Karttunen's system) rather to one proposition alone. Unfortunately, however, such an operation is a mere type shifting operation that serves a purely grammatical purpose, namely enforcing of LF-movement of *a student*. Note that the very same effect could as well be achieved within syntax alone, namely by stipulating a syntactic transformation, without resort to a *wh*-operator as in (13). In the sense of (7), then, the *Wh*-operator is arguably a trivial one, leading to the conclusion that any kind of *wh*-features is not really interpretable.

This conclusion, namely that the syntactic apparatus that treats question formation is not really interpretable, shouldn't come as surprise: Viewed from a compositional point of view, something should be **added** by an interpretable feature. However, from a purely formal point of view, the semantic of a question does not add anything substantial but rather implies **lessening**

of information: a proposition with gaps (which can also be encoded as a set of possible fillings) provides less information than a complete proposition. Doesn't the question as such then consist of the requirement to fill this gap? The semantics of the question, however, does not provide this "meaning" in any way. It does not encode the illocution itself.

A more relevant case of compositionality is the features of normal personal pronouns. For example, one could speculate that a pronoun such as *we* can be decomposed into separate individual meanings, as shown in (14-a) oder (14-b):



I will illustrate a semantic system of such kind in section (12).

5 Some Problem Cases for Interpretability

In this section I am concerned with number and person features of pronominal DPs. These are usually considered to be interpretable. But now consider the following example from German:

- (15) Man_i respektierte einander_i
 One expects each other

The problem here is the following: the pronoun *man* agrees with the verb which exhibits third person singular; however, given the syntactic context it is clear that binding a reciprocal implies a semantic interpretation as a plural entity, hence we might see a mismatch here between a singular feature and a plural interpretation.

Observe also that in terms of Binding theory, co-indexation implies feature agreement. This is not really problematic: there is no evidence that the reciprocal is morphologically a plural. But if it is a singular then we observe another mismatch between morphology and semantic interpretation.

Another type of mismatch can be observed in English, but not in German:

- (16) a. *Each informant* thus effectively creates **their** own scale as **they** give additional judgments (cited from Featherston (2007))
 b. *Some student* left **their** umbrella (cited from Johnson (2004))
 c. The author *themselves* probably knows no more of the language than exactly this point which **they** have taken from a descriptive grammar (Featherston op. cit.)

On the one hand, the plural on the pronoun may serve as a strategy to avoid gender; on the other hand, it signals a potential extension of the domain of reference in the sense of Kadmon and Landman (1993) (for a recent discussion, see also Chierchia (2006)).

Plural forms of politeness, also called *pluralis reverentiae*, are traditionally regarded as another case of conflict. In German, the change from *du* (you_{sg}) to *Sie*_{3.ps.,pl} illustrated in (17)

- (17) Wie geht es **Ihnen**_{3.ps.,pl}?
how are it you?

not only involves a shift from singular to plural (as expected from languages like English or French), but also a change from 2nd to 3rd person (*Sie* instead of **ihr*_{2nd,pl})⁴. The next example (18) illustrates that the form of politeness *Sie*, while morpho-syntactically a plural, is still semantically a singular, as evidenced by the singular relative pronoun in (18):

- (18) Meiner Ansicht nach sind_{pl} **Sie**_{pl} es, **der**_{sg/*die}_{pl} meine Rechte überhaupt
My opinion according-to are you it who my rights PRTCL
erst verletzt hat_{sg/*haben}_{pl}
PRTCL violated has

The relative pronoun is not in agreement with the morphosyntactic features of *Sie*, but must be construed *ad sensu*, showing that referentially (ie., in the sense of reference semantics) the addressee is clearly a singularity.

A shift from a (referentially to be expected) 2nd to 3rd person can also be found in old-fashioned forms of address.

- (19) Komm **er** bitte her!
Come he please here!

A similar case is the usage of 3rd person Mr./Mrs. in place of *I*. An example has (unintendedly) been provided to me by Mrs. Egger, the hostel warden of the university's guest house in Oberjoch, who, when talking to my children, referred to herself by name:

- (20) “Die Frau Egger sieht das aber überhaupt nicht gern. . .”
The Mrs. Egger sees/tolerates this but not at all ???

