

The Syntax of Valuation and the Interpretability of Features*

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1. Introduction

The features of lexical items interact through agreement to influence the shape of syntactic structure and the process of semantic interpretation. We can often tell from the form of a construction that agreement has taken place: the value of a particular feature is morphologically represented on more than one lexical item, even though semantic interpretation may be lacking on some of these lexical items. Less obvious is the nature of the process that yields agreement in the first place. Less obvious as well is the syntax of the output of this process. Because of the central role played by agreement in syntactic theory, much work over the last decade has been devoted to all these topics.

In this paper, we will present a particular proposal about the nature of agreement processes and the syntax of its output. Our proposal builds on current work, but departs from existing research in a number of ways. We hope to demonstrate that our proposals not only advance the overall understanding of agreement, but also contribute to a clearer and simpler view of a number of specific syntactic phenomena. At the heart of our proposal is a conception of agreement that draws on various traditions that view it as "feature sharing". We combine this conception with a proposal that valuation and interpretability of features are independent concepts. These ideas taken together allow us to revise existing analyses of a number of syntactic constructions. In particular, we will focus on the role of verbal tense morphology in specifying other properties of a sentence, and the comparable role played by *wh*-morphology in specifying clause type. Particular attention will be devoted to the syntax of raising constructions and to an analysis of sentential subjects that improves on earlier work of our own.

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We begin with some simple observations about the nature of agreement. Consider the Latin sentences in (1). In these examples, we can observe agreement between D, N and A, and between DP and the finite verb:

- (1) a. Haec puella Romana ambulat.
 this-Nom.Fem.Sg girl-Nom.Fem.Sg Roman-Nom.Fem.Sg walks-3.Sg
- b. Hae puellae Romanae ambulat.
 these-Nom.Fem.Pl girls-Nom.Fem.Pl Roman-Nom.Fem.Pl walk-3.Pl

Agreement clearly involves features of lexical items that differ along two dimensions: valued/unvalued and interpretable/uninterpretable. We begin by discussing these two distinctions separately.

Let us consider valuation first. Certain features on lexical items appear to come from the lexicon unvalued, and receive their value from a valued instance of the same feature, present on another lexical item. The fact that D, N and A in (1) all bear the value *feminine* for the feature *gender* is due to a property of N — namely, the fact that the noun *puella* is listed in the lexicon as feminine. Neither the demonstrative *hic* 'this' nor the adjective *Romanus* 'Roman' comes from the lexicon with a value for gender. The gender feature of D and A is lexically *unvalued*, and gets valued as a consequence of a syntactic process of agreement with the gender feature of N. Likewise, the *number* feature of D and A is probably not valued in the lexicon, but gets valued as a result of agreement with N. One argument in favor of this point of view is the existence of *pluralia tantum* nouns — nouns like Latin *moenia* 'town walls' or English *scissors* that are always plural in form, thus indicating lexical valuation of N for number. By contrast, there are no pluralia tantum determiners or adjectives, at least in languages with which we are familiar. This fact suggests that number, like gender, is valued in the lexical entries of nouns, but is unvalued in the lexical entries for determiners and adjectives.¹ More generally, the existence of

¹ This view, which we will maintain for the DPs of languages like English (and possibly Latin and Russian), might not be correct for all languages. For example, in Spanish, genuine pluralia tantum of the sort described in the text seem not to exist. "Semantic" pluralia tantum do exist, e.g. *tijeras* 'scissors', *pantalones* 'pants', which is morphological plural, while referring to a singular object. This object, of course, is in a sense plural (or more accurately dual) in containing two identical moving parts, which function together to create the named object. In Spanish, unlike English, words for such objects may also be used in their singular form, e.g. *tijera*, *pantanolón* which also mean 'scissors' and 'pants', respectively. This might suggest that plural morphology in Spanish is the result of "m-merger" (Matushansky (to appear b)) of a distinct Num head with N (Picallo (1991), Ritter (1991), among others), rather than a lexical property of N itself, as in English. (See Heycock and Zamparelli (2005) for related discussion.) If this more nuanced view is correct, then Spanish would fall within the system of Borer (2004a; 2004b), who argues that features such as number are not specified directly on N, but attach to N via the syntactic amalgamation of an independent head with a category-free root.

tantum forms for a particular feature F within a particular syntactic category X can be taken as a sign that F is a valued feature for words of category X.

