Interpreting Uninterpretable Features

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August, 2006
To appear in *Linguistic Analysis*

1 Introduction

Uninterpretable features play an important role in recent work in the Minimalist framework; they are essential to movement and other relations in syntax. For example, it is assumed that uninterpretable features render a linguistic object active, allowing it to be targeted by syntactic operations (Chomsky 2000:123). A version of this assumption is that once an expression no longer contains any uninterpretable features, it necessarily spells out (Svenonius 2001a:116, 2001b:275).

In this paper, I address the question, what does it mean for a feature to be uninterpretable? I examine Agreement, Case, Gender, Movement, and other phenomena which are important to the development of a theory of syntactic features.

Before setting out, it is important to clarify the notion of uninterpretability that is relevant. It will be useful first of all to adopt the terminological convention of speaking of 'X features,' where X is a module or component. Thus there are semantic features, namely those which are relevant to semantic interpretation, and phonological features, which are used in phonological representations. A feature which triggers syntactic operations is a syntactic feature. All this should be captured by something like the definition in (1).

(1) A feature F is an X feature iff F can constitute a distinction between two different X representations

Given (1), we can distinguish F which is interpretable in X, F which is uninterpretable in X, and F which is not even a part of X, i.e. not an X feature; this way, the terms interpretable and uninterpretable take on a more restricted sense than is sometimes used. I will not speak of vowel height as uninterpretable to the semantic component; vowel height is simply not a semantic feature (it is a phonological one).

*Thanks to David Adger, Gillian Ramchand, and Michal Starke for discussion, and thanks to Gillian Ramchand and an anonymous reviewer for comments on an earlier draft.

I am leaving open how many different X's there are, but will generally speak of semantic features in something like the traditional sense, assuming a rich semantic representation which includes not only truth-conditional information but also discourse-packaging information (as in Chomsky 1970, for example).[1]

I will argue, for example, that declension classes are not semantic features, because there is no semantic interpretation associated with the declension class a noun belongs to. A feature like number is a semantic feature, because there are systematic correspondences between the appearance of a number feature in the syntax and some aspects of the semantic representation.

Already, a caveat is in order: the word 'feature' is also used to refer to values of features, as when a pronoun like *we* is characterized as having first-person plural features. More precisely, one could say that it had the value *first* for the feature PERSON, and the value *plural* for the feature NUMBER. On this more refined notion, it can legitimately be asked whether number is a semantic feature after all; for instance number might be a syntactic feature only, while plural and singular might be the semantic features (also syntactic if syntax is sensitive to plurality). In general, I will follow general practice in allowing the term to retain this ambiguity, disambiguating as necessary.

Before defining interpretability, there is another notion, implicit in (1), that should be made clear. In a derivational model, some features are present only during the derivation, and not at its output, for example features which drive movement. These features have analogues in a non-derivational model, in the form of features which are relevant only to certain subsystems, and are never referred to by other subsystems. These can be called internal features, again relativized to different components, so that a syntax-internal feature is one that is a syntactic feature and only a syntactic feature. Features which are features in more than one module could be called interface features, as stated in (2).

(2) For any F, and any modules X and Y,
   a. F is an X-internal feature iff F is an X feature and not a feature of any other module
   b. F is an X-Y interface feature iff F is an X feature and a Y feature

In practice, (2) will be used to distinguish feature value classes rather than specific instantiations of features, for example NUMBER or *singular* could be said to be an interface feature if it systematically distinguishes representations in two distinct modules (e.g. it controls agreement in the syntax and corresponds to a notion of plurality in a meaning component, pluralia tanta such as *scissors* notwithstanding).

To illustrate the notion of internal features, suppose for the sake of argument that syntax checks case assigners against case-marked DPs, so that two syntactic representations could be distinguished by the presence or absence of case features, but that no such distinction could be made in any other module.

[1] Setting aside various interesting questions concerning how these different kinds of information are related to each other; cf. Fodor (1983; 2000)) on the importance both of modularity and of non-modular aspects of the mind.

Then case would be syntax-internal by (2). (I will revisit case in §6 and draw somewhat different conclusions.)

Often, what are called uninterpretable features are, under these definitions, those which are syntax-internal by (2) and are not semantic or phonological features by (1) (cf. Chomsky 1995b).

Now a narrower notion of interpretability can be defined, one that can be used for interface features which are not translated or interpreted in the mapping from one module to another.

(3) For any X-Y interface feature F,
   a. F is interpretable iff it corresponds systematically to some part of a well-formed X representation and some part of the corresponding Y representation
   b. F is uninterpretable otherwise

Put another way, X-Y interface features are those which are in principle visible both to X and Y. Interpretable ones are those for which there is a mapping defining a correspondence (in something like the sense of Jackendoff 1997). This allows us to say that agreement features are syntax-semantics interface features, because they are visible both to syntax and to semantics, but are uninterpretable if there are no rules mapping their values to a semantic representation (I discuss this in more detail below). In practice, (3) will more often be used to distinguish instantiations of feature values, rather than classes of features; for example, when it is said of NUMBER features that they are interpretable on the noun but not on the verb.

Given (3), the hypothetical syntax-internal case feature mentioned above is undefined for interpretability, so could neither be said to be interpretable nor uninterpretable. This deviation from some current terminological practice is useful to distinguish distinct notions here. The question of whether there are uninterpretable features in the sense of (3) is now clearly distinct from the question of whether there are syntax-internal features in the sense of (2).

2 Functions

Expanding a little on the notions presented in the last section, suppose that a language has a C element which appears in clauses with topicalization; this element would denote a two-place relation between a proposition and a topic—essentially, something like "$\lambda\phi_{\langle t\rangle}\lambda x_{\langle e\rangle}$.Topic(x,$\phi$)" (in cases where the topic is moved from within the TP denoting the proposition ϕ, then x would be coindexed with a variable in ϕ). C has the property that if a topic fails to merge, then the resulting structure is ill-formed; the CP crashes at the interface. If the feature is characterized this way, then it is a syntactic feature, by (1), and if "Topic(x,ϕ)" is an instruction to a semantic component, then it is also a semantic feature; therefore it is an interface feature by (2).

It could be characterized differently. If the feature forcing an XP to merge is

not considered a logical part of the feature which provides the Topic instruction to the semantic component, but they are simply collected together in a lexical item (the way both are collected together with a phonological value), then there is no interface feature here. However, if the feature is akin to a function, then the two are inseparable, as it is in the nature of functions to be saturated. Syntax provides a means of saturation, and the output of the function yields an interpretation.

Similarly, an interrogative C might require that an XP with *wh*-features merge with it; if *wh* is invoked both by the syntactic and the interpretive components, then it is an interface feature. The EPP requirement that a clause have a subject could be treated along the same lines, if subjects are in some sense topical, as has long been claimed.[2] In fact, all of selection and movement could be thought of in this way, following a generally Fregean or Montagovian line of thinking.