These usage of 3rd person in (19) and (20) conflicts with the opinion generally supported in the literature that the 3rd person meaning consists of the requirement that a reference to the speaker or listener is excluded.

As illustrated in (21), the shift from singular to plural can also be observed on the verb alone, without agreement with the subject, in a register of German sometimes called waiter's German (Kellnerdeutsch):

- (21) a. Was **wünschen** der Herr Leutnant? **Haben** der Herr schon bestellt?
What wish_{pl} the Sire Leutnant? Have the Sire already ordered?
b. Grüß Gott, **wünschen** noch jemand Kaffee oder Teeeee?
Grüß Gott, wish PRTCL anyone coffee or tea?
(Uttered by a Bavarian waiter of a service trolley in the ICE train from München to Stuttgart)

With regard to the problem of interpretability, one might argue that (21) poses no real problem, as the plural of the verb, as often assumed and argued for above, is not semantically interpreted, hence irrelevant for our main question.⁵ Nonetheless one might argue that it is precisely this

⁴Compare also a theory which seems to be incompatible with this additional shift, cf. Wechsler (2004)

⁵This must not be confused with the fact that there may well be a semantic operation of pluralization which operates on the verb or on a verb projection (cf. Sternefeld (1998)), so that one might argue that plural is at least

function of expressing politeness which does in cases like (21) add to the semantics/pragmatics interface, and that it is precisely this kind of interpretability which makes it possible to violate agreement: recall that it is precisely the non-interpretability of ordinary agreement markers on the verb that lead to checking and agreement, but assuming now that the verbal plural feature in (21) has somehow acquired an interpretation, namely that of politeness, the feature would indeed be interpretable, and thus need not be checked against the subject. Therefore the apparent lack of agreement can be tolerated; in fact it is predicted by the theory under investigation.⁶

Turning now to a different case of conflict, it is often observed that academic works allow for a shift from *I* to *we*, the *plural modestiae*, as in:

(22) In this article, we have shown that . . .

Presuming the concept of a *literal* meaning, the question arises how this literal meaning can be reconciled with the fact that, referentially, corresponding to *we* there is only a singularity, namely the one and only author of the article. I will turn to an explanation of this further below.

A final but central problem for interpretability is illustrated in (23):

- (23) a. Only you are aware of **your** secrets
 Semantic analysis: Everyone else except you is aware of **his** secrets
 b. 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

The problem illustrated in (23-f,g) is that 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 (10), this should be impossible.

There are two types of solutions 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. Against these proposal, I would like to raise the following 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: This kind of manipulating features is totally ad hoc when it comes to give an account of Rullmann's problem, a problem I will discuss further below in section 9

in some sense interpretable even when attached to the verb. The point is, however, that such an operation cannot be the reflex of a morphological operation (nor that of a feature) on the verb. This becomes immediately obvious when taking into consideration the fact that this operation can also be triggered by plural objects without there being any morphological verb-object-agreement in German.

⁶I refrain from discussing the notion of interpretability the above explanation presupposes; it's probably not compositional semantic interpretation that is at stake here, but a somewhat more global pragmatic mechanism. Observe also that we are still dealing with conventional meaning in specific constructions; it is not the case that plural in general could express politeness. No beauty surgeon would be very polite with uttering (i):

- (i) Sehr geehrte Frau Meier, ich würde Ihnen raten, das Fett ihrer **Bäuche** absaugen zu lassen
 Very honorable Mrs. Meier, I would to-you suggest the fat of-your bellies suck-off to let

6 Solutions

6.1 Overview

Note that the problems we sorted out in the last section can be classified into two types: One is that the interpretation of an alleged feature is not the usual one, the other is a subcase, namely the lack of any interpretation of the feature. In order to solve these problems I would like to suggest that we need at least five components that must interact in a well-defined manner. The five ingredients are the following:

- 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**

The first three points will help to explain why certain expressions have unexpected interpretations: here we will argue that either the semantics also differs from what is naïvely expected, or the unexpected property of the offending expressions is that they lack the offending features. This will be captured by an elaboration of the first two ingredients where it is shown that the grammatical system is much more unrestricted than one would expect, leaving room for all sorts of (unexpected) interpretations. The main work then has to consist in explaining why the otherwise expected interpretations nevertheless prevail; this is part of pragmatics, and we also need purely syntactic restrictions on anaphora, which is addressed in point 3 and 4 above. We then turn to the case of bound variable pronouns whose features are not interpretable, showing that this follows from an appropriate definition of interpretation of pronouns. In a final section then we show that all these ingredients must interact in order to solve Rullmann's problem.