Agreement involving V presents a similar picture. Number and person are presumably unvalued in the lexical entry of V (for example, there are no *pluralia tantum* nor particular-person *tantum* verbs²). Number and person on V are valued as a consequence of agreement. By contrast, *tense* (T) on V is valued in the lexicon.³ One might wonder whether unvalued occurrences of T-features also exist. In Pesetsky and Torrego (2001; 2004), we argued that they do, as suggested by Williams (1994, 11) (see also Haerberli (2002)). In particular, we argued that structural case like the nominative marking seen in (1) is unvalued T, thus integrating case into the general system of agreement.

Having examined valuation, let us now consider the *interpretable/uninterpretable* distinction. This distinction is concerned with a different question: whether or not a feature of a particular lexical item makes a semantic contribution to the interpretation of that item. In (1a-b), the person and number features on DP may make a crucial contribution to semantic interpretation. The corresponding features on V appear to make no contribution to meaning whatsoever.⁴ (Likewise for the number features of A.) Similarly, nominative case on D, N and A makes no semantic contribution (see Pesetsky and Torrego (2001, 407 note 17). If we were correct, however, in viewing nominative case as unvalued T in Pesetsky and Torrego (2001;

² To be sure, there are verbs that lack a particular form, or only occur in a particular form for a variety of reasons, but we are unaware of verbs that have, for example, only first person forms — i.e. both first person singular and plural, but not other persons. Norvin Richards (personal communication) notes that languages such as Hopi often show suppletion in verbal number agreement (see also Noyer (1997)). If we are on the right track, these are irregular agreeing forms of a single lexeme, not distinct singular and plural *tantum* forms.

³ Past-tense *tantum* verbs may exist, e.g. Latin *meminisse* 'remember' which is present in meaning but has only perfect-system forms. Likewise *coepisse* 'began', which is past tense in meaning, but is unattested in the present.

⁴ An anonymous reviewer notes in connection with this presentation the possible relevance of the phenomenon of *pluractionality* or *verbal number*. This is a situation in which verbal morphology appears to specify that more than one event took place (or alternatively that a participant in the event is itself a plurality — independent of the morphological number associated with that participant). One might speculate that pluractionality displays an option available in some languages but not others to semantically interpret an independent number feature on V. As emphasized by Corbett (2000, 243-264), however, the available data concerning actual cases of "verbal number" cross-linguistically leaves it somewhat open whether the phenomenon does in fact involve the same features implicated in nominal plurality. Corbett also notes the difficulty in distinguishing (in effect) a possible grammatical feature of number on V from properties of the encyclopedic information carried by individual verbs (e.g. English *scatter* or *disperse*) which may invoke plurality without an actual grammatical feature.

2004), then the same features do make a semantic contribution elsewhere in the structure — a topic to which we return below.

The study of the distinctions important to agreement is of particular significance to the theory of syntax if a conjecture by Chomsky (2000; 2001) (henceforth *MI/DbP*) is true. In *MI/DbP*, Chomsky has argued that the rule establishing agreement (*Agree*) is a component of movement, and thus is central to syntax. Chomsky suggests that agreement is the consequence of a situation in which an unvalued instance of a feature *F* c-commands another instance of *F*:⁵

(2) **Agree (Assignment version; following Chomsky (2000; 2001))**

(i) An unvalued feature *F* (a *probe*) on a head *H* scans its c-command domain for another instance of *F* (a *goal*) with which to agree.

(ii) If the goal has a value, its value is assigned as the value of the probe.

If the probe also bears the so-called EPP property⁶, rules of pied-piping identify a category containing the goal, which is then re-merged to *H* or to a projection of *H*.⁷ It is in this way that *Agree* acts as a precursor to movement.