If all feature-checking were understood in terms of unsaturated functions, then certain uses of them in the syntactic literature could be reexamined in these terms. For instance, a single DP checking EPP features in two clauses (Chomsky 1995b:283) would be the equivalent of one argument being predicated over by two different predicates. One non-interpretable feature checking another could be cast in terms of a function over predicates.[3] Predictions are made by such formalizations, predictions which could greatly restrict the possibilities for feature-checking (see Adger 2000 for a version of feature-checking along these lines).

3 Agreement and Agree

Agreement in natural language is an asymmetric relation: inherent properties of one element, called the controller, determine the morphological form of another element, called the target.

A distinction is sometimes made between index agreement and concord (cf. Pollard and Sag 1994, ch. 2, where the latter is called syntactic agreement). Index agreement involves those features which are encoded in the index of a DP: person, number, and gender. It is used to describe relationships that are commonly captured using referential indices, as between an anaphor and its antecedent, and between the subject or verb agreement on a predicate and the controller of that agreement, the subject or object.

[2] Cf. Åfarli and Eide (2000) for a suggestion in this general vein; the interesting problem for such an approach is the existence of expletives like English *there*, which suggest that there is no consistent meaning associated with the subject position. A possible solution in found in É. Kiss (2002:118), where it is suggested that expletive *there* can be interpreted as a 'spatiotemporal topic.'

[3] For an example see Kratzer (2004:412), where one non-interpretable instance of a telic feature (uninterpretable in her terms) checks another, and both are then checked by an interpretable instance of the same feature. See also Bošković (to appear), where a verb which checks instrumental case is satisfied by a preposition which also checks instrumental case, in the absence of a DP bearing instrumental case.

Concord, on the other hand, is the term used for the spreading of features within a constituent, usually a noun phrase. The usual features involved are number, gender, and case.

Case is among the features normally controlled in concord but not in index agreement, since for example a nominative controller can be coindexed with an accusative anaphor; however, case is frequently important to index agreement in that only arguments in a certain case will control agreement at all (e.g. only nominatives control agreement on finite verbs in many languages). Person, on the other hand, is normally copied in index agreement but not in concord. Number and gender are relevant to both (Corbett 1991), though gender is not part of the finite subject-verb agreement system in most Indo-European languages.

Below, I discuss index agreement first, then turn to concord.

3.1 Index agreement

Index agreement is very common in languages (cf. e.g. the typological study in Gilligan 1987, where 78 of 100 languages are identified as having subject agreement on the finite verb).[4] In the most typical case, some features which are interpretable on DP, such as number and person, or which are intrinsic to DP, such as gender, determine the form of some morpheme attached to a predicate or modifier (in a few cases, agreement is suppletive, as with English *am*∼*are*∼*is*).

One way to think about index agreement is in terms of the placement of restrictions on the argument slots of a predicate (cf. Keenan 1978), as in the standard treatment of index agreement in HPSG (Pollard and Sag 1994). For example, a predicate over arguments of type e which bears third person plural agreement may carry the presupposition that its argument is third person and plural. In this case, it is sometimes said that the features are interpretable, but only on the argument: the predicate bears uninterpretable ϕ-features, which must be checked against interpretable ϕ-features (Chomsky 1995b:277, 349, 2001:3; Pesetsky and Torrego 2001:359).

Given the definition in (3), however, the question of whether a feature is interpretable depends crucially on whether it survives the translation into another component. There is one conceivable way in which agreement features on a predicate might be argued to be interpretable in this sense.

In many cases, the agreement morpheme itself may be analyzed as a kind of pronoun or anaphor, doubling the argument with which it is coindexed (Givón 1976); for example Anderson (1982) and Taraldsen (1992) suggest such analyses for Breton and Welsh, respectively,[5] and similar analyses exist for various polysynthetic languages (see Baker 1996).

[4] Similarly, the *World Atlas of Language Structures* (Haspelmath et al. 2005) lists 296 of 378 languages (78%) as having subject or object person agreement on the verb.

[5] McCloskey and Hale (1984) argue, mainly on the basis of Irish, that known syntactic mechanisms cannot be responsible for the placement of agreement morphology in these languages—that is, in case of complementary distribution, the agreement morpheme cannot have moved from the argument position.

It is widely assumed that there is a difference between pronominal or clitic doubling and agreement; for example, pronominal or clitic doubling normally corresponds to a marked information structure, while agreement is ordinarily obligatory regardless of the information structure. An example of clitic doubling is given in (4), from Cinque (1990:14).

(4) Gianni, (lo) ho visto.
Gianni him have seen
'I have seen Gianni'

With clitic doubling, *Gianni* is interpreted as a topic (or broad subject in the sense of Alexopoulou et al. 2004). Without it, the fronted *Gianni* is interpreted as focused. Bare quantifiers cannot normally be clitic doubled, as illustrated in (5).

(5) *Nessuno, lo ho visto.
nobody him have seen

Some Romance dialects have what appears to be clitic doubling without these properties, however. For example, some Italian dialects have obligatory clitic doubling for subjects, including bare quantified subjects, as in (6a) (example from Trentino dialect, taken from Brandi and Cordin 1989:118); and some Spanish dialects have obligatory clitic doubling of objects in some contexts, as illustrated in (6b) for a pronominal object (from Suñer 1988).

(6) a. Nisun l'ha dit niente.
nobody he-has said nothing
'Nobody has said anything'
b. Ellos la llamaron a ella.
they her called to her
'They called her'

It is sometimes concluded on the basis of such evidence that these are not clitic pronouns, but agreement markers. However, the fact that *la* in (6b) is obligatory does not prove that it is not interpreted like a pronoun; nor does the fact that *(i)l* in (6a) is coindexed with a quantifier. Compare (7), in which *nobody* and *he* can be interpreted as coindexed.

(7) Nobody would say what he thought.

Pronouns like that in (7) (on the relevant reading) are interpreted as bound variables. Their semantic contribution in such cases is to saturate an argument slot in a predicate, to carry an index, and sometimes to place a restriction on the range of elements with which they can be coindexed (e.g. *he* implies human or at least sentient reference, and male for some speakers). The question, in the context of (3), is whether that restriction is present as part of the semantic representation of the sentence, or whether that information is lost in translation.

Bresnan and Mchombo (1987) provide an argument that is usually taken to

settle the matter. They argue on the basis of a detailed analysis of agreement in Chichewa that two types must be distinguished. What they call anaphoric agreement is essentially like what is commonly called clitic or pronoun doubling; the agreeing element must be anaphoric to a discourse topic. What they call grammatical agreement is different, in that the agreement morpheme makes no semantic contribution. For example, in the subject question in (8a) (their (42), p. 760), the obligatory subject marker (SM7) agrees with the class 7 noun *chíyâni* 'what,' while in the object question in (8b) (their (40) and (41)), the object marker (OM7) is disallowed.

(8) a. Kodí chíyâni chi-ná-ónek-a?
Q *what.7* SM7-PAST-*happen*-INDIC
'What happened?'

b. Kodí mu-ku-(??chí)-fún-á chíyâni?
Q *you*-PRES-OM7-*want*-INDIC *what.7*
'What do you want (*it)?'