6.2 Morphology

Our explanation for the mismatch between morphology, syntax and semantics rests on two assumptions, firstly that unmarked forms like 3rd person singular do not have any features that would contradict interpretability, and secondly that the interpretation of morphologically plural forms include semantically singular objects, that is, non-pluralities or individual. Let me begin with the first assumption.

As many traditional grammarians do, I assume that the 3rd person is unmarked, i.e., there is no such feature as 3rd person in the morphological system of German, and the same holds for the singular.

- (24) Nowhere in the morphology of German do we need features like [SINGULAR] or [3RD PERSON]

The point, which has to be established for the grammatical system as a whole, is that singular and 3rd person can be taken as default values, so that all relevant forms can, and in an optimal system in fact must, be featureless. In particular, we claim that all forms of the verbs or adjectives let themselves be characterized in such a way that we can still define the relevant natural classes without making use of the unmarked feature values. This is indeed the case in German (cf. Sternefeld (2006), chapter 1), and I would like to illustrate the claim on the basis of the verbal inflection in (25). All exponents of the finite inflection are characterized by different sets of features, namely the privative features for plural [+pl] and for first and second person [+1]

and [+2]. The feature system is given in (25), the entire paradigm for a weak verb, exemplified by *glauben* (believe), is shown in (26):

- (25)
- /t/ = [+pl,+2]
 - /en/ = [+pl]
 - /st/ = [+2]
 - /e/ = [+1,+Ind,+Präs]
 - /t/ = [+Ind,+Präs]
 - /Ø/ = []

(25) contains a complete list of inflectional person/number exponents of German. The stem form of the verb in (26) is *glaub-*; the exponents in the indicative present differ from all other tenses or moods only in the 1st and 3rd person, otherwise the exponents are as shown in (26) for all other tenses and moods. As an example for a form which is not indicative present, I have chosen the praeterite (or preterit), which is formed by adding *-te* to the weakly inflecting stem *glauben*.

(26)

		[+IND,+PRÄS]		sonst		
	[+1]	ich	glaub	e	glaub-te	Ø
	[+2]	du	glaub(te)			st
		er	glaub	t	glaub-te	Ø
[+PL]	[+1]	wir	glaub(te)			en
	[+2]	ihr	glaub(te)			t
		sie	glaub(te)			en

Looking first at the features in (25), an exponent like /en/, for example, does not have a feature for person; at the same time, though, an interpretation of /en/ as second person (plural) is excluded by the *elsewhere condition* (cf. Kiparsky (1973)), as there is a more specific feature combination for this, namely /t/ in the first row of (25). Everything follows a default logic that says that in a specific context the more specific forms have to be chosen if possible in that environment. Moreover, the marked features, here the plural feature, has to be considered first, i.e., has to be given preference when competing with unmarked forms. This is reflected in the ordering of morphemes in (26), where the plural forms precede the singular forms. The mechanism that transforms (25) into (26) is therefore as follows:

Assume that the chart in (26) initially does not contain any exponents. Then take the topmost features and fill in the exponent where the features fit into the chart in (26). If a cell is already occupied, don't erase the exponent already in the cell, simply ignore the cell. After filling in the exponent, remove the exponent from the list and look at the topmost feature of the remaining list and start again.

This works because we adhere to a logic of ranking and default, and we assume that this also accounts for the syntactic mechanism of agreement. This means that lack of agreement is not always sorted out by the feature checking mechanism, but also by a blocking mechanism that prefers marked and more specific exponents over unmarked underspecified forms.

This much said it is easy to see that

- 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 (15), although being lexically 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!
- 3rd person pronouns like *er* (=‘he’) must not necessarily be interpreted as having 3rd person reference = different form addressee and speaker

Let us now turn to another instance of the problem of unexpected interpretations, namely the deviant interpretation of plural terms.

