Honorific marking: Interpreted and Interpretable

Ash Asudeh, University of Canterbury
Christopher Potts, UMass Amherst

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1 Introduction

The pronominal systems of languages like French, German, and Russian are notable for a formal vs. familiar distinction in their pronouns of address. Typically, the formal pronoun is borrowed from elsewhere in the paradigm, but not always. For example:

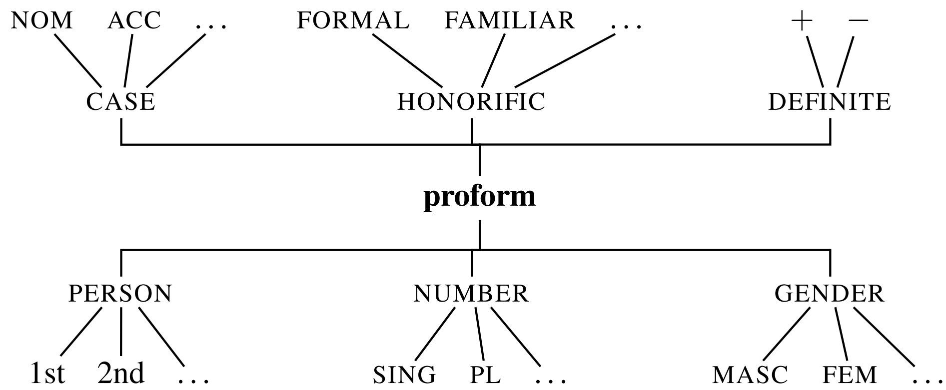
(1) **Some nominative formal and familiar pronouns**

	familiar	**formal**	
Danish	du	De	[same as 3rd plural]
German	du	Sie	[same as 3rd plural]
Russian	ty (ты)	vy (вы)	[same as 2nd plural]
French	tu	vous	[same as 2nd plural]
Spanish	tu	usted	[formal 2nd singular only]
Swedish	du	Ni	[same as archaic 2nd plural]

Japanese, Korean, and Thai provide yet more extensive and articulated honorification paradigms, with a range of special formal, familiar, and derogatory pronominal forms, as well as verb forms and others.

This extra dimension in the pronominal system separates these languages from, e.g., English and Arabic, where the pronominal paradigms make no such distinction. But it is evident that, in natural language, a pronoun's feature structure can be at least as complex as (2) will allow. (HONORIFIC organizes the formal/familiar distinction.)

(2)



The relationship between this feature structure and semantics is the overarching concern of this paper. The investigation takes on special significance internal to the Minimalist Program (MP), where a second-order feature (a feature of features) called *interpretable* is central to explaining feature distribution and regulating the application of a range of transformations.

The HONORIFIC dimension of the above pronoun structure has received relatively little attention; person, number, gender, and case are the usual focus of ϕ-feature studies (Anagnostopolou 2003; Harley and Ritter 2002). But HONORIFIC and DEFINITE are arguably the only members of this feature set that are reliably and predicably interpreted by the semantics. For the others, the syntax–semantics connection is not specifiable in a general way. Section 2 more fully explains the difficulties and their consequences. For similar arguments, we refer to Babby 1994 (on case), Sauerland 2002 (on tense), and Kratzer 1998 (on person).

This apparent disparity raises important questions for researchers studying the mapping from syntactic structures to interpretations (models of the world, mental representations). The following related questions are of special concern to us in this paper:

i. Is there a homomorphic mapping from syntactic features into denotations?

ii. Do we need to have a syntactic distinction between interpretable and unintepretable features?

Our strategy is to assume that the answer to (i) is “Yes, there is a functional mapping from features to functions”. This basically commits us to answering (ii) with, “No, and therefore these contrasts must follow from something else about the combinatorics”. This entailment is brought out by the following two uses of instrumental case in Russian:

(3) a. Отец режет хлеб ножом.
Otets redzet xleb nozh-om
*father cuts bread knife.*INST
'Father cuts bread with a knife.'

b. Он будет профессором.
On budet professor-om.
*he will-be professor.*INST
'He will be a professor.'

In (3a), the instrumental case-marker *-om* contributes the meaning $[\![$*with*$]\!]$, which we could specify as a function from entities into predicate modifiers (type $\langle e, \langle\langle e, t\rangle, \langle e, t\rangle\rangle\rangle$). Without this function, the structure will not be interpreted properly if it is interpretable at all.

Roughly the opposite is true for (3b). Here, the instrumental case marking *-om* has no instrumental meaning. It simply marks the predicate-nominal argument to the future copular verb. If we interpreted it, we would presumably end up with something like *He will be with a professor*, a much different meaning than is carried by (3b).

Our positive answer to (i) affords an efficient explanation for this contrast. In both (3a) and (3b), the instrumental case feature denotes the function $[\![$*with*$]\!]$. However, in (3a), this feature remains *unchecked*, whereas in (3b) the feature is *checked*. To make this checking procedure precise and to bring out its underlying logic, we introduce a small fragment of linear logic (Girard 1987). Linguistic applications of linear logic have been most extensively explored in Glue semantics (Dalrymple 2001, 1999; Asudeh 2004), but recent work has explored the applications of linear logic to the Minimalist Program (see Retoré and Stabler 2004 and the other papers in the special issue of *Research on Language and Computation*). This paper has obvious connections to the recent work mentioned, particularly to Cornell (2004). Crouch and van Genabith (2000) present an introduction to linear logic for linguists that assumes very little logical background.

The fragment of linear logic that we adopt permits us to define terms like those in (4).

(4) a. INST

b. INST $\multimap$ INST

c. INST $\multimap \mathbf{1}$

The first is an atomic resource. Both (4b) and (4c) are *resource-sensitive* implications. They are resource sensitive in the sense that they *consume* their antecedent resource to produce a consequent resource. If we feed (4b) the atomic resource INST, we receive INST back. If we feed (4c) INST, we get the identity $\mathbf{1}$ back. This logical consumption seems to model the MP notion of feature checking quite exactly. Both (4a) and (4b) can play a role in understanding interpretable features, and (4c) is the heart of our view of uninterpretable features. The central logical notion is that the term $\mathbf{1}$ does not affect truth or provability. It is an identity that, when conjoined to a premise, returns the premise unaffected. Thus, $\mathbf{1}$ effectively makes no logical contribution and we can generally ignore it. So (4c) removes INST from the composition. Schematically:

(5) a. father cuts bread knife.INST
INST

b. he will-be professor

$$\frac{\textsc{inst} \multimap \mathbf{1} \quad \textsc{inst}}{\mathbf{1}}$$

In the first, INST is interpreted; it is unchecked. In the second, INST becomes $\mathbf{1}$. That is, it is removed from the compositional interpretation; it is checked. So there is no need to have multiple realizations for INST. The apparent changes in its semantic contribution are handled by the checker INST $\multimap \mathbf{1}$, the relevant part of the feature structure for the copular verb *byt'* (*will be*), which governs the instrumental for predicate nominal arguments.