Bresnan and Mchombo argue that the subject marker in such examples reflects grammatical agreement, while the object marker is a morphologically bound pronoun which must be anaphoric to a discourse topic. If a generally anaphoric approach to agreement were to be pursued, then one would say instead that the subject marker in Chichewa does not introduce the presupposition that the referent is a discourse topic; and so the features introduced by the subject marker could still conceivably be present as part of a richly detailed semantic representation.

In sum, given the variety of pronoun types across languages, it cannot be ruled out at this point that agreement and pronominalization are fundamentally one and the same, as suggested by Givón (1976), nor can it be ruled out that index agreement features are interpretable in the terms stated in (3). What is needed is a detailed analysis of the possible pronoun types and their relationship to discourse information, along with a determination of how detailed the semantic representation is. It remains to be seen whether such an approach can improve on one like that of Bresnan and Mchombo (1987) in explaining the correlation of a cluster of properties normally associated with agreement, including prosodic lightness, morphological integration with the stem or with tense morphology, obligatoriness, locality requirements on antecedence, and relative absence of discourse-informational restrictions. But the widespread existence of index agreement does not clearly motivate the characterization of uninterpretable features sometimes assumed.

3.2 Concord

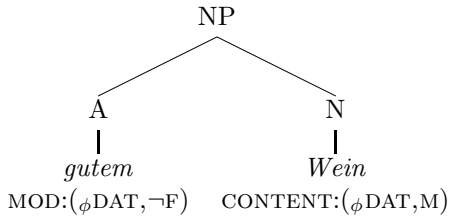
Concord, like index agreement, is also very common cross-linguistically; very many languages show multiple expressions of number, gender, and case in the noun phrase, for example. Some examples are given here from German, for the nouns *Wein* 'wine,' *Bier* 'beer,' and *Milch* 'milk' and the adjective *gut* 'good.'

(9)

	M	**N**	**F**
NOM	guter Wein	gutes Bier	gute Milch
ACC	guten Wein	gutes Bier	gute Milch
DAT	gutem Wein	gutem Bier	guter Milch
GEN	guten Weines	guten Bieres	guter Milch

Concord is usually handled with mechanisms very similar to those employed for index agreement, in terms of restrictions on the argument of a modifier (Keenan 1978, Pollard and Sag 1994, Wechsler and Zlatić 2003). In both index agreement and concord, the controller can be represented as an argument, and the target (the element which agrees) as a predicate. Schematically, an HPSG-style analysis is represented as in (10).

(10)



General principles are stated to ensure that the MOD[ifier] value on the adjective is nondistinct from the CONTENT value on the noun; here, ¬F is nondistinct from M. Furthermore, the CONTENT feature values on N must match the CONTENT values on DP, ensuring that the case value is right (see Pollard and Sag 1994 and Wechsler and Zlatić 2003 for details).

Similarly, on a Minimalist implementation, the A node would bear unvalued features, $u\phi$, which would copy values from valued counterparts, $i\phi$, on the noun.[6] At the point of lexical insertion, the form of the adjective with *-em* would be chosen as it is specified in the lexicon with nonfeminine dative feature values.

Nothing essential changes on either version if there is a DP above NP, or if, following Cinque (1994), APs occupy specifiers of functional heads between D and N.

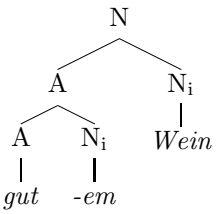
If there is no translation of the agreement values on the modifier to semantic representations, then the instantiation of features on the modifier (e.g. plural is semantically uninterpretable on the adjective) are uninterpretable, although the features themselves might be interpretable (e.g. plural is semantically interpretable). I suggested in the last subsection that this conclusion might be avoided for index agreement if the semantic interpretation included the contribution of pronominal or anaphoric agreement.

But extending a pronominal or anaphoric analysis to concord turns out not to obviate the need for uninterpretable features. On a pronominal analysis, the agreement morpheme *-em* would be a kind of pro-NP, coindexed with the controller. Thus the features it bears would be understood as presuppositional,

[6] Borrowing the notation from Pesetsky and Torrego (2001). See also Pesetsky and Torrego (2004) on the distinction between valuation and interpretability.

or as conditions for coindexation; they would not fail to be interpreted semantically. This is sketched in (11), where the adjective is depicted as combining with an argument pro-N, coindexed with the head N and spelled out as the agreement suffix.

(11)



If the features borne by *-em* were simply gender and number, then this would be rather similar to the case of index agreement; the pro-NP simply shows the features that its controller has. But the German example in (9) is typical in that in very many languages, concord also reflects case, which is a property of the whole DP, not of the NP itself (as discussed below).

Though I will argue below that case can be interpretable in the sense of (3), the instantiations of case features on lower projections of the NP do not correspond to any independently motivated part of the corresponding semantic representation. It simply does not make sense to say of the adjective in (11) that it is predicated of something dative, which is coreferential with the N *Wein*; only the DP can be dative. So at the very least, the case feature on the agreement suffix cannot be interpretable in the sense of (3).

This is even clearer in richer case systems. The 'local' cases of Finnish, for example, correspond to prepositional meanings. The compositional semantic contribution of the noun phrase embedded inside these local cases does not vary with the case on the DP as a whole, but the nominal dependents show concord, as illustrated in (12) (from Karlsson 1977).

(12)
a. tavallise-ssa liikkee-ssä
normal-INESS *business*-INESS
'in a normal business'
b. varhaise-sta aamu-sta
early-ELAT *morning*-ELAT
'from early morning'
c. mi-ltä laituri-lta
which-ABLAT *platform*-ABLAT
'from which platform'
d. tuo-lta vanha-lta naise-lta
that-ABLAT *old*-ABLAT *woman*-ABLAT
'from that old woman'

Similarly, in mainland Scandinavian, concord reflects definiteness (cf. e.g. Delsing 1993:78), which is also clearly a property of DP and not of NP.

In Finnish, case agreement morphemes appear on the different components of a complex number (examples from Karlsson 1977:135–136; the case on a numeral is identical to the case on the noun it modifies).[7]

(13) a. kahde-n-kymmene-n
two-GEN-*ten*-GEN
'twenty' (genitive)

b. kolme-lle-kymmene-lle
three-ALLAT-*ten*-ALLAT
'thirty' (allative)

c. kolme-lla-tuhanne-lla sada-lla-kahde-lla
three-ADESS-*thousand*-ADESS *hundred*-ADESS-*two*-ADESS
'three thousand one hundred and two' (adessive)

Presumably, a given subpart of a complex number has a constant denotation across different cases of the DP that number appears in, so the relationship of the different parts of the number to each other are constant under different cases. To try to assign a interpretable value to each agreement feature in these cases would be folly.

Importantly, the domain for spreading of features in each of these cases is strictly syntactically defined; it is sensitive to strictly syntactic notions such as category, maximal projection, and head, not to phonological notions (such as foot, prosodic phrase, or consonant-final). Thus I do not adopt Sigurðsson's (2006) and Bobaljik's (2006) suggestions that morphological agreement is part of an extrasyntactic component.