6.3 Plural Semantics and Pragmatics

Consider:

- (27) 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

As this well-known example shows, the reference of plural terms also includes atoms/singularities, as argued for by Schwarzschild (1996) and others. What are the consequences of this assumption?

- The choice between singular and plural forms is largely a matter of pragmatics, cf.:

(28) 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)
- Since plural and singular variants may have identical reference, the preference for more indirect ways of conveying meaning is by and large conventionalized (politeness, distance, rudeness etc.)
- 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 (which now becomes 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 provisionally subscribe to Horn’s division of pragmatic labor:
 (morphologically) unmarked form = unmarked semantics

In general, then, pragmatics conforms to the Strongest Meaning Hypothesis, unless the strongest meaning is incompatible with context (knowledge, common ground etc.). That is:

- A singular form interpreted as “Atom” is stronger than a plural form interpreted as “Sum + Atom” (inclusive plural)
- A plural interpreted as “Sum” (exclusive plural) is stronger than interpreted as “Sum + Atom”
- Weakening in (29-b) is justified as a consequence of ignorance; weakening as in (29-c), however, is disallowed.

- (29) a. There are children in the garden
 b. Are there children in the garden?
 c. #Do you have M.A.-degrees?

There is no space here to discuss this in detail, let me point out, however, that dependent plurals still pose a problem in the domain of nominal plural markings. To illustrate the problem, imagine a German school class and a teacher who says to his pupils:

(30) Take out your Geography books! (Nehmt eure Erdkundebücher!)

Since each pupil has only one book, he could as well have said

(31) Nehmt euer Erdkundebuch_{sg}

In fact, I see no semantic or pragmatic difference here between singular and plural. This seems problematic for any approach based on preference principles: as I cannot detect any strong preference in favor of any form, this must be left as an open problem for pragmatics.

6.4 Feature Sharing: A Grammatical Restriction

The above example (31) does not imply that there is only one book in class; this is because the possessive pronoun may be interpreted as being bound by a distributive operator, and the same also holds for examples like:

- (32) 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 (32-c) is ungrammatical. We therefore need an additional **grammatical restriction**:

(33) Failure of agreement of ϕ -features must, if possible, be interpreted as disjoint reference.

This implies that the shift from plural to singular, although semantically legitimate and pragmatically consistent, must be ruled out. The same also holds for the shift from second to third person in (34):

(34) *Only you_i are aware of **his**_i secrets

A problem, however, seems to remain. As already pointed out above, the pronoun corresponding to *you* in (35) is a politeness form with plural morphology, but the relative pronoun is in the singular:

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

Wouldn't we expect agreement between the relative pronoun and the head-DP, since both refer semantically to singularities? Perhaps we need additional restrictions to the effect that the deviance in form connected with politeness is restricted to personal pronouns and cannot carry over to relative pronouns. This means that relative pronouns always construe *ad sensu* and can be made exempt from agreement. At present, it is unclear to me how this could follow from more general principles or conventions.

7 Bound Variable Pronouns

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

The solution I can offer is that this property of feature ignorance should be built into the semantics of (bound variable) pronouns and therefore can to be accounted for in a purely semantic way. Such an entirely semantic approach necessitates a purely semantic treatment of binding as provided by the textbook of Heim and Kratzer (1998) that allows a semantic way of saying that a pronoun is bound or free. In H&K, variable assignment functions g operate on finite domains 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 $x_i \in \text{Domain}(g)$, but $x_i \notin \text{Domain}(g')$. Evaluation of a sentence starts with an empty assignment function.

Formally this amounts to the following:

- (36) a. $\llbracket \forall x_i p \rrbracket_g = 1$ iff $x_i \notin D(g)$ and $\llbracket p \rrbracket_{g'} = 1$ for all minimal extensions g' of g such that $x_i \in D(g')$.
 b. $\llbracket x_i \rrbracket_g = g(x_i)$ iff $x_i \in D(g)$, undefined otherwise

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

- (37) a. A pronoun is bound iff its translation x_i is in the domain of an assignment function.
 b. Otherwise (ie., if there is no antecedent), x_i can only be interpreted by the context c : We assume that c is defined for x_i iff g is undefined for x_i .