Chomsky suggests that *Agree* exists because it deletes uninterpretable features. Deletion of uninterpretable features is a requirement imposed by the interfaces between the syntax and neighboring systems. If there is a logical connection between valuation of *unvalued* features and deletion of *uninterpretable* features, as is conjectured in the *MI/DbP* framework, then interpretability and valuation must go hand in hand. Thus, crucial to this hypothesis is the biconditional relation that we can state as in (3):

(3) **Valuation/Interpretability Biconditional (Chomsky (2001, 5))**

A feature *F* is uninterpretable iff *F* is unvalued.

Chomsky suggests that this biconditional reflects the fact that the mechanisms of syntax could not inspect a feature and determine whether the semantics will or will not assign an interpretation to it, but could inspect the feature and determine whether it is valued or not (a point anticipated by Epstein, Groat, Kawashima & Kitahara (1998); see also Epstein and Seely

⁵ In this paper, we will not explore the precise locality conditions on *Agree*, nor will we investigate whether *Agree* is subject to a c-command condition, as we assume (following much literature), or whether there are circumstances under which a probe on a head *H* may find a goal in *Spec,H* (as argued by Richards (2004), Bejar (2003), Rezac (2003)).

⁶ Reformulated for technical reasons as an "occurrence" (OCC) property by Chomsky (2001), a discussion that we ignore here.

⁷ Alternatively, copied and remerged, an issue discussed in *DbP* and elsewhere (Blevins (1990); Epstein, Groat, Kawashima & Kitahara (1998); Chomsky (2001); Gärtner (2002)).

(2000) for discussion). In this sense, valuation is a lexical encoding of interpretability. Also crucial, of course, is the process of deletion itself:

(4) **Deletion of uninterpretable features**

Once an uninterpretable feature is valued, it can and must delete.

The point at which deletion must take place, on this view, is no later than the point at which the syntactic units communicate with the semantics. Chomsky suggests that deletion takes place at the end of each phase, and has offered various proposals about which locations within a phase are accessed by the deletion process during the derivation.

It will be important shortly to note a key property of Agree in Chomsky's system that we have not highlighted so far. Agree is a valuation process that applies to two distinct instances of a given feature. Once two instances of a feature F_1 and F_2 have undergone Agree, the syntax cannot inspect them and see that the valuation of F_2 is due to Agree with F_1 (or conversely). There is no *link* established between F_1 and F_2 .

The MI/DbP framework thus combines the view of Agree in (2) with the biconditional in (3) and the hypothesis about deletion in (4) to form a coherent proposal about the mechanics of agreement. This combination of hypotheses, however, belongs to a larger family of potential proposals that assume the syntactic conditioning of agreement as stated in (2) but offer alternatives to (3) and (4). In this paper, we will compare the view sketched above to one alternative proposal drawn from this larger family of possibilities.

We focus on (3) and (4) because these conditions, in contrast to (2), are not "inevitable". One might imagine another sort of relationship (or no relationship whatsoever) between valuation and interpretability. Likewise, one might imagine another view of the syntactic fate of uninterpretable features. By contrast, though one might imagine alternative locality conditions on agreement, it is clear that agreement is structurally conditioned. Thus, though one might question details of (2), or attempt to explain (2) as a consequence of deeper principles, (2) (or some variant) is presumably correct.

Let us consider first the biconditional in (3). This proposal provides a very direct account for why Agree in the syntax brings about the deletion of uninterpretable features. This account is in essence a proposal about lexical items. As a consequence, although this proposal may answer a question about the syntax, it does so at the cost of a puzzling question about the lexicon. Why should the *lexicon* couple such distinct properties of lexical items as interpretability ("Does the item have a message to send to the semantics?") and valuation ("Are any syntactically relevant properties of the lexical item left unspecified?")? We will shortly suggest an alternative proposal which, like (3), yields a link between valuation and interpretation, but yields this link more indirectly, removing the need for (3).