I conclude that concord systems show that syntactic systems are sensitive to uninterpretable instantiations of features, in the sense given in (3) (recall that a feature which is interpretable in one instantiation may have other instantiations which are uninterpretable). This is compatible, as noted above, with the way agreement is formally treated in HPSG, in terms of unification of constraints, and may be formalized in a Minimalist approach in terms of feature-value copying and the deletion of feature-value matrices.[8] It should be noted that once uninterpretable instantiations of features are admitted into the system, the motivation to exclude them from index agreement is reduced. That is, the same mechanisms which handle concord may also handle what Bresnan and Mchombo call grammatical agreement.

In fact, concord systems may even motivate syntax-internal features. For example, the German strong and weak adjectival inflection paradigms both distinguish the same set of interface features, but the weak paradigm is chosen in the presence of a determiner bearing agreement inflection, which is not a semantic feature in itself (cf. Pollard and Sag 1994 for an analysis and references).

[7] With longer numbers, the non-final case markers may be omitted (Karlsson 1977:136).

[8] As formalized in HPSG, MOD is a syntax-internal feature, but its values are interface features; MOD values could be reformulated as uninterpretable instantiations of interface features.

3.3 Agree

Agreement (using the term here as a cover term for index agreement and concord) need not be in ϕ-features; for example, Wiklund (2005) shows that non-finite verb forms can agree in tense and aspect with other verb forms, so that participial features are copied from one to the other. Here, the verbs *vilja* 'want' and *hinna* 'manage' standardly appear with bare infinitive complements as in (14a) (examples from Wiklund 2005:29).

(14) a. Han hade vel-at hinn-a komm-a hit.
he has want-PTCPL *manage*-INF *come*-INF *here*
'He had wanted to manage to come here'
b. Han har vel-at hunn-it komm-a hit.
he has want-PTCPL *manage*-PTCPL *come*-INF *here*
'He had wanted to manage to come here'
c. Han har vel-at hunn-it komm-it hit.
he has want-PTCPL *manage*-PTCPL *come*-PTCPL *here*
'He had wanted to manage to come here'

The meanings of all three examples are the same. As Wiklund shows, the participial feature can only be copied from an adjacent participle; it cannot cross an infinitive. Note also that the participial ending varies according to conjugation class; *vilja* 'want' takes *-at*, but *hinna* 'manage' takes *-it* (there is also a vowel change in the stem). When the participial feature is copied, the conjugation class feature is not.

Thus, just as with the cases of concord, a feature which is interpretable in one place (here, perfective aspect) is morphologically realized in another. A more dramatic example is presented by the Australian language Kayardild (Evans 1995), in which all VP-internal nominals show case marking determined by the tense and modality of the clause (examples from Evans 1995:108).

(15) a. Ngada warra-ju ngarn-kiring-ku.
I.NOM *go*-POT *beach*-ALL-MPROP
'I will go to the beach'
b. Ngada warra-jarra ngarn-kiring-kina.
I.NOM *go*-PAST *beach*-ALL-MABL
'I went to the beach'
c. Ngada warra-da ngarn-kiring-inj.
I.NOM *go*-DES *beach*-ALL-MOBL
'I would like to go to the beach'

Following Evans, the case markers which are governed by the tense and modality of the clause are glossed M[odal]PROP[rietive], M[odal]ABL[ative], M[odal]OBL[ique]; the same suffixes have non-modal uses as well. The modal case markers appear outside case markers signalling grammatical relations in the clause, here

ALL[ative] *-kiring* on the goal.[9]

The Agree relation is often characterized as deleting *u*F. If agreement is to be handled by Agree, then the deleted feature must be visible to lexical insertion (hence Chomsky 1995b:280 suggests distinguishing between deletion and erasure). Similarly, on the HPSG implementation, there is an asymmetry between the interpretable CONTENT features on the controller and the uninterpretable MOD[ifier] (or SUBCAT[egorization]) features on the target.

Thus, valued features can be uninterpretable at the syntax-semantic interface in the sense in (3), even if the features themselves are syntactic and semantic features in the sense in (1). In the next section, I examine a kind of feature that is not a semantic feature in the sense in (1), and show that it is not a syntactic feature either, for example it is not visible to Agree in Minimalist terms, or to the MOD or SUBCAT features in HPSG terms.

4 Class Features

There are features which are not semantic features at all. I suggest in this section that such features can be visible to lexical insertion but are not visible to the syntax.

Sometimes, a morphological paradigm requires reference to classes, e.g. noun classes or verb classes, which play no role in agreement but only in the selection of allomorphs expressing inflectional features. These classes, unlike gender classes, may be purely phonological in nature, and may be lexically arbitrary. Also unlike gender, other categories than nouns may have classes, for example in the two conjugations of verbs in Slavic languages, or the strong and weak conjugations of Germanic languages. To illustrate with a well-known example, Russian has two conjugations; in (16), the infinitive and present tense forms are given for one verb of each class.[10]

(16)

	Conjugation 1	**Conjugation 2**
INF	pis-a-tj	bros-i-tj
1SG	piš-u	broš-u
2SG	piš-e-š	bros-i-š
3SG	piš-e-t	bros-i-t
1PL	piš-e-m	bros-i-m
2PL	piš-e-te	bros-i-te
3PL	piš-ut	bros-j-at
	'write'	'throw'

In the second conjugation, there is a suffix *-i* throughout the paradigm (surfacing as /j/ before /a/, and as palatalization before /u/). In the first conjugation, there is generally an /e/ but not in the infinitive, which has the theme vowel

[9] See Nordlinger (1998) for a detailed analysis. As Evans notes (Evans 1995:403), there are examples in which the temporal or modal morphology on the verb underdetermines the case; on an agreement-based analysis null temporal or modal heads would have to be postulated.

[10] Thanks to Eugenia Romanova for discussion of this point.

-a (there is evidence that the theme vowel is underlying present throughout the paradigm but deleted by VV simplification; cf. Halle 1959, Lightner 1972). If the /e/ represents a present tense marker *-e*, as suggested by Jakobson (1948), then it must be absent from the second conjugation, or else the regular phonological rule of VV simplification would delete the *-i*. So it can be concluded that present tense has two allomorphs, one for Conjugation 1 and one for Conjugation 2 (the second could either be ∅ or *-i*). Furthermore, there are two allomorphs of the third person plural suffix.

Conjugation 2 is the marked conjugation. When another morpheme intervenes between the Conjugation 2 stem and the tense and agreement morphology, the tense and agreement morphology surface as Conjugation 1. For example, the secondary imperfective form has a suffix with various allomorphs, including *-yvaj*. Examples are shown in (17), where it can be seen that the first conjugation agreement suffix appears.[11]

(17) a. vy-pis-yvaj-ut
out-write-IMPF-3PL
'[they] copy'

b. vy-bras-yvaj-ut
out-throw-IMPF-3PL
'[they] throw out'

Thus it seems that the special second conjugation allomorph of third person plural is only used in case it is inserted adjacent to a morpheme which is specifically marked as belonging to the second conjugation; it seems that information about conjugation class is not visible at a distance. That this is more general is argued by Adger et al. (2003).[12]

To most people it will come as no surprise that there are morphological categories with no semantic content; morphology is routinely described in terms of arbitrary declension and conjugation classes (cf. e.g. Halle 1994). But since I will claim that many apparently arbitrary classes turn out on closer examination to have some semantic character (see the next section, on gender), it is important to establish conclusively the non-semantic nature of some classes which are visible to morphology.