These definitions imply that pronouns cannot be interpreted without an index. For the German singular pronouns *er* (he), *ich* (I), and *du* (you_{sg}) we thus get the following definitions:

- (38) a. $\llbracket er_i \rrbracket_{g,c} = \llbracket [\text{PRON}, i] \rrbracket_{g,c} = g(x_i)$, if g is defined for x_i , and the most salient singularity in c otherwise
 b. $\llbracket ich_i \rrbracket_{g,c} = \llbracket [\text{PRON}, +1, i] \rrbracket_{g,c} = g(x_i)$, if g is defined for x_i , and the speaker in c otherwise
 c. $\llbracket du_i \rrbracket_{g,c} = \llbracket [\text{PRON}, +2, i] \rrbracket_{g,c} = g(x_i)$, if g is defined for x_i , and the hearer in c otherwise

These definitions immediately raise a number of questions. For one thing, we may ask whether +1 and +2 can be given a compositional interpretation. Formally, this seems impossible in the present framework, because the interpretation needs to know whether the features are relevant, and this means that we need an index which encodes whether g or c should be used for interpretation. Compositionality can be regained, however, if indices become part of the object language, a matter we cannot discuss here (cf. Sternefeld (2001)). A more compositional semantics along these lines would be the following:

- (39) a. $\llbracket er_i \rrbracket_{g,c} = \llbracket er \rrbracket_{g,c} (\llbracket i \rrbracket_{g,c}) = \llbracket [\text{PRON}] \rrbracket_{g,c} (i)$
 b. $\llbracket [\text{pron}] \rrbracket_{g,c} = g \cup c$ (recall that the domains of g and c are disjoint)
 c. $\llbracket [+1] \rrbracket_{g,c} =$ that function f such that $f(g \cup c)(i) =$ the speaker in c if $i \in \text{Domain}(c)$ and $g(i)$ otherwise.
 d. $\llbracket [+2] \rrbracket_{g,c} =$ that function f such that $f(g \cup c)(i) =$ the hearer in c if $i \in \text{Domain}(c)$ and $g(i)$ otherwise.

Another option is duplication or spreading of the index, to which I will return in section 9.

Another issue is the division of labor between *g* and *c*. Before going into this, let me illustrate (39) by discussing the following example.

- (40) Only I knew that **I** would win
 a. noone else knew that **I** would win (referential reading of 2nd occurrence 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 ambiguity is presented by (41):

- (41) 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 occurrence of “I” is the focus of *only*:

- (42) a. $\text{Only}_C ([I_j]_{\text{FOCUS}} \in \{x_k: x_k \text{ knew that } I_j \text{ would win}\})$ (I_j interpreted as $c(x_j)$)
 b. $\text{Only}_C ([I_j]_{\text{FOCUS}} \in \{x_k: x_k \text{ knew that } I_k \text{ would win}\})$ (I_k interpreted as $g(x_k)$)

Rooth’s focus semantics of “only”:

- (43) For none of the contextually relevant alternatives *y* to I_j in *C* it holds that $y \in \{x_k: x_k \text{ knew that } I_{j/k} \text{ would win}\}$

The key to the solution here is that the relevant binder for the pronoun is not, as one might have suspected, the operator *only* but still the pronoun I; this method presupposes double indexing, a standard way of representing and analyzing the ambiguity (cf. Reinhart (1983) and Heim (1993)).

One might object that the proposed solution, using a conditional in the truth conditions, is in fact ad hoc, because it stipulates a kind of ambiguity that should not exist. My reaction is that there is in fact an ambiguity that is lexically resolved in other languages, eg. East Asian Languages, as shown below (courtesy to Yasuhito Hosaka for providing me with the Japanese examples (45) and (53)):

- (44) Only $\text{John}_{i,j}$ hates himself $_{i/j}$
 a. There is no *x* except John who $_j$ hates x_j (bound variable reading BVR)
 b. There is no *x* except John who $_x$ hates John_i (referential reading RR)
- (45) a. Jiro-dake-ga zibun-o nikunde-iru ($\sqrt{\cdot}$:BVR, $?^*$:RR)
 Jiro-only-nom self-acc hates
 b. Jiro-dake-ga kare-zisin-o nikunde-iru ($\sqrt{\cdot}$:RR, $?^*$:BVR)
 Jiro-only-Nom he-self-Acc hates

We will see below that this lexical disambiguation is replicated and thereby confirmed when turning to Rullmann’s problem.