Similar questions arise about (4), which is a second instance of a stipulated link between valuation and interpretability. We are assuming with the MI/DbP framework that the LF interface cannot transfer information from a syntactic derivation to the semantics if it contains

features that are "illegible" to the semantics — and that such features must therefore delete. (We will have an argument for this view below.) It is not obvious, however, why valuation of an unvalued feature should be a precondition for deletion — a fact stated in (4), but not explained. Our alternative proposal will not eliminate (4) as a statement true of the grammar (as it will eliminate (3)), but will explain why (4) is true.

2. Agree and feature sharing

We will suggest that the key to eliminating (3) and explaining (4) lies in a reassessment of a property of agreement discussed above. As we noted, once valuation takes place in the MI/DbP framework, the syntax no longer has access to the process: there is no permanent connection between a now-valued feature and the feature that gave it value. We will suggest instead that valuation of F_2 by F_1 creates a link that is accessible to subsequent processes in a manner we will explain below.

When Agree applies between a probe feature F at a syntactic location α and a goal feature F at location β , we propose that the output is a single feature F shared by two locations. We thus support the claim that Agreement results in *feature sharing* — a claim familiar from some recent literature within the Minimalist research tradition (Brody (1997, 158-159); Frampton & Gutmann (2000); Frampton, Gutmann, Legate & Yang (2000); as well as from much work that develops the ideas associated with HPSG (Pollard & Sag (1994); Sag, Wasow & Bender (2003)).⁸ We replace the "assignment version" of Agree in (2) with the "feature sharing version" in (5):

(5) **Agree (Feature sharing version)**

- (i) An unvalued feature F (a *probe*) on a head H at syntactic location α (F_α) scans its c-command domain for another instance of F (a *goal*) at location β (F_β) with which to agree.
- (ii) Replace F_α with F_β , so that the same feature is present in both locations.

If the goal is valued for F , replacing the probe with the goal results in an instance of valued F occupying the location previously occupied by the unvalued probe. In this respect, the output of the feature sharing version of Agree in (5) is the same as the output of the assignment version of

⁸Other work in the Principles and Parameters approach has occasionally posited modes of "communication" between syntactic elements that are in an assignment or checking relation — modes of communication that resemble the notion of feature sharing discussed here. An early example is the theory of agreement and case assignment proposed by Chomsky (1981, 259ff.). In more recent work, Collins (2003) develops a system of case-checking that in essence invokes feature sharing. At a further remove, one might investigate a feature sharing perspective on other types of "chains" that have been argued for as means of non-local communication of a variety of properties of elements merged into syntactic structure — most notably, the "chains" relevant to referential dependencies in the theory of Reinhart and Reuland (1993). This conceptual connection has been explicitly exploited in recent work by Reuland (2005).

Agree in (2): H now contains valued F. Of course, F on H may now serve as the goal for some later operation of Agree triggered by an unvalued, higher instance of F serving as a new probe. The result will be a single feature F shared by three positions, and the process could iterate further.

We will use the term *instance* (e.g. *instance of F*) to refer to a feature-location pair. A feature that has undergone Agree will thus have more than one instance. We will use the term *occurrence* (e.g. *occurrence of F*) to refer to distinct features that might undergo Agree, but have not done so yet. Agree thus takes two occurrences of F and turns them into two instances of F. Adapting a notation from the HPSG literature, we will use indices in brackets to indicate multiple instances of a single feature. When a feature is valued, we will write its value (preceding the bracketed index) in only one of its locations. By way of illustration, (6) shows a single valued feature F shared by four locations:

(6) **Notation for feature sharing**
 $F[73] \dots F[73] \dots F \text{ val}[73] \dots F[73]$

A feature that has not participated in Agree will be indicated (where relevant) by an empty pair of brackets: $F[]$ if unvalued, or $F \text{ val}[]$ otherwise.