To strengthen the case that there are class features with no semantic content, I turn to an example of noun classes in Northern Sámi, where membership in each class can be shown to have a historical explanation in terms of phonology.

In Northern Sámi, there is a very regular and productive set of case suffixes; but there are different patterns of mutation of stem-internal consonants (called

[11] The prefixes affect the meanings of the verbs, such that "out-write" in (17a) means 'copy'; for discussion see Svenonius (2004b). I am glossing over many details regarding the morphology of Russian—for discussion with references to previous work, see Svenonius (2004a).

[12] Jabłońska (2004) has argued that the *i*-stem in Polish corresponds to some extent with argument structure, and conjugation classes in Russian show many of the same correlations (cf. Svenonius 2004a). Therefore, the Russian example does not conclusively establish that there are class features with no semantic content. The Northern Sámi example presented next does, however.

consonant gradation); historically, this is because codas of stressed syllables were 'strengthened' or lengthened before open syllables (see Sammallahti 1998). This strengthening has different surface manifestations in the modern language, for example as gemination of liquids, preaspiration of stops, and preglottalization of nasals. As a simple illustration, consider the pattern of strengthening in the paradigms for the noun *goahti*, a word for a kind of hut (historically with an even number of syllables in most of its paradigm, hence ES for even-syllabled), and the noun *beana*, 'dog' (historically with an odd number of syllables in most of its forms, hence OS for odd-syllabled).

(18) ES declension *goahti* 'hut'

	Singular	**Plural**
Nominative	goahtii	goaðiiht
Accusative	goaðii	gooðijt
Illative	goahtaaj	gooðijðe
Locative	goaðiis	gooðijn
Comitative	gooðijn	gooðijkujn
Essive	goahtiin	

(19) OS forms *beana* 'dog'

	Singular	**Plural**
Nominative	beana	beaʔnagaht
Accusative	beaʔnaga	beaʔnagijt
Illative	beaʔnagii	beaʔnagijtta
Locative	beaʔnagis	beaʔnagijn
Comitative	beaʔnagijn	beaʔnagijkujn
Essive	beanan	

The patterns of strenghtening are nearly polar to each other: the nominative singular and the essive show strong forms in the ES paradigm (as does the illative singular), while everything but the nominative singular and the essive shows strong forms in the OS paradigm.

The historical pattern of strengthening of codas before open syllables can be seen in (20), where the result of affixing an accusative suffix *-(e)m* to a vowel-final stem is compared to the effect of affixing the same suffix to a consonant-final stem. The consonant which changes into strong grade is marked with a grave accent in each case.

(20) Approximate historical reconstruction for ES *goahti* 'hut' and OS *beana* 'dog' (based on Sammallahti 1998)

	ES	**OS**
NOM SG	*koat̀ee	*peanʒk
ACC SG	*koatee-m	*peaǹʒk-em

The conditioning environment is now lost, along with the overt accusative suffix, so that the nominative and accusative in the ES paradigm are distinguished only by consonant gradation. Consonant gradation is productive, and is applied to new coinages and loans, so competence in Northern Sámi involves a way to

derive grade alternations from underlying forms. I analyze this (in Svenonius to appear) in terms of a suffix which triggers consonant gradation (for a different suffixal analysis see Bye 2001). What is important for present purposes is simply that ES and OS have differing morphological realizations for the same syntactic features, for example nominative singular shows consonant gradation in the ES paradigm but not in the OS paradigm.

Since ES and OS have no semantic value, this means that there are inflectional classes relevant to the selection of inflectional allomorphs which have no semantic content whatsoever. On the other hand, they clearly have an interpretation at the interface where phonological forms are selected for insertion.

I take it as established that there are non-semantic features which are morphologically relevant. Interestingly, it seems that such features are highly restricted in their distribution. Arguably, they are visible only to lexical insertion, and not to syntactic operations such as Agree. It seems that they are subject to an extreme form of locality, one that is much more restrictive than would be expected if they were visible to syntactic operations. Nor do they trigger movement, or have any other discernible syntactic effect.[13] In this, they are contrasted to gender features, which I argue are different both in being visible to syntax and in being semantically interpretable.

5 Gender

Gender systems, like agreement systems, are very common cross-linguistically. A gender system is a lexical partitioning of the class of nouns; in a language with grammatical gender, all nouns belong to one gender or another (Greenberg 1978; though see Corbett 1991:181 on multiple-gender nouns). Corbett (1991) is the classic guide to gender systems. He argues (following Hockett 1958) that gender systems must be defined in terms of agreement: some element, called the target, shows a reflex of the gender that is a property of the noun. Note that this means that the famous Bantu noun class systems (seen controlling agreement in (8)) count as genders. On the other hand, classifier systems like those typical of east Asia, and declension classes for morphological endings (such as those examined in the previous section), are not genders. Thus it can be said that for Corbett, gender systems involve agreement *by definition*.

It is interesting, then, that certain properties emerge which correlate with gender under Corbett's definitional assumptions. Importantly for the discussion of the interpretability of features, all gender systems have a semantic core, including either a masculine-feminine distinction or an animate-inanimate distinction, or quite often both. Other semantic classes which are often important include trees, tools, edible plants, dangerous animals, liquids, body parts, abstract concepts, weather, approximate shape (long, flat, or round, for example), and so on. A derivational morpheme normally has a particular gender, such

[13] These facts could be made to follow if the items bearing class features are inserted 'late' in the derivation, as in Distributed Morphology (Halle and Marantz 1993).

that all nouns derived with it have that gender (e.g. deverbal *-ung* in German and *-ation* in French are feminine).

Typically, there are not as many genders as there are semantic distinctions. For example, in Archi (as described by Corbett 1991:27–29, citing previous work by Kibrik et al.), there is a gender for male rational beings, a gender for female rational beings, and then two genders called III and IV. Class III includes such semantic categories as adult domestic animals, insects, musical instruments, trees, and meteorological phenomena, while class IV includes young animals, tools, liquids, and abstract concepts. One of the two is presumably a default class, but it does not seem possible to distill a single semantic characterization for either class III or class IV; for whichever is not the default, there seem to be several semantic properties which can result in assignment to a single class. Trosterud (2001) gives twenty-eight semantic rules of gender assignment for Norwegian, divided among three genders.[14]

As documented by Corbett (1991), phonological assignment rules exist for gender systems, but they are secondary to the semantic ones, in the sense that phonological rules are overridden by semantic ones when they conflict.[15]

Thus, although declension classes may emerge on the basis of purely phonological distinctions, as was shown for Northern Sámi, such classes cannot command agreement on modifiers or predicates. The interaction they have with morphology is extremely local, apparently restricted to adjacency, and probably within a certain very small syntactic domain (approximately the 'word'). I suggested above that this shows that class features are invisible to the syntax, and are only relevant for the selection of allomorphs in lexical insertion. The fact that gender commands agreement on non-adjacent elements and on elements outside the phonological word containing the controller shows that gender is different. Furthermore, the fact that agreement for gender occurs in a syntactically defined domain (appearing e.g. on heads of category A, within a DP) shows that it is part of syntax.