Throughout this paper, we rely heavily on Adger 2003, which provides the most systematically developed view of the MP to date. We devote special attention to the principle of Full Interpretation as it relates to semantics.

(6) **Full Interpretation** The structure to which the semantic interface rules apply contains no uninterpretable features. (Adger 2003:85)

The principle is generally viewed as guided by the semantics. We critically explore this assumption. We distinguish the notion of *interpretable* in the MP from a purely semantic notion *interpreted* (for which we provide a definition). What we find is that these two notions do not line up in an easy way. We attempt to rectify this situation by appeal to the ideas sketched above about the semantic consequences of feature checking, as viewed through our resource-sensitive logic. The guiding insight is that (6) is a principle about semantic composition rather than about semantic interpretation per se.

2 Interpreted features

Our overarching theoretical aim is to assess the extent to which the notion of *interpreted* from semantics corresponds to the technical term *interpretable* that plays a central role in the design of the MP's feature system.

The definition of *interpretable* in the context of the MP tends to be complex in the sense that, to determine whether a feature F is interpretable or not, one must gather together the diagnostics available in the literature and then adapt and apply them to the relevant structures containing F. Adger (2003:53) writes:

(7) "Syntactic features may also be accessed by the rules of semantic interpretation. Those features which have this effect are called interpretable features."

And Adger (2003:45) assumes that

(8) "[...] person, number and gender [...] go under the general name of Phi-features (often written ϕ-features). Φ-features appear to be interpretable, and are motivated by both semantic and morphological facts."

We will rely on this ostensive/working definition of *interpretable* to capture the intuition lying behind this term in Minimalist work.

Standard type-driven translation systems permit us to get a firm grip on the extension of the term *interpreted feature*, i.e., a feature that has a semantic reflex:

(9) **Interpreted features** A syntactic feature F in a structure S is *interpreted* iff changing F to the identity feature, $\mathbf{1}$, results in a syntactic structure S' such that $[\![S]\!]$ is not model-theoretically equivalent to $[\![S']\!]$.

We've given the definition in terms of model-theoretic interpretability. To some, this will sound unfairly restrictive — perhaps there are semantic effects that some would not describe in model-theoretic terms. But we do not intend (9) to be restrictive. We here adopt the view that *every* element of meaning is representable in model-theoretic terms (see, e.g., Stalnaker 1998, 1999).

The feature $\mathbf{1}$ mentioned in the definition is the identity, true at all nodes. We assign it the semantics of the identity function. So, to view condition (9) slightly differently, if we can replace a feature with the identity function in the semantics without changing the meaning of the whole, then that feature is not interpreted. (Perhaps such features denote the identity function already. If that is the case, then the substitution is vacuous.)

This perspective prevents clever semanticists from rendering the interpreted/uninterpreted distinction vacuous by claiming (rightly) that they can find a function for *any* syntactic feature one cares to propose. In many cases, they will come up with the identity function.

It's worth showing how (9) works by way of a few examples. Consider first the syntactic feature NOM. We'll assume it has a denotation, $[\![\textsc{nom}]\!]$, taking entities into entities. Thus, we can have application schemes like the following:

$$[\![\textsc{nom}]\!]\big([\![\textit{Isak}]\!]\big)$$

We claim that, whatever the effect of $[\![\textsc{nom}]\!]$, the following holds for any choice of functions f:

$$f\Big([\![\textsc{nom}]\!]\big([\![\textit{Isak}]\!]\big)\Big) = f\Big([\![\mathbf{1}]\!]\big([\![\textit{Isak}]\!]\big)\Big)$$

As a result of this equivalence, NOM is not an interpreted feature, because the structure obtained by exchanging NOM with the identity function is interpretively identical to the original. Here is another formula that makes the same point:

$$[\![\textsc{nom}]\!]\big([\![\textit{Isak}]\!]\big) = [\![\mathbf{1}]\!]\big([\![\textit{Isak}]\!]\big) = [\![\textit{Isak}]\!]$$

Not all features can be swapped with the identity function without a semantic alteration. Consider, for instance, the feature PAST in matrix sentences (not the zero-past that can appear in embedded clauses; Kratzer 1998). The following are obviously different:

(10) a. $[\![\textsc{past}]\!]\big([\![\textit{raining}]\!]\big)$

b. $[\![\mathbf{1}]\!]\big([\![\textit{raining}]\!]\big)$

The first locates $[\![\textit{raining}]\!]$ at some point in the past. The second is either timeless or located in the contextual present. So the propositions differ model-theoretically. It follows from (9) that PAST is interpreted. Sauerland (2002) argues that the English present tense is uninterpreted (has no presuppositions).

Definition (9) is about particular features. It is not about feature classes. Many generalizations in the MP hinge upon the (un)interpretability of feature classes like CASE and NUMBER, so it is useful to have access to this higher-level notion of interpretation. We can make use (9) to define this concept:

(11) **Interpreted feature classes** A feature class C is interpreted iff every feature F of C is such that, wherever F is used, F is interpreted as defined in (9).

The definition involves two universal quantifications: *every* feature in the class is interpreted in *every* one of its uses. If features have uniform semantic effects, that is, if there is a functional relationship between features and their denotations (as there is assumed to be for the rest of the lexicon; see Montague 1974; Partee 1997), then it will not be a context-sensitive matter whether a feature F is interpreted or not, and hence we can simplify the definition to "A feature class is interpreted iff every one of its members is interpreted". But we'll stick with the more general formulation in (11).

We now proceed to inspect the pronominal feature-space given above, to see which of the classes of features represented in that structure can reliably be called *interpreted*. What we find is that only the HONORIFIC and DEFINITE classes invariably provide work for the semanticist. We adopt a Heimian semantics for definites (Heim 1982, 1983) and we develop a semantics for formal and familiar pronouns using the proposal of Potts and Kawahara (To appear) as our guide.

2.1 Case

In order to meaningfully explore the relationship between case and interpretation, it is necessary to subdivide the CASE feature-class into *at least* three subclasses: structural case, lexical case, and thematic case (Babby 1994, 2004).

i. Structural cases are those that arise from specific configurations or positions that we can identify independently of individual lexical items.

ii. Lexical ("quirky") cases override structural-case provisions via lexical specifications.

iii. Thematic ("semantic") cases provide lexical content, turning their associated nominal into modifiers.

The difficulty with this classification is that it rarely if ever correlates well with morphological distinctions. Consider, for instance, the morphological instrumental case in Russian. It can makes entries into all three case-types, as we can see in (12)–(14).

(12) Она хочет быть переводчуцей.