In certain respects, the consequences of a feature sharing view of Agree as in (5) do not differ from the consequences of the assignment view in (2). There is at least one important respect in which the two views do differ, however, as stressed by Frampton, Gutmann, Legate & Yang (2000). If the assignment view is correct, Agree between an *unvalued* goal F_β and an *unvalued* probe F_α is either vacuous or impossible, depending on the exact specification of the procedure. If value assignment is allowed to apply vacuously, the derivation on this view contains two unvalued occurrences of F before Agree, and contains exactly the same two unvalued occurrences of F after Agree. If the feature sharing view is correct, however, Agree between two unvalued occurrences of F ($F_\alpha[]$ and $F_\beta[]$) is far from vacuous, since its output will be a structure that contains only one occurrence of F with two instances:

(7) $\dots F_\alpha[] \dots F_\beta[] \dots \Rightarrow \dots F_\alpha[3] \dots F_\beta[3] \dots$

If a later operation of Agree applies between one of the instances of unvalued F just discussed and a distinct *valued* occurrence of F at location γ , the result will be a valued feature F present at three locations:

(8) $\dots F_\alpha[3] \dots F_\beta[3] \dots F_\gamma \text{ val}[] \Rightarrow \dots F_\alpha[3] \dots F_\beta[3] \dots F_\gamma \text{ val}[3] \dots$

Crucially, F has been valued at *both* of its previous locations α and β as a consequence of an application of Agree that involves only one of these locations.⁹ This difference between the two views of Agree will be important for what follows.

3. The independence of valuation and interpretability

Our proposal will differ from the MI/DbP approach not only in its feature-sharing view of Agree, but also in the absence of the Valuation/Interpretability Biconditional in (3). The elimination of (3) allows lexical items to come from the lexicon with features that display two combinations of properties not countenanced by the MI/DbP theory: (i) uninterpretable but valued; and (ii) interpretable but unvalued. (We indicate interpretability and uninterpretability with *i* and *u* written to the left of the feature name.) We thus expect the lexicon to contain items with four sorts of features:

(9) **Types of features** (boldface = disallowed in MI/DbP)

<i>uF val</i>	uninterpretable, valued	<i>iF val</i>	interpretable, valued
<i>uF []</i>	uninterpretable, unvalued	<i>iF []</i>	interpretable, unvalued

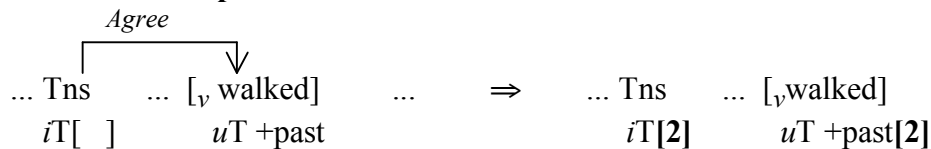
As we noted above, Chomsky (2001, 5) proposed the Valuation/Interpretability Biconditional in (3), because of the plausible consideration that the syntax has no direct access to information about interpretability, but can inspect a feature to determine whether it is valued. Thus, though it is uninterpretable features that end up functioning as probes, the syntax identifies them as probes not because they are uninterpretable, but because they are unvalued. It should be clear, however, that the reasoning by which it is unvalued features that act as probes might be valid even if the Valuation/Interpretability Biconditional is not adopted. This is the path that we will follow here. We will adopt Chomsky's view that it is unvalued features that act as probes, without assuming the Valuation/Interpretability Biconditional. As a consequence, within our approach, two types of features — interpretable unvalued as well as uninterpretable unvalued features (i.e. the lower line of (9)) — may act as probes. The novelty, of course, is the ability of an *interpretable feature which is unvalued* to act as a probe. Let us consider some possible examples of this situation.

A plausible example of an interpretable unvalued feature acting as a probe is, in fact, the T feature of the category Tns. (To avoid confusion, we will reserve the abbreviation T for the tense feature, and will use Tns for the category (and TnsP, etc.)) If Chomsky (1957), Emonds

⁹ When Agree applies between two unvalued occurrences of a feature, inspection of the output cannot reveal whether the goal replaced the probe or vice-versa. This raises the possibility of simplifying the formulation of Agree in (5) so as to leave open the directionality of replacement. The case in which it matters is the case allowed by MI/DbP: Agree between an unvalued and a valued occurrence of a feature. Here, however, recoverability considerations might prevent replacement of the valued occurrence by the unvalued occurrence. If so, we can indeed simplify (5) as proposed.