Why should gender be different from class features in controlling agreement? I suggest that it is precisely because gender has a semantic basis (and is therefore a semantic feature in the sense of (1)). That is, the gender feature has some interpretation. This is normally thought of as patently false, given the great degree of apparent arbitrariness in most gender systems; French gender assignment has been claimed to be based on phonology in 85% of cases (Corbett 1991:57–58, citing work by Tucker et al.). But that figure (as Corbett points out) maximizes the importance of phonology, in ignoring the contribution of the semantic rules and of the morphemes which are associated with a particular gender.

[14]Lakoff (1987:91–104), discussing Dixon's (1972:306–312) analysis of Dyirbal gender classes, suggests that even more systematicity is present if certain associative 'chains' are recognized.

[15]Cf. also Corbett and Fraser (2000:321); Rice (2006) argues that there are some semantic rules which are overridden by some phonological rules, though one might argue in those cases that the semantic rules are wrongly formulated, or are not synchronically active; Nesset's (2006) *Core Semantic Override Principle* is formulated to capture the exceptionless cases).

For example, French nouns ending in /sjɔ̃/ are found to be feminine in 99.8% of cases, which shows the success of a phonological characterization; but if many of those words involve the suffix *-ation*, then a semantically based rule assigning *-ation* to the feminine gender on the basis of its meaning contribution might fare as well. As pointed out above, a single gender might encompass any number of semantic classes, so there would be no need to suppose that the semantically based rule for *-ation* is the same rule that assigns nouns referring to females to the feminine gender.

Thus, it seems reasonable to postulate that gender features have some semantic interpretation, and that this is important for agreement. This is consistent with a very restrictive assumption about the possibility of syntax-internal features, namely that features which are not semantic features are not syntactic features.

It still remains to say exactly what the semantic contribution of gender is, given that there undisputably are phonological rules for gender assignment, and nearly every gender system seems to have numerous lexical exceptions. One possibility would be that gender is connected closely to the categorial feature N, which is interpretable, if it provides the semantic distinction between nouns and other categories (cf. Baker 2003 for one suggestion about what that feature might be, namely the presence of identity criteria; cf. Kihm 2005 on a possible connection between N and gender).

Indirect evidence for the cognitive significance of gender categories comes from aphasia. Anomia due to brain trauma sometimes results in classes of nouns being difficult to recover (see Goodglass and Wingfield 1997 for an overview). The classes noted in the literature on noun-retrieval problems include tools, animals, and other categories which surface in gender systems. Categories that are not used in gender systems, such as color, do not seem to characterize classes of nouns which become inaccessible in anomia, either (what is called 'color anomia' is the inability to name colors, not an inability to name objects of a certain color; cf. Damasio and Damasio 1992). Possibly, nouns are stored in semantically grounded clusters for rapid retrieval; the semantic categories established in the course of acquisition turn out to be insufficient to predictably partition the nouns acquired. Random assignment would not facilitate noun retrieval, so phonological strategies emerge. But for the linguistic system, the gender feature is still interpretable: it provides information that a noun belongs to a particular category.

An analogy can be drawn to personal names.[16] Personal names do not carry lexical semantic content of the kind that can be decomposed into functional structure, but are distinguished only by the individual referents they are identified with. Suppose that a gender category is like a name for a category of nouns. In the presence of the fuller specification of the noun itself, the gender value may be logically redundant, but the cooccurrence is one of the many redundancies that natural language tolerates.

[16]Thanks to Gillian Ramchand, personal communication, for suggesting this.

6 Case

I have argued that class features exist which are interpretable only at the interface with lexical insertion, and that a syntactic operation Agree can copy only semantic features, but that the copies may not have their normal interpretations (i.e. there may be uninterpretable counterparts of interpretable features). I have argued that even gender, which is normally thought of as having no semantic content, is a semantic feature and is interpretable in some instantiations. I now turn to case, which Chomsky (1995b:278–279) calls the "formal feature par excellence," and argue that the mechanisms outlined so far are well-suited to handle it. I suggest furthermore that case is a semantic feature, and often interpretable, though its morphological instantiations are often uninterpretable.

There are several different phenomena which go by the name of case; I will discuss local cases first, and then structural cases. The latter is especially important; Chomsky (2000:119) regards structural case as completely non-interpretable, in my terms not a semantic feature in the sense of (1). I will argue that it is only uninterpretable in some instantiations, however.

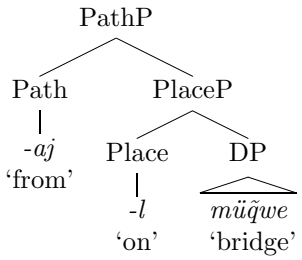
6.1 Local and semantic case

Systems in which affixes on the noun directly express spatial relations are called local case systems. The Kayardild allative was seen above in (15). An example from Lezgian (a Daghestanian language) is given in (21). Each non-nominative noun stem is followed by a case suffix for the genitive, dative, or superelative (SREL), in the example (the verbal affixes are P[ar]T[ici]P[le] and AOR[ist]).

(21) Pačahdi-n rik' ala-j dewe müq̃we-laj wac'u-z awat-na.
king-GEN *heart be.on*-PTP *camel bridge*-SREL *river*-DAT *fall.off*-AOR
'The king's favorite camel fell from the bridge into the river' (Haspelmath 1993:89)

In such systems, expressions bearing local case have the interpretation and syntactic distribution of PPs. In fact, they can insightfully be analyzed as PPs (cf. Nikanne 1993, van Riemsdijk and Huybregts 2002). As van Riemsdijk and Huybregts (2002) argue, PPs cross-linguistically can be parsed into directional and locative projections, and local cases like the Lezgian superelative express both. In the representation in (22), the superelative is parsed into its subcomponents expressing path and location (I use Jackendoff's 1983 labels Path and Place for van Riemsdijk and Huybregt's DIR and LOC).

(22)



On this analysis, the superelative case is a sequence of two affixal postpositions, with DP appearing (either by movement or because Path and Place are linearized head-finally) to the left of the postpositions.

Other representations are of course possible, but the semantics of local case morphology must involve something like type-shift (cf. Kracht 2002); local case, like an adposition, turns a DP (type e) into a predicate modifier (type $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$).

The incorporation-style analysis sketched above is especially attractive for Lezgian, where there is no case concord. In Finnish, however, as already shown in (12) above, adjectives agree with the noun in case, and furthermore the morphemes which express case concord on adjectives are identical to the morphemes which express case on nouns. Case suffixes on nouns in Finnish might therefore be treated on a par with case agreement on adjectives, with the semantics of the local case being contributed by null Path and Place heads (cf. Nikanne 1993).[17]

Other semantic cases are similar to the local cases, for example dative on experiencers in Icelandic, accusative on duration adverbials in Russian, or instrumental on paths in Serbian. These pose no distinct problems for interpretability; there is a semantic correlate to the case, whether the case morpheme expresses it directly or indirectly (cf. Chomsky 1995b:285). In many such examples, there may be a null P element which assigns a structural case. I turn to structural cases in the next subsection.