Ona xochet byt' perevodchutseĭ.
*she wants to-be translator.*INST

'She wants to be a translator.'

(13) Отец доволен новой работой.

Otets dovolen novou rabotoĭ.
*father pleased new.*INST *job.*INST

'Father is pleased with his new job.'

(14) Отец режет хлеб ножом.

Otets redzet xleb nodzot.
*father cuts bread knife.*INST

'Father cuts bread with a knife.'

By our definition of *interpreted*, example (14) involves INST as an interpreted feature, whereas it is not interpreted in (12) or (13). What does this mean for the status of case features with regard to the principle of Full Interpretation, which ensures that the interpreted structure contains no uninterpretable features? Can it contain case features? Some of them? Which ones?

The problem is especially pressing in light of (15), which we conjecture is true of all natural languages.

(15) **Case Ambiguity Hypothesis**
No natural language has a morphological case that is used exclusively for semantic purposes. (Interpreted morphological case is always enlisted for other purposes: lexical governance (quirky case) or specific structural configurations (structural case).)

Thus, if (15) obtains, then there can be no language that is just like Russian except that its instrumental case invariably makes a semantic contribution, never appearing simply because a predicate or class of predicates governs it.

Similar observations could be made about the genitive case in numerous languages. Sometimes it signals possession or a related notion (Partee and Borschev 2001, 2003). Sometimes it is the reflex of some other element in the sentence, as with the genitive of negation in Russian, which has complex semantic effects (Partee and Borschev 2002, To appear). But at other times the genitive is present merely to satisfy the demands of a fickle predicate.

Even more striking support for hypothesis (15) comes from Finnish. It is well-known that Finnish and other Finno-Ugric languages have a wide variety of semantic cases, such as the elative and the illative, which respectively mean ⟦*out of*⟧ ("from inside out") and ⟦*into*⟧ ("from outside in"). These cases can nevertheless function as lexically assigned quirky case:

(16) Minä pidän hänestä.
I like her.ELATIVE
'I like her.'

(17) Minä luotan häneen.
I like her.ILLATIVE
'I trust her.'

An attempt to maintain that the elative and illative are functioning in their usual semantic guise in these examples would be difficult to maintain. It might be claimed that the source of the liking in the first example is the object and that the liking therefore comes "out of" the individual that the object refers to. However, the source of the trust in the second example is equally the object, yet the illative is used. It might similarly be tempting to think of the second example analogously to the English *I trust in her*, but other languages use completely different spatial relations to encode the abstract relationship. For example, Swedish uses *på* ('on'), as in:

(18) Jag litar på henne.
I trust on her
'I trust her.'

The semantic case that expresses ⟦*on*⟧ in Finnish is the adessive, though, not the illative.

Before closing this section, we should address one issue pertaining to structural cases like NOM and ACC in English. We claim that these are not interpreted, in virtue of the fact that

(19) $[\![\text{NOM}]\!]\big([\![a]\!]\big) = [\![\mathbf{1}]\!]\big([\![a]\!]\big) = [\![a]\!]$ for any a.

But one might object that there is a sense in which nominative case correlates with a class of semantic objects, namely, that it is typically the last argument to the predicate (or the thing that applies to the main predicate of the clause). So when we look at verb denotations, we can identify the nominative argument as the first projection of the tuples in that verb meaning. English accusative case seems to mark non-initial members of these sets of tuples. Are these cases then *interpreted* in the relevant sense? According to (9), they are not, in virtue of equations like (19) above.

Similarly, one might wonder whether accusative case plays an important interpretive role in sentences like (20).

(20) Den Hund habe ich gebissen.
*the.*ACC *dog.*ACC *have I.*NOM *bitten*
'I bit the dog.'

Here, the case marking is a listener's primary grammatical cue that the structure is inverted — an OVS structure rather than the canonical SVO structure of German main clauses. Does this mean that NOM and ACC are interpreted? For us, it does not. What has happened is a syntactic inversion. It might have happened for many reasons: the presence of certain features, the information status of the object, or the information status of the subject (Ward and Birner 2004). The reorganization does not change the argument structure of the relation ⟦*gebissen*⟧ ('bitten'): ⟦*den Hund*⟧ ('the dog') is still its first argument, ⟦*ich*⟧ ('I') still its second. So we need not use the case-marking to interpret this structure. Speakers might use these case distinctions to get at the logical form of the sentence, but this does not mean that the cases themselves are semantically potent. They guide speakers to a logical form like

$$\textbf{bitten}(\textbf{the}(\textbf{dog}))(\textbf{speaker})$$

and away from

$$\textbf{bitten}(\textbf{speaker})(\textbf{the}(\textbf{dog}))$$

But at no point do we need to include functions like $[\![\text{NOM}]\!]$ in the semantics.

Case thus provides a good testing ground for the notions "uninterpretable" and "interpretable". In particular, it illustrates the danger of understanding these terms based solely on their intuitive content. On the one hand, we observe pre-theoretically interpretable Case — like the Russian instrumental and genitive and even more strikingly the Finnish elative and illative — apparently functioning as structural cases akin to nominative and accusative, which we would normally think of as uninterpretable. On the other hand, nominative and accusative pick out semantic arguments, so these cases seem more interpretable than previously thought.

2.2 Number

We encounter fewer difficulties when interpreting NUMBER features than we do when interpreting CASE features, but the issues remain complex in this area. To what extent can we reliably interpret a feature like PLURAL?

We aim to make these remarks independent of specific theories of semantic plurality. So we make the minimal assumption that the entity type, e, has two subtypes, as follows:

(21) a. e_s is the type of singular entities

b. e_p is the type of plural entities

c. $e = e_s \cup e_p$

We can remain open about the exact relationship between the domains for e_s and e_p. The relevant interpretive question can now be stated as follows: does the syntactic feature PL(URAL) invariably bring its associated nominal's denotation into the domain for e_p? Some well-known examples suggest that the answer is no. Consider, for instance, the following, which is discussed by Kratzer (1998) and Schlenker (2003) (we believe the example itself is due to Irene Heim):

(22) a. Few students did their homework

b. **few**(**student**(x))(x **did** x**'s homework**)

The formula in (22b), an informal semantics for the dominant reading of (22a), suggests what the issue is: the syntactically plural bound pronoun and the syntactically plural restriction on *few* correspond to a singularity and a set of singularities, respectively. These facts mean that we cannot maintain attractive mapping principles like (23) unless their semantic consequences are mitigated by other aspects of the grammar.

(23) a. [pro, PLURAL] translates a variable of type e_p.

b. [N, PLURAL] translates as a term of type $\langle e_p, t\rangle$.

Nonetheless, there are cases in which we can see that agreement, reflecting a singular/plural contrast, is crucial for semantic interpretation. The subject noun phrases in (24), from McCawley 1998, change their denotations in a way that we could describe using SING and PLURAL.