What is missing up to now is an analysis of the plural, which of course raises the question of how this feature could be integrated into the analysis in a compositional manner.

8 Compositionality and Decomposition

8.1 Plural and Compositionality

Let us adopt the following conventions:

- $g(x_i)$ and $c(x_i)$ denote singularities in the domain of entities D_e ,
- $g(X_i)$ and $c(X_i)$ denote (possibly “improper”) pluralities in $D_{\langle e,t \rangle}$ (sets or singletons)
- for each index i , either $g(\alpha_i)$ or $c(\alpha_i)$ must be defined.

We can now define the denotation of the plural pronoun *they_i*, having the features in (46):

- (46) [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.

Accordingly, a singular pronoun is interpreted as $c/g(x_i)$, whereas a plural pronoun is interpreted as $c/g(X_i)$. Observe that the reference of bound plural variables is not restricted to pluralities; technically, a non-plural bound variable reading arises from enforcing an interpretation of a plural variable by restricting possible values to singularities, as in the distributive interpretation of *John and Mary believe that they would win*:

- (47) $\forall x \in \{\text{John, Mary}\} : \lambda X [X \text{ believe, that } X \text{ would win}] (\{x\})$
 with $\llbracket x \rrbracket \in D_e$ und $\llbracket X \rrbracket \in D_{\langle e,t \rangle}$

We thus exploit the idea that each individual (each *Urelement*) x corresponds to a singleton set containing x , a correspondence that is implemented as identity in the set theory of Quine (1980) and its application to plural semantics in Schwarzschild (1996).

Returning to the issue of compositionality, we argued above that +1,+2 cannot be interpreted compositionally unless the interpretation has access to an index. Assume now that the index can spread, ie. can be duplicated, so that 1st or 2nd plural is actually the result of set theoretical union of the sets in (48):

- (48) a. $[+1, \text{PL}, \text{PRON}, i] = [+1, i] \cup [\text{PL}, \text{PRON}, i]$
 b. $[+2, \text{PL}, i] = [+2, i] \cup [\text{PL}, \text{PRON}, i]$

For the purpose of compositionality, we thus have the following elementary units at our disposal:

- (49) [PRON, i],
 [PL, PRON, i],
 [+1, PL, PRON, i]
 [+2, PL, PRON, i]

Now, a more compositional semantics for +1 and +2 can be formulated by assuming, that person features introduce the following presupposition:

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

From the point of compositionality, +1 and +2 now operate on [PRON, i] and on [PL, PRON, i], presupposing some flexibility of logical types. I think that this is furthest we can go without taking indices into the object language itself.

At this point one might wonder how the spreading of the index might be motivated. I will present a partial answer to this question by analyzing what I called Rullmann’s problem.

9 Rullmann's Problem: Partial Binding

Indirect evidence for a mechanism like spreading can be derived from the interpretation of pronouns that involve more than one index. This is the case in certain examples that require the pronoun being split up into two components that bear their own index. The compositional make-up of the pronoun can then be assumed to result from set theoretical union, a device that seems to be independently justified. Let us look at the relevant examples.

- (51) 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)

As revealed by the paraphrases, the bound variable reading seems to split the interpretation of *us* into a referential meaning and a bound variable meaning!

In Korean and Japanese (thanks to Shin-Sook Kim for providing me with the Korean example (52)), the ambiguity is nicely resolved by using referential and bound variable pronouns in a totally exceptional way. Whereas in ordinary uses of the reflexive, there is no plural marker because the form is neutral with respect to the distinction (as is *sich* in German), we do find an additional plural marker on the reflexive in the partial binding construction:

- (52) 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.'
- (53) a. Kimi-dake-ga kimi-tachi-ga kekkon suru koto-wo nozonde-ita
you-only-nom you-pl-nom marry that-acc wanted
- b. Kimi-dake-ga zibun-tachi-ga kekkon suru koto-wo nozonde-ita
you-only-nom self-pl-nom marry that-acc wanted

How can we account for this? My proposal is to split up both the meaning and the feature bundle of *us* in such a way that the result is the union of interpreted features:

- (54) $[+1, +PL, PRON, i, j] =$
 $[+1, PRON, i] \quad (= x_i = \text{bound variable})$
 $\cup [+PL, PRON, j] \quad (= X_j = \text{free variable})$
 Semantik interpretation:
 $[[+1, PRON, i] \cup [+PL, PRON, j]] = [[+1, PRON, i]] \cup [[+PL, PRON, j]]$

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 \cup in (54)).