6.2 Structural Case

Structural case is often taken not to be a semantic feature at all. Unlike local case, structural case is not interpretable on the constituent bearing it: a DP with nominative or accusative or genitive case might be definite or indefinite, and might bear any thematic role, for example. Even agents may bear accusative, in ECM constructions, or genitive, in nominalizations.

(23) a. I heard him perform a sonata.
b. Their destruction of the city was unnecessary.

[17]This might also explain why case suffixes on Finnish nouns appear inside possessor morphology (Spencer 1992). Finnish provides a minimal contrast with Hungarian, in which case morphology is outside the possessor and there is no case concord on attributive adjectives, more or less as would be expected if the cases there were enclitic postpositions.

As documented by Blake (2001), attempts to find 'Gesamtsbedeutung' for structural cases (that is, to reduce structural cases to semantically-based feature systems) go back hundreds of years and have invariably failed.

One possibility for analyzing structural case would be to think of it, like local case, as involving type-shift.[18] Supposing that nominative is the absence of case, as argued for example by Bittner and Hale (1996), then it could signal type e interpretation (subject to type-shift for other reasons) and other cases would express types other than e. For example, a finite predicate might seek an argument of type e, while a non-finite predicate seeks an argument of some other type, and accusative case would be the realization of type-shift from e to that type. This would mean that some instances of case would probably be syntax-internal, in the sense of (2) (that is, if these manipulations of type correlated with nothing in the semantic interpretation). Such an approach seems especially useful for genitive case, since it is normally the case of nominal dependents. A type-shift approach might also be right for so-called inherent cases selected by specific predicates.

A slightly different approach, and one I consider to be a breakthrough in the analysis of core structural cases, is to understand case as expressing interpretable features of the predicate, making case the mirror-image of agreement. Pesetsky and Torrego (2001) have pursued this for nominative, arguing that it is the expression of tense on the nominal. Kratzer (2004) has argued that accusative is the uninterpretable manifestation of telicity, interpretable on the predicate. I have argued that the alternation in Icelandic between accusative and dative on objects can be productively understood as reflecting the Aktionsart of the event in which the object participates (Svenonius 2002b): essentially, if the initiating event is isomorphic with the process that the object undergoes, then the object is accusative, and if the initiating event is distinct from the process that the object undergoes, then the object is dative (Svenonius 2005). I sum this up in the slogan 'Case is uninterpretable aspect' (Svenonius 2002a). Such an approach is importantly different from one which tries to identify underlying thematic interpretations such as 'recipient' for cases like the dative.

One thing that is important to bear in mind in the equation of case with temporal-aspectual notions like telicity and isomorphism of initiation and process is that the case forms are likely to underdetermine the aspectual contrasts.

Thus, for example, in my analysis of Icelandic dative and accusative objects, there may be several different conditions which make one or the other possible, which are underdetermined by the choice between dative and accusative (the many-to-one mapping of contexts to cases is stressed in Sigurðsson 2003). Nonetheless, the generalization that non-isomorphic subevents lead to dative case in Icelandic captures a range of examples. For example, dative appears on complements of verbs like 'help,' and on complements of verbs like 'spray,' as illustrated in (24).

(24) a. Vaxtalækkun hjálpar efnahaginum.
interest.rate.cut.NOM *helps* *the.economy*.DAT

[18] This was first suggested to me by David Adger.

'An interest rate cut helps the economy'

b. Hann spreyjar málningu á bílinn.
he sprays the.paint.DAT *on the.car*.ACC
'He sprays the paint on the car'

In each case, the event is set in motion by an external argument, but then the event continues without the external argument's assistance. In this sense the dative is semantically predictable. In another sense, however, the dative in these cases is lexical or inherent, because these uses of these verbs must always be interpreted as involving a dissociation between the initiating event and the result of that initiation. That is, it is not enough that the speaker intend a different meaning, for the accusative to occur; the accusative is regarded as ungrammatical. Thus, there is a sense in which the case here is agreement with a (semantically interpretable aspect of) the predicate.

The upshot is that case, unlike class features, might be analyzed as interpretable, given the assumptions here. Like gender, its exact contribution to meaning is quite abstract, and it is further obscured by the fact that the semantic characterization of the feature can only be stated over the predicate, in many cases.

7 Word Order

Many cases of word order are connected to interpretation, e.g. topicalization, already discussed above. As suggested above, the *u*F driving topic-fronting might be a syntax-internal unsaturated topic value, hence not interpretable in one sense, but a semantic feature in another sense.

More difficult to explain are cases of movement which yield cross-linguistic variation, since it is ordinarily assumed that a given meaning could map onto distinct word orders in different languages; that is, there is some sense in which a Japanese SOV clause can express the same "thought" as an English SVO one. There have been several suggestions concerning such situations. One is to suppose that all the same movements occur in every language, but that they occur covertly in some languages, overtly in others. A variant of this idea is that what is attracted by a probe is features (Chomsky 1995b:262), and that what varies from one language to another is how much syntactic material is pied-piped along with a feature. Note that pied-piping involves radical reconstruction (almost by definition).

(25) a. Which pocket did you put the butter in?
b. In which pocket did you put the butter?

The interpretation of the PP is the same in both cases, namely with P in the reconstructed position. If the semantic representation is the same in both cases, then the difference between one and the other cannot be due to a semantically interpretable feature. Possibly, pied-piping has to do with phonologically interpretable features.

7.1 Subject movement

Obligatory movements, such as the automatic movement of the subject to SpecTP in English, are often taken to be semantically vacuous (Katz and Postal 1964:31). This is difficult to demonstrate, since the movement is obligatory; for many movements, it is just as plausible to assume an accompanying semantic reflex. For example, movement of the subject to SpecTP in English might confer some sort of topicality on the subject; this topicality would be part of what is responsible for the difference in meaning between passive and active counterparts like those in (26).

(26) a. The lion chased the tiger.
b. The tiger was chased by the lion.

There are two obstacles to this assumption. One is the existence of expletives; however, it is possible that an interpretation can be motivated for expletive subjects (e.g. *there* might be interpreted as referring to the event, cf. n. 2), in which case this obstacle falls away. The second obstacle is cross-linguistic variation.

In Irish, McCloskey (1996) has argued that the subject does not raise to SpecTP, in contrast to English. If the subject does not raise at LF either, then there seems to be an irreducible difference between English and Irish. Assuming that English speakers and Irish speakers are able to express the same 'thoughts,' it would seem that the feature distinguishing English from Irish could not be interpretable. That is, if the EPP feature F has an effect on the meaning of the English sentence, and it is present in every declarative clause, then where would F come from in the equivalent Irish clause, the one expressing the 'same' meaning?