(24) a. My lover and best friend is coming to dinner.

b. My lover and best friend are coming to dinner.

In the first example, singular agreement tells us that the subject denotes a single entity. In turn, plural agreement in the second tells us that the example involves a distributed determiner (*my lover and my best friend*). This complex interplay between the syntax and the semantics is further emphasized by the following examples, based on those found in McCloskey (1991):

(25) a. That the politician censored the press and that he was reelected is not surprising to me.

b. That the politician censored the press and that he was reelected are not surprising to me.

c. It is not surprising to me that the politician censored the press and that he was reelected.

d. *It/they are not surprising to me that the politician censored the press and that he was reelected.

When the two clauses are interpreted as referring to independent propositions, we find plural agreement. Where they are related in such a way as to form a single proposition, the agreement is singular. Example (25c) is revealing in that it is ambiguous between (25a) and (25b) readings; plural agreement, or a plural pronoun, is impossible, as in (25d). So the ties between this semantic puzzle and syntactic form are tight.

We have not even begun to solve the problem of how NUMBER is interpeted. We have merely revealed that this is a nontrivial question, and in turn that talk of NUMBER as interpetable is risky unless "intepretable" is regarded as a particular kind of *syntactic* property.

2.3 Gender

The semantic basis for gender might be different in different languages (Jacobson 2000). In English, it seems based fairly squarely in the semantics, with only a few specialized exceptions, all highly conventionalized (e.g., ships and other beloved transportation machines get feminine gender). But English is not representative; gender is only grammaticized in the pronominal system. To understand gender, we must look to languages with more robust and pervasive means for dividing up the lexicon along this dimension.

German and Russian are useful starting places. Each has a three-way distinction in the lexicon: masculine, feminine, and neuter, with the gender distinction disappearing in plural forms. For these languages, we might generalize as follows:

(26) a. Where the referent(s) have a perceived gender independently of language, the gender system is semantic.

b. Where the referent(s) are not seen as having a language-independent gender, they receive their grammatical gender based on the form of the word or arbitrarily.

Hypothesis (26b) is not of much concern to us here. It is easy to find illustrations for it:

(27) a. das Television
*the.*NEUT *television*

b. der Fernseher
*the.*MASC *television*

Since (26b) doesn't say much about the semantics, we'll pass over it, moving to (26a), which is more pressing for the syntax to semantics mapping. To illustrate (26a), we offer the following Russian example:

(28) papa (папа)
*father.*MASC [*-a signals a feminine form*]

The noun *papa* has an ending typical of feminine nouns, and it declines like a feminine noun. But because it refers to a class of male entities, it determines masculine agreement.

However, even Russian and German call into question the validity of (26a). For instance, the German diminutive suffix *-chen* determines neuter gender. This grammatical gender wins out over a language-independent gender in forms like those in (29).

(29) das Mädchen
*the.*NEUT *little-girl.*NEUT

When a phrase like (29) establishes a discourse referent, one generally uses *es* ('it.NEUT') to refer to it. This further amplifies the difficulties with (26a).

Russian presents a slightly different kind of challenge. Many common nouns that refer to professions (banker, lawyer, doctor, etc.) have masculine gender. When they are used as predicate nominals with female subjects, they retain their masculine gender, which results in a somewhat unusual (for Russian) gender mismatch:

(30) Она хороший врач.

Ona xoroshiĭ vrach.
she.FEM *good*.MASC *doctor*.MASC

'She is a good doctor.'

Hypothesis (26a) is not easily squared with such examples. They seem to indicate the triumph of syntax and morphology over semantics. They mean that we cannot even interpret, e.g., masculine gender as a sufficient condition for inclusion of its denotation in the class of male entities. The only thing we can do is assume that gender, at least in Russian and German, does not have a semantic interpretation. It is not interpreted.

We conjecture that the same is true of languages with more robust gender systems, including those with complex classifier systems (e.g., Bantu languages). For such systems, we find a broad correlation between the classifications and speakers' conceptualization of the world, but this breaks down for too many cases to give us hope that the relationship is governed by interesting conditions.

2.4 Definite

Heim (1982, 1983) uses the morphological features [+DEF] and [−DEF] to implement the principles of novelty and familiarity within File-Change Semantics. In essence, the principles say that noun phrases marked [−DEF] must be discourse-new and noun phrases marked [+DEF] must be discourse-old. Indefinites headed by *a* are typical [−DEF] phrases, and definite descriptions are typical [+DEF] phrases. The principles yield a satisfying account of contrasts like (31), among many others.

(31) a. Jim showed a movie$_i$. It$_i$ starred Buster Keaton.

b. Jim showed a movie$_i$. The movie$_i$ starred Buster Keaton.

c. #Jim showed it$_i$. A movie$_i$ starred Buster Keaton.

The DEF features are interpreted according to our definition (9). For example, the following phrases are not treated identically by the dynamic system:

(32) a. $man_{[-\text{DEF}]}$

b. $man_{[+\text{DEF}]}$

c. $man_{[\mathbf{1}]}$ (= *man*)

It might be that (32c) is not defined at all; in Heim's system, every noun phrase must bear some DEF feature. But it is more interesting to assume that (32c) is defined. It lacks a DEF feature, so it is subject to neither the novelty condition nor the familiarity condition. As a result, the dynamic system will treat it differently from either (32a) or (32b). We conclude that the features are interpretable.

These assumptions seem to stay in lockstep with the morphology of English. It seems that the definite and indefinite articles reliably contribute to the overall interpretation in ways that are consistent with Heim's dynamic treatment. Only examples like (33) might give one pause.

(33) a. Sue is a doctor.

b. Sue is the president.

c. Sue is a president.

In (33a), it seems that, as semanticists, we want to ignore the indefinite article in order to get right at the property denoted by *doctor* (see Partee 1987). But the contrast between (33b) and (33c) indicates that articles remain semantically potent even in these copular constructions: example (33b) indicates that $[\![\mathit{president}]\!]$ is a singleton, whereas (33c) allows that there might be multiple presidents, and thus the choice of (33c) over (33b) conversationally implicates that $[\![\mathit{president}]\!]$ has at least two members.

One might question whether DEFINITE belongs in the class of ϕ features. We maintain that it does belong there. It contributes to the morphological shape of pronouns, and it can also contribute to the agreement system. We see this in the declension system of German, which has both strong and weak variants. For example:

(34) a. das rote Haus
the.NEUT *red*.NEUT *house*

b. ein rotes Haus
a.NEUT *red*.NEUT *house*

Definite determiners (*das*, *der*, *die*, ...) determine the strong agreement forms, as in (34a). Other determiners in this class are positive and negative universals and possessives. Indefinite determiners (*ein*, *eine*, *einer*, ...) determine weak agreement, along with cardinal determiners, *viele* ('many'). Indeed, the strong/weak distinction in this area closely mirrors the strong/weak distinction of generalized quantifier theory, which provides additional evidence that DEF is semantically contentful.