This works systematically with all other feature combinations, cf.

- (55) 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

For further discussion of the data, see Rullmann (2004).

10 Conclusion

Having shown for the cases under consideration which assumptions enable us to adhere to the Minimalist principle, one further result of the present discussion is that, if our theory is on the right track, other theories that implement unmarkedness and interpretation in a totally different way, cf. in particular Sauerland (2003); Sauerland et al. (2003), and which therefore are inconsistent with the present explanations, could well be wrong or misguided.

Nonetheless, I remain skeptical concerning the general validity of the claim. Still many problems remain. Eg., we didn't yet mention gender in German which is, from an ontological perspective, uninterpretable when attached to nouns. This problem can be argued to be harmless, when nouns always have a DP-shell, so that gender agreement with a determiner safes the connections between checking and uninterpretability. It therefore remains to look at gender on pronouns, which are intransitive determiners whose gender feature can therefore not agree with that of an NP and which therefore should be "interpretable" without having a straightforward semantic interpretation. I concede that the interaction with the interfaces might yield a highly context dependent pragmatic function of gender as a means to disambiguate coreference. How this is to be integrated into interpretability has still to be worked out.

Something similar holds for tense and aspect in the verbal domain. Although the many parallels between tense and pronouns might lead one to expect that the problems could be resolved along similar lines (cf. Partee (1973))⁷, the kind of context dependence on interpretation is not always that of bound variable pronouns. Let me mention briefly two examples. Modals in German are inflected as if they had the feature praeterite, and historically this conclusion is well supported. Yet this feature has lost its semantic interpretation in modern German: the actual interpretation is present tense. Likewise, conjunctive II forms in German can be argued to be past forms, yet their interpretation is present tense irrealis, rather than past. This again is a shift of interpretation depending on context, but perhaps not one that could be described by merely looking at the semantic environment that induces such an interpretation. Although it would be trivial to say that certain features receive a certain context dependent interpretation (depending on other features of the stem), such a move would certainly violate uniformity condition we imposed on feature interpretation. By weakening this requirement, one would weaken, in fact trivialize the entire theory.

⁷Note that we even find a parallel in using polite forms: With certain usages of auxiliaries we observe a shift from present to the past that is intended to express something like politeness, cf.

- (i) a. Hallo Ede! Ich **wollte** mir von dir bis morgen 10 Euro leihen!
 Hi Ede, I only wanted (!) to borrow 10 Euro from you
- b. Hallo Fritz! **Wollte** dich nur kurz dran erinnern, dass du mir 10 Euro schuldest!
 Hi Fritz, I only wanted to remind you that you owe me 10 Euro!

Note that the form *wollte* is in fact ambiguous between past and subjunctive II; assuming the latter interpretation, we face a new problem of interpretability for the subjunctive, which, in the present context, does not have the usual interpretation as *irrealis*.

Another problem we left open is unmarkedness in the domain of tense. Note that in our attempt to describe the tensed inflection of German without the unmarked values for person and number, we still had to refer to indicative and present, which arguably should be unmarked values for tense and mood, so that again the question arises of how to interpret these features. As before, model theoretical semantics gives some ontological preference to the indicative mood which is not really interpreted in the usual systems. Yet, a morphological system without these features would be descriptively inadequate.

Something similar holds for third person singular in English: As a historical accident, only the most frequent, semantically unmarked (but phonologically highly marked) form “s” has survived in Modern English, so that on a descriptive level it seems to be necessary to assume respective features on the verb. Yet we want to avoid the consequence that these must also be features of the pronoun. The only way out here I can see is to drastically modify the checking mechanism in such a way that it allows for the “emergence of the unmarked” without actually checking against other features. The details of such a proposal must be left for further speculation, but it seems fairly clear to me that the nice dichotomy of features we presupposed above cannot be maintained: It seems to me that we need some third kind of process or, for that matter, a third type of features (unmarkedness features) whose properties have not yet been explored.

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