(1976; 1978), Pollock (1989) and others are correct in positing a distinct Tns node as the locus of semantic tense interpretation, the theory must take cognizance of the fact that in many languages, the finite verb — not Tns itself— bears the morphology that makes tense distinctions. This means that T on the finite verb in such languages is an uninterpretable feature that participates in an Agree relation with T on Tns. Since Tns c-commands the finite verb, its T must be the probe in this relation. Consequently, T on Tns must be an interpretable feature that is unvalued and acts as a probe. Likewise, T on the finite verb must be an uninterpretable feature that is valued and acts as a goal:¹⁰

(10) **The relationship between Tns and the finite verb**¹¹



This situation thus exemplifies precisely the two types of features expected under the current proposal, but disallowed in the MI/DbP framework.¹²

A similar point is made by *wh*-constructions, which in our approach may be taken to display all of the feature-types exhibited in (9). In languages like English, a family of clause-types, including interrogatives, relative clauses, and free relatives, share an overall syntax. The complementizer in these clauses attracts a phrase containing a special element (a *wh*-phrase) to Spec,CP. What is striking is the fact that the exact nature of the special element varies somewhat from construction to construction. Thus, for example, *what* is not a possible *wh*-form in relative clauses, and *why* — though possible in interrogatives and certain relative clauses — is excluded in free relatives:

¹⁰ We will assume here that the "finite verb" in question is *v* rather than V (Hale & Keyser (1993; 2002); Chomsky (1995b)). In a fuller presentation of this work (in preparation), we argue that it is V rather than *v* that comes from the lexicon with uninterpretable valued T, and that *v* comes from the lexicon with uninterpretable unvalued T. T on *v* acts as a probe, and is valued by T on V. T on Tns then acts as a probe, and is valued by T on *v*. We also omit discussion of some issues bearing on the category T₀ posited by Pesetsky & Torrego (2004) and others cited there — a topic that will also be taken up in the fuller presentation.

¹¹ In section 5, we will modify the assumption that "+past" etc. are values of T, but this change will not affect the present argument.

¹² If we are correct, the "T-chains" proposed by Guéron & Hoekstra (1988; 1990; 1995) may now be viewed as cases of the agreement relation. It would be interesting to fully assimilate this work with our own.

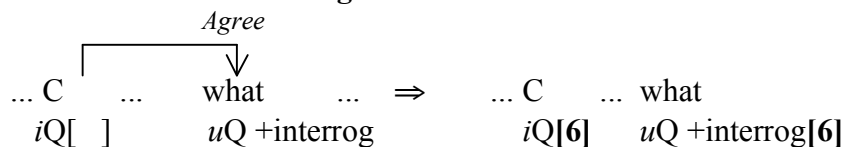
- (11) a. I wonder [*what* Mary bought ____]. (interrogative)
 b. *the book [*what* Mary bought ____] (relative;
 cf. *the person who Mary saw*)
- (12) a. I wonder [*why* she left]. (interrogative)
 b. the reason [*why* she left] (relative)
 c. *John left [*why* Mary left]. (free relative)

If the matching of clause-type to *wh*-type is a variety of agreement, then C in these constructions must contain an unvalued feature that is valued when it probes and finds an appropriate *wh*-expression containing its goal.

In a MI/DbP approach, the probe feature on C cannot actually be the same feature as the one responsible for differentiating the possible interpretations of CP, since lack of value entails uninterpretability in that framework. For this reason, a MI/DbP approach must posit two distinct features in C: an uninterpretable, unvalued feature *uWh* with an EPP property (the feature that probes for a *wh*-goal); and a distinct, interpretable, valued feature *iQ* (the feature relevant to the interpretation of the clause). Correlations between clausal semantics and *wh*-type must be captured with mechanisms other than Agree.

In the approach of this paper, however, there is no need to posit distinct Q and Wh features. Instead, we may posit a single feature *iQ*[] on C — interpretable but unvalued — which acts a probe and receives its value from an uninterpretable counterpart *uQ val* on a *wh*-phrase. Example (13) illustrates this for an interrogative clause:

(13) **Formation of an interrogative CP**