We turn now to the final feature in (2), HONORIFIC. Like DEF, it is interpreted. We think it is not an accident that these two features pattern together semantically, because we claim that the interpretation of HONORIFIC is best done in terms that closely mirror the above (simplified) Heimian analysis of definites and indefinites.

3 The semantics of formal and familiar

Potts and Kawahara (To appear) develop a semantics for a wide range of honorific and antihonorific constructions in Japanese. We provide some of their examples in (35)–(38).

(35) Jim-wa o-warai-**ninar**-anakat-ta. [subject honorific]
*Jim-TOP laugh-**subj.hon**-not-*PAST

i. 'Jim did not laugh.'

ii. 'The speaker respects Jim.'

(36) Kathyrn-wa Sam-o hai-ken-shi-nakat-ta. [object honorific]
*Kathryn-TOP Sam-*ACC ***obj.hon**-saw-do-not-*PAST

i. 'Kathryn did not see Sam.'

ii. 'The speaker respects Sam.'

(37) Mary-ga ringo-o tabe-**mashi**-ta. [performative honorification ('polite
*Mary apple ate-**perf.hon**-*PAST
speech')]

i. 'Mary ate the apple.'

ii. 'I am speaking nicely to you.'

(38) John-wa [Mary-ga nesugoshi-**chimat**-ta] -koto-o shitteiru. [antihonorification]
*John Mary oversleep-**antihon**-*PAST *-fact know*

i. 'John knows that Mary overslept.'

ii. 'It sucks that Mary overslept.'

At the heart of their analysis is a parallel with the Heimian analysis of the way definite noun phrases track discourse referents dynamically. Here, we employ a simplified and slightly modified version of their proposal to the features FORMAL and FAMILIAR.

The descriptive claim is that formal and familiar pronouns harbor expressive content (Potts 2003, 2004). We now run through the central properties of expressive content, showing how they apply to formal and familiar pronouns.

3.1 Conventionally-encoded content

Communicators can be expressive in numerous ways: with hand gestures, with facial expressions, with body language, with amplitude, etc. These aspects of communication might one day have a place in semantic theory, but it is clear that the conventionally-encoded content is the most pressing for linguists. If expressive content emerges as an essential fact about some lexical item, then we are forced to pay attention to it. The descriptive aim of Potts (2003, 2004) can be seen as, in part, an attempt to show that a rich class of lexical items harbor expressive content. Formal and familiar pronouns are a particularly clear case, as they indicate that expressive content is sometimes to be found in a closed-class, highly grammaticized area of the lexicon.

3.2 Speaker-orientation

Expressive content is speaker-oriented in the sense that it always arrives with the same force as matrix-level content. No operators can ever take scope over it. Examples like (39) indicate that this is a property of formal and familiar pronouns:

(39) a. [School teacher to a waiting parent]
"Das Kind sagt, dass Sie seine Mutter sind."
*the child says that you.*FORM *its mother are*

b. [Son to his father, a school teacher]
"Karl behauptet, dass du seine Hausaufgabe verloren hast."
Karl maintains that you his homework lost have

Here, the embedded subject pronouns indicate something about the relationship between the speaker and his addressee. There is no sense in which either example can convey that, for example, the matrix subject bears this relationship to the addressee. The Japanese examples above work the same way. For example, (38) cannot attribute to John the negative feelings that the antihonorific *chimau* conveys.

3.3 Descriptive ineffability

The formal/familiar distinction can be mysterious to second-language learners whose native languages lack this dimension. The mystery is only heightened by the fact that it is extremely difficult for native speakers to articulate the meaning of these items or even carve out the conditions under which they are used. (This task is hard even for native speakers.) We use *descriptive ineffability* as a coverterm for this stubborn resistance to paraphrase. It indicates to us that the content that these items offer is not propositional. Section 3.5 shows how it can be treated in entirely non-propositional terms.

3.4 Immediacy

The *immediacy* property says that these pronouns are performatives: they have an immediate effect on the discourse. Their content is not negotiable in the way that regular declarative content is negotiable.

3.5 Analysis

The above considerations indicate to us that a formal theory of formal/familiar pronouns should assign them nonpropositional content that we can classify as performative in some sense. These two desiderata go hand-in-hand, and the discussion of DEFINITE features above suggests a way to satisfy them. Our fundamental claim is that these pronouns contribute special expressive discourse referents (in addition to their regular function of referring to the addressee).

To formalize the idea that these pronouns contribute special kinds of discourse referent, we introduce two new primitive objects into our interpreted structures: † and ℓ. The first (which recalls a necktie, no?) represents formal content, the second (which should look intertwined) represents familiar content. More specifically, we say that the presence of † in the discourse means that the speaker is formal (feels herself to be on formal terms with) the addressee, and ℓ in the discourse means that the speaker is familiar (feels herself to be on familiar terms with) the addressee. (Potts and Kawahara are led to a significantly more complex view of the models by the diversity of honorific and antihonorific expressions in Japanese.)

Like the feature +DEF, the feature FORMAL is subject to a felicity condition, namely, that the context contains a †. Similarly, FAMILIAR is felicitous only if the context contains a ℓ. We specify in addition that every context contains † or ℓ and that no context contains both of them.

We now have an account of why it is impossible to mix formal and informal pronouns within a single discourse:

(40) * Sie haben gesagt, dass Du uns helfen würdest.
*you.*FORM *have said that you.*FAM *us help would*
'You said that you would help us.'

(41) * Du hast gesagt, dass Sie uns helfen würden.
*you.*FAM *have said that you.*FORM *us help would*
'You said that you would help us.'

The reasons these examples fail is that they place contradictory demands on the context. For instance, (40)'s matrix subject requires a † context and its embedded clause requires a ℓ context. But, just as we cannot shift the referent of a first-person pronoun in German (or any of the languages under discussion here; see Schlenker 2003 for complications), we cannot shift the context in such a way as to change † to ℓ, or the reverse (see (41)).

Thus, to recap this section: we claim that HONORIFIC features are always interpreted. Like DEFINITE, they can thus be counted among the interpretable features in an unproblematic way, because for them we can equate this notion with that of interpreted, which is given model-theoretic grounding in (9) above.

What about the numerous examples discussed above in which it was hard to see how to make sense of the notion *interpretable* and its negation? We address that issue in the next section, arguing that we can clarify the situation by viewing the relevant features from the perspective of a resource-sensitive logic for composition.