Ramchand (1996) has argued for a similar case in Scottish Gaelic that the organization of information structure which is forced in English by the EPP can be introduced into the Scottish Gaelic clause in a different way. Essentially, she proposes that the choice of a topic can either be forced in the syntax, or left up to a meaning component. This allows a very direct relationship between syntax and meaning, and at the same time means that the movement of the subject triggered by the EPP in English is not semantically vacuous.

Ramchand and Svenonius (2006) pursue this line of thinking further and argue, for several cases of parametric variation, that what is determined in the syntax in one language can be determined in a post-syntactic component in another, even given a very strict modularity and a commensurately restrictive notion of what is possible externally to syntax.

Essentially, the idea is that there are aspects of semantic interpretation which vary from language to language as to whether they are introduced by syntactic elements or negotiated in the CI (the Conceptual-Intentional system, in the sense of Chomsky 1993:2). These latter aspects include such contextually dependent notions as definiteness and (we argue) perfectivity. This means that syntactic structure may underdetermine meaningful representations, and may do so differently for speakers of different languages.

7.2 Other movements

The tightening of restrictions on the base component (Kayne 1994, Chomsky 1995a, Brody 1997) has led to an increasing reliance on movement to derive basic word order. This leads to additional cases where it is difficult to see what the semantic contribution is of a feature which drives movement. For example, the Lezgian PP sketched in (21) above would correspond to a head-initial structure in English (*from the bridge*, or *from on the bridge*). On an antisymmetric analysis, the PP in one language involves movements that are absent in the other, and here the notions of discourse informational structure that I invoked in the example of subject movement discussed above are not relevant. Semantic representations do not contain information that corresponds only to whether a structure is head-initial or head-final. The problem is not trivial and I will not attempt to solve it here. Possibilities, beyond those already mentioned, include treating it as part of the syntax-phonology interface.

One analysis of movement which is relevant in this regard is that of *wh*-dependencies in Adger and Ramchand (2005), in which a feature, Λ, is interpreted as predicate abstraction. Another feature value matrix, ID:ϕ, also located on the same *wh*-expression, provides a variable which must be identified by context. Since the predicate abstraction and the variable cannot be interpreted in the same location, the only convergent derivation is one in which a copy of the *wh*-expression is made; Λ is then interpreted at the head of the chain thus formed, while ID:ϕ is interpreted at its foot, and the other copies of each feature are uninterpretable (and are deleted, on Adger and Ramchand's account).

This example displays some of the same issues mentioned in conjunction with the hypothetical Topic feature in §2. Once a predicate is combined with an argument, there is no longer any direct correlate of Λ in the representation, but failure to combine a predicate with any argument will prevent a representation from being formed at all. Thus Λ, on one formal implementation, could be considered syntax-internal in the sense of (2); however, on another implementation it is an interface feature.

8 Conclusion

In order to make sense of the question whether there are uninterpretable features, and if so what they are, I have broken the issue down into parts.

First, I have defined features in terms of what system they are relevant to (in (1)), reasoning that for features which have no relevance to a module, the question of their interpretability does not arise. Thus, there are phonological features which are not also semantic features, and there is no question of their being interpretable semantically.

Given this distinction, I have further divided the usual notion of interpretability into two. The first is visibility at an interface; a feature which is not visible at any interface, I have called 'internal' (see (2)), and distinguished it from what I have called 'interface' features. Interface features include all fea-

tures which survive to the interface level, whether their values are interpreted by interfacing systems or not.

The narrow sense of interpretability, which I have defined in (3) only over interface features, has to do with the application of mapping rules stating correspondences between two representations. Uninterpretable instantiations of features are those which are not interpreted into an interfacing module.

Given these distinctions, more precise questions can be asked. For example, the usual question, 'are there semantically uninterpretable syntactic features?' translated into the terminology here, corresponds to at least three distinct questions.

(27) a. Are there syntactic features which are not also semantic features?
b. Are there syntax-internal features?
c. Are there uninterpretable syntax-semantics interface features?

The evidence for something being a syntactic feature is that syntax is sensitive to it, for example the feature requires a particular word order, or requires the presence of a particular kind of expression. Although there are difficult questions around the possible existence of a morphological component, I have assumed that the presence of morphology is evidence for a syntactic feature, if the distribution of the morphology in question is determined by syntactic structure.

The evidence for something being a semantic feature is that it distinguishes between two meanings, assuming a fairly standard but reasonably rich semantic representation of meaning, one which specifies predicate structure, gross information packaging, and some additional information that we associate with meaning.

On the basis of these considerations, I have concluded that many apparently non-semantic features can be construed as semantic (case, gender). There are clearly features which are not semantic (class features, phonological features), but in those clear cases they are not syntactic either. Features having to do with movement and word order might conceivably provide examples of non-semantic syntactic features. However, at the moment it seems that the strongest hypothesis can tentatively be upheld, namely that the answer to (27a) is no.

The most contentious examples discussed were gender and case. If I am wrong about them each having a semantic core, then there are syntactic features which are not semantic, and so the answer to (27a) would be affirmative.

If the answer to (27a) is affirmative, then question (27b) can be addressed, and the question would be whether the non-semantic syntactic features interface with some other component. The answer to (27b) is therefore maybe.

As for question (27c), I was able to fairly conclusively answer it in the affirmative: there are uninterpretable instantiations of features, in agreement and (on my analysis) case.

This leaves open the possibility that all syntactic features are also semantic features. If so, then it does not seem necessary to divide syntax and semantics

into distinct modules.[19] It would still be possible, in that the syntax module might include interface features with many different modules, while the semantics module might include only a subset of those features, but the most Minimalist hypothesis would naturally be that syntax and semantics are the same module, synsem. In that case there is no interface between them, and the questions above must be restated so that each instance of syntax or of semantics is replaced by synsem. The answer to question (27a) then becomes necessarily no; (27b) turns into a question about whether there are synsem-internal features, and the answer could well be yes. Question (27c) would have to be examined with respect to interpretability at the interface with CI, not a trivial task.

There are clearly aspects of meaning which have no interaction with syntax, namely the aspects of meaning often discussed under the rubric of 'concepts,' or as 'encyclopedic knowledge' about lexical items; this is the information associated with categoriless roots in the models of Borer (2005a;b) and Marantz (2001), and is the component or collection of components I referred to briefly above as CI, the Conceptual-Intentional system, following Chomsky (1993).

If Fodorian encapsulation suggests that CI is largely disjoint from synsem, then basic synsem concepts like number and tense might be synsem-internal, corresponding to nothing in CI. On the other hand, if CI is the domain of general reasoning, then it seems that number and tense must have representations there, since their values are accessible to general reasoning.

At this stage, a compromise might be the one made briefly in §1: feature-value classes, such as NUMBER and TENSE, are synsem-internal features, while their values, such as *plural* and *past* are CI features. Since synsem agreement copies the values, they would be synsem features as well, hence synsem-CI interface features. Since not all such values map onto CI representations, the answer to the restated version of (27c) would still be affirmative. Thus, it seems that no matter where the boundary between form and meaning is drawn, there are uninterpretable features in the sense of (3).

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[19] This point has been made forcefully by my colleague Michal Starke in numerous lectures over recent years.

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