4 Feature checking as resource consumption

One of the foundations of the Minimalist Program is the notion of feature checking. We would like to have a formal theory of feature checking: a logic of feature checking. We would like to understand better how interpretable and uninterpretable features are different from each other. They are usually conceived of as second-order features — features of *sets of* features. We are, at least for now, suspicious of this lifted version of the features system. Other feature-based theories of syntax (HPSG, LFG) have so far not required such higher-order features, at least not in anything like the sense of [$\pm$interpretable].

A resource logic seems ideally suited for both these tasks. Such a logic precisely captures the intuitions behind feature checking and provides a basis for understanding the distinction between interpretable and uninterpretable features. We here adopt the influential resource logic of linear logic (Girard 1987). Linear logic is a substructural logic that lacks the structural rules of *weakening* and *contraction* (Restall 2000). Weakening allows premises to be freely added without affecting logical consequence:

(42) If $\Gamma \vdash B$, then $\Gamma, A \vdash B$ (weakening)

Contraction allows additional occurrences of premises to be freely discarded:

(43) If $\Gamma, A, A \vdash B$, then $\Gamma, A \vdash B$ (contraction)

Lack of weakening and contraction means that premises cannot be reused or discarded. The premises can then be construed as resources that must be consumed. The resulting logic is a resource logic. In order to demonstrate the relevance of resource sensitivity to feature checking, we need to introduce a few of the basic notions of resource logics.

The principle connective we require is a kind of implication, which we symbolize with $\multimap$. This operator has some of the characteristics of its classical counterpart $\rightarrow$, but readers should be wary of equating the two, or attempting to import insights about $\rightarrow$ to understanding $\multimap$, because the two are rather different.

It is helpful to think of $\multimap$ as *consuming* its antecedent to produce its consequent. Thus, in the following short proof, the initial premise p is literally used up by the implication to produce q:

$$\frac{p \qquad p \multimap q}{q}$$

So we cannot have derivations like the following:

$$\frac{p \qquad p \multimap q}{p \qquad q} \quad \textbf{[INVALID]}$$

This is illegitimate because the p in the conclusion was used up in deriving q. Such *multiple consumption* is disallowed. The corresponding classical proof, with $\multimap$ changed to $\rightarrow$, is impeccable; classical logic allows premise reuse.

We are also unable to have proofs in which some premises (resources) are ignored. For instance, the following is invalid:

$$\frac{p \qquad p \multimap q}{p} \quad \textbf{[INVALID]}$$

With the implication $p \multimap q$ unused, the proof fails. The classical version of this is legitimate, because classical logic allows one to ignore premises.

If we adjust the presentation a bit, we see that this is familiar stuff for linguists. The combined effect of these proofs can be summarized as follows: an implication is a licit premise only if its antecedent is also a premise. If we view the antecedent as an uninterpretable feature and the implication as a feature-checker, we arrive at a formalization of feature checking that comes right from linear logic.

The fragment of linear logic that we use for the logic of feature checking ($\mathcal{L}_{fc}$) is shown in Figure 1. It is an extremely weak logic. It allows only implication elimination (modus ponens), conjunction introduction (conjunction of premises), and identity elimination (removal of the identity). The logic therefore allows only elimination of features and does not permit introduction of features, which is just the checking behavior required. From a logical perspective, it is quite surprising that such a weak logic could form the basis for an aspect of linguistic competence, a very complicated cognitive capacity.

It is interesting to briefly note the possibility of adding the rule of implication introduction:

Implication (elimination)	**Conjunction** (introduction)	**Identity** (elimination)
$\dfrac{A \multimap B \qquad A}{B}\multimap_{\mathcal{E}}$	$\dfrac{A \qquad B}{A \otimes B}\otimes_{\mathcal{I}}$	$\dfrac{A \qquad \mathbf{1}}{A}\mathbf{1}_{\mathcal{E}}$

Figure 1: Natural deduction for the logic of feature checking ($\mathcal{L}_{fc}$)

(44) **Implication Introduction**

$$\dfrac{[A]^i \rightsquigarrow B}{A \multimap B}\multimap_{\mathcal{I},i}$$

The rule states that if we assume an A and derive a B from the assumption, then we can discharge the assumption to prove that $A \multimap B$ (A implies B). Implication introduction allows us to automatically derive a number of type changes, including type raising, from application of the proof rules alone, without further stipulation (van Benthem 1991). Here is the proof for type raising:

(45)
$$\dfrac{\dfrac{A \qquad [A \multimap B]^i}{B}\multimap_{\mathcal{E}}}{(A \multimap B) \multimap B}\multimap_{\mathcal{I},i}$$

In terms of feature checking, the addition of the introduction rule for implication allows on the fly construction of higher-order feature checkers; i.e., checkers of checkers. Since we are unsure of the linguistic motivation for such feature checkers, we do not add implication introduction to our fragment. It would be a potentially interesting direction for future research to see if there is in fact linguistic motivation for higher-order feature checkers. One possible linguistic use that deserves further investigation is in implementing Roll-Up (Rackowski and Travis 2000). If each successively higher feature checker in the Roll-Up path is one order of implication higher, then it seems that we get precisely the Roll Up behavior.

We now move to the linguistic theory proper. The first step is to define a set of features as atomic resources:

(46) $\left\{\text{NOM}, \text{ACC}, \text{INST}, \text{MASC}, \text{FEM}, \text{NEUT}, \text{DEF}, \ldots\right\}$

In addition to being a resource for feature-checking purposes, we assume that each denotes a unique function. We extend the interpretation function $[\![\cdot]\!]$ to these resources. For example:

(47) a. $[\![\textsc{nom}]\!] = [\![\textsc{acc}]\!] =$ identity

b. $[\![\textsc{inst}]\!] = [\![\textit{with}]\!]$

c. $[\![\mathrm{NP}_{+\textsc{def}}]\!] = [\![\mathrm{NP}]\!]$ is familiar

At this point it should be clear that the theory has dispensed with the notions of uninterpretable versus interpretable features. There are just features, all of which denote functions. The formerly uninterpretable features simply denote the identity function. We feel that this is a welcome move, because the theory no longer has a higher-order feature (a feature of features).

We define a general notion of *feature checker*

(48) A term ψ is a *feature checker* iff ψ is of the form $p \multimap q$, where p and q are members of the set of atomic resources.

If a feature checker is of the form $p \multimap \mathbf{1}$, then p becomes an uninterpretable feature, since the action of this checker is essentially to dispose of the feature. If a feature checker is of the form $p \multimap p$, then it checks the feature p but allows it to remain in the derivation for later interpretation. Checking of interpretable features is not something that MP typically espouses. However, there is a common notion that features that are uninterpretable in one place can be interpretable in another place. The $p \multimap p$ feature checkers model this “contextual interpretability”. For example, tense features are uninterpretable in little v but interpretable in T. We associate a feature TENSE with v and a feature checker TENSE $\multimap$ TENSE with T.

The $p \multimap p$ feature checkers can also model feature valuation (Adger 2003; 168–171), which occurs when a feature checker fills in the value for a feature that it checks. On this approach, v is assumed to have the feature TENSE without a value and its feature checker in T provides the value, e.g., PAST. Feature valuation ensures that only compatible values for a feature can be checked. In our system, this follows by assigning the feature values directly. For example, v would have the feature PAST and T would check PAST $\multimap$ PAST. The matching or valuation requirement follows from the logic of implication: a tense feature PRESENT cannot satisfy the checker PAST $\multimap$ PAST, because PRESENT does not satisfy the antecedent.

Certain lexical items have feature checkers as part of their lexical properties. For instance:

(49) a. bamboozle [English]
ACC $\multimap \mathbf{1}$

b. gefallen ('to please') [German]
DAT $\multimap \mathbf{1}$

c. byt' ('to become') [Russian]
INST $\multimap \mathbf{1}$

Each of these lexical items has a feature checker associated with it. If they appear in the absence of a phrase with the feature specified in the checker's antecedent, the result violates the proof-rules for $\multimap$, because the feature checkers remain unused (use everything!). If a feature checker takes two instances of its antecedent as its arguments, the result will also violate the proof rules for $\multimap$ (no reuse!). The resource logic thus gives perfect matching of consumers (feature checkers) and resources (features).

The Russian instrumental case demonstrates these ideas. We repeat our examples (12)–(14) here:

(50) Она хочет быть переводчуцей.

Ona xochet byt' perevodchutseĭ.
she wants to-be translator.INST

'She wants to be a translator.'

(51) Отец доволен новой работой.

Otets dovolen novou rabotoĭ.
father pleased new.INST *job*.INST

'Father is pleased with his new job.'

(52) Отец режет хлеб ножом.

Otets rezhet xleb nozhot.
father cuts bread knife.INST

'Father cuts bread with a knife.'

Example (50) demonstrates INST in its uninterpretable guise. The verb *byt'* has a feature checker INST $\multimap \mathbf{1}$ lexically associated with it, as in (49c). Example (52) demonstrates INST in its interpretable guise. There is no feature checker and INST simply remains in the derivation. Example (51) demonstrates a third aspect of $p \multimap p$ checkers. Case agreement between the adjective *tovou* and the noun *rabotoy* can be enforced by assigning the adjective a INST $\multimap$ INST feature checker. This checker is satisfied by consuming the noun's INST feature. Ultimately this use of the INST feature is uninterpretable, though. We associate the feature checker INST $\multimap$ $\mathbf{1}$ with the verb *dovolen*. Thus, the feature INST is checked off and eliminated by the INST $\multimap$ $\mathbf{1}$ feature checker associated with the verb, but only after the INST $\multimap$ INST feature checker associated with the adjective has enforced agreement. All of these examples demonstrate the elimination of the uninterpretable/interpretable distinction as a property of the features. In all cases, there is a single type of INST feature that is handled differently by different checkers or not checked at all.

We can now restate the principle of Full Interpretation. We first repeat Adger's (2003) definition:

(53) **Full Interpretation** The structure to which the semantic interface rules apply contains no uninterpretable features. (Adger 2003:§3.5.3)

Our version of this principle relocates the important features in the feature-checkers. We call it Full Interpretation (RS), where RS stands for *resource sensitive*:

(54) **Full Interpretation (RS)** The structure to which the semantic interface rules apply contains only atomic feature resources.

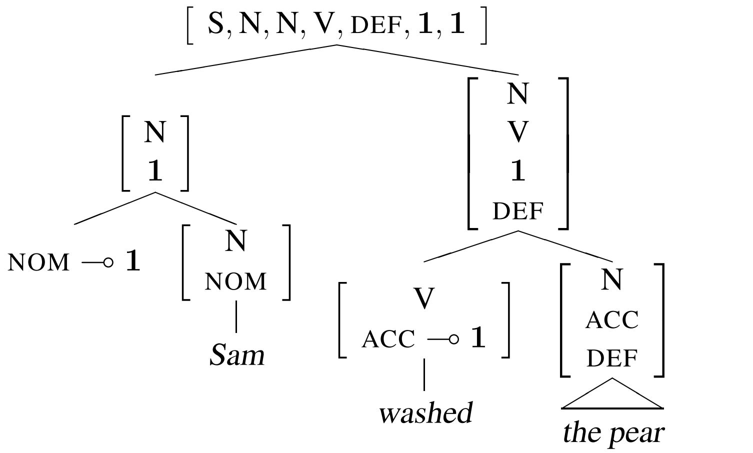
We offer a slightly more technical perspective on (54): it can be read as an injunction that the feature make-up of logical forms can be given in the form of multiplicative conjunctions (ordered n-tuples) of atomic feature resources. So we inspect a logical form, pull out all the linear logic terms, and form a kind of conjunction of them. If that conjunction contains only atomic (nonfunctional) terms, then it is well-formed, else it is ill-formed because it does not conform to Full Interpretation (RS). Full Interpretation (RS) is thus achieved by placing the following goal condition on our feature checking proofs:

(55) $\Gamma \vdash F_1 \otimes \ldots \otimes F_n$ all F_i atomic

Recall from Figure 1 that the connective $\otimes$ is (multiplicative) linear conjunction, just as $\multimap$ is linear implication. The goal condition states that a successful feature checking proof on a set of features G yields a conjunction of atomic resources. It follows from this statement and the use of a resource logic that all feature checkers must be satisfied and that all uninterpretable features must have been eliminated as a result.

The method by which we move from a full feature inventory for a derivation to one of these conjunctive formulae is governed entirely by the underlying substructural logic. Here is an example:

(56)



The feature resources are indicated to the right of the slash after the category feature. Notice that we have taken the representational shortcut of associating the feature checker for NOM with the subject, whereas we would want to associate it with T or some other higher functional projection in a more careful presentation.

We have represented feature consumption in the tree above. A more precise characterization is that we extract the linear logic terms (the features) and perform the following proof:

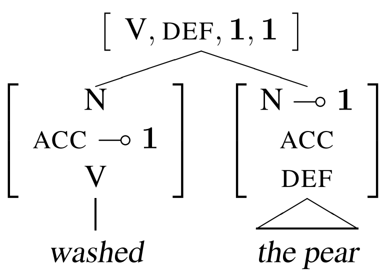
(57)

$$\dfrac{\dfrac{\mathrm{NOM} \multimap \mathbf{1} \qquad \mathrm{NOM}}{\mathbf{1}}\multimap_{\mathcal{E}} \qquad \dfrac{\mathrm{ACC} \multimap \mathbf{1} \qquad \mathrm{ACC}}{\mathbf{1}}\multimap_{\mathcal{E}} \qquad \mathrm{DEF}}{\mathrm{DEF}}\ \mathbf{1}_{\mathcal{E}}$$

We are left with just the interpreted feature DEF.

The categories can themselves be thought of as uninterpretable features that trigger Merge (Adger 2003:90ff). In this case we associate category features of the complement type with the head and $p \multimap \mathbf{1}$ checkers with the complements. This is shown here for just the verb phrase:

(58)



We suppress the proof for this premise set.

The notion of triggering Merge through feature checking highlights a more general facet of MP feature checking from which we have diverged. Uninterpretable features in MP drive the checking requirement such that a feature checker is necessary in order to check and eliminate the uninterpretable feature. Thus, feature checkers are present *because* uninterpretable features need checking. In the system we have developed so far, it is the feature checkers that drive checking: features are present *because* the feature checkers need to consume them. We chose this way of doing things because it dispenses with the notion of uninterpretable versus interpretable feature. We felt that there were theoretical reasons for doing this (the removal of higher-order features from the theory), but more importantly empirical reasons (the very same feature can be interpretable or uninterpretable, as demonstrated by Russian instrumental case and Finnish elative and illative). However, since the goal condition of our feature checking proof just requires a conjunction of atomic feature resources, nothing prevents just performing an "early conjunction" in the absence of feature checkers. For example, we could perform the following conjunction of the features from (56) (*Sam washed the pear*):

(59) $\text{NOM} \otimes \text{ACC} \otimes \text{DEF}$

But nothing has been checked!

There is a way to maintain the intuition that the uninterpretable/interpretable distinction should be dispensed with as well as the standard MP intuition that uninterpretable features drive checking. The solution is to use standard type theory. We type features as follows:

(60) a. F^u is the type of uninterpretable features

b. F^i is the type of interpretable features

c. $F = F^u \cup F^i$

This reintroduces the notion of uninterpretable and interpretable features, but as subtypes of a more general feature type. *Uninterpretable* and *interpretable* are not features of features, though, they are just *types* of a more general type of feature.

We can now restate our goal condition as follows:

(61) $\Gamma \vdash F_1^i \otimes \ldots \otimes F_n^i$

The goal is now to derive from a set of features Γ a conjunction of only *interpretable* features. We no longer need the stipulation that the members of the conjunction be atomic, because the typing ensures this: the requirement of a conjunction of type F^i resources cannot be satisfied by non-atomic resources, because these will necessarily have a higher type.

The resource logic now ensures that we get back the typical behavior of uninterpretable features driving checking, Merge, and so on. If an uninterpretable feature is left in the derivation, the statement in (61) cannot be satisfied, since there would features of type F^u in the conjunction. Therefore, $p \multimap \mathbf{1}$ feature checkers must be present to dispose of these resources. Our feature checkers do not need to change, though: their antecedents can just have the general feature type F. This means that we can continue to consistently give the Russian instrumental case the interpretable type $\textsc{inst}_i$.

In sum, this account of feature checking has a number of desirable properties:

i. Through the use of linear logic, we provide a formal logic for feature checking that precisely captures its intuitive content.

ii. The theory dispenses with "unintepretable" and "interpretable" as higher-order properties of features.

iii. The theory allows interpretable features to be consistently assigned but to behave as uninterpretable features in the presence of $p \multimap \mathbf{1}$ feature checkers.

5 Conclusion

The first part of this paper was devoted to highlighting the fact that the relationship between ϕ features and semantic interpretation is complex and idiosyncratic, so that we cannot easily make sense of claims like "ϕ features are interpretable", unless "interpretable" bears only a loose relationship to the semantic notion of *interpreted*, which is defined in (9). Only for the features DEFINITE and HONORIFIC (FORMAL and FAMILIAR) can we say with confidence that the features are interpreted. For the others, we find that they contribute to the semantics in some environments but not in others.

In section 3, we defined and motivated a semantics for HONORIFIC that matches the Heimian semantics for DEFINITE in the sense that it treats HONORIFIC features as indicating that the discourse contains one of two expressive discourse referents, † and ℓ. Every discourse contains one or the other of these features, and none contains both. Formal and familiar pronouns register which is in the discourse.

In section 4, we returned to the ϕ features that are more puzzling for the syntax–semantics mapping: PERSON, NUMBER, GENDER, and CASE. We developed a resource-sensitive logic for featuring checking that allows us to maintain that ϕ features have uniform semantic denotations on all the uses. That is, they do not challenge the fundamental notion that there is a homomorphism from the syntax to the semantics (Partee 1997).

Where the semantics of a given feature, we can identify a feature checker that eliminates it from the structure. Such terms are of the form $p \multimap \mathbf{1}$, where $\mathbf{1}$ is the identity element and thus makes no contribution. So these feature checkers literally consume their antecedent features. (If we need to have checking without elimination, then terms of the form $p \multimap p$ can do it.)

Our reinterpretation of feature-checking in terms of resource-sensitivity affords us a restatement of the principle of Full Interpretation, but this time as a condition on licit feature combinations. Our principle makes no appeal, explicit or implicit, to semantic structures. But this does not reduce it to an arbitrary principle. On the contrary: it is governed by deep principles of resource-sensitive logic. In effect, our proposal shows that the logic of feature checking cannot be reduced to the logic of semantic composition.

This move is motivated by the observation that whether a feature is "interpretable" does not line up well with whether it is semantically interpreted. However, the current proposal is also consistent with the proposal of Asudeh (2004:§3) to completely reduce Full Interpretation to Linguistic Resource Sensitivity. Asudeh (2004) follows other work in Glue semantics in using linear logic for the logic of semantic composition. The goal of a Glue proof of sentential semantics is an atomic type *t* linear logic term that corresponds to the sentence's meaning (proofs for subsentential constituents will have correspondingly higher types). The goal condition can be represented as follows:

(62) $\Gamma \vdash \phi : s_t$

Here Γ is the set of premises used to derive the conclusion, ϕ is the sentential meaning, and s_t is the corresponding linear logic term.

In the proposal we have made here, Full Interpretation (RS) ensures that the result of feature checking contains only interpretable features. We have noted in some detail that interpretable features can fail to be interpreted. However, these will have been taken out of the derivation by $p \multimap \mathbf{1}$ feature checkers. The result of feature checking will therefore contain features that will in fact be semantically interpreted. If semantic composition is resource-sensitive, then the features left after feature checking must all be properly consumed in deriving the interpretation. This effectively means that the logic of semantic composition is sufficient to ensure Full Interpretation (RS) and it is not needed as a separate statement. Since Full Interpretation (RS) replaced the version of Full Interpretation based on elimination of uninterpretable features (Adger 2003)85, FI can be entirely eliminated from the theory due to the resource-sensitivity of semantic composition. However, successful elimination of FI depends on a logic for feature checking that successfully handles the intuitive notion of "uninterpretable" feature. We have presented such a logic here.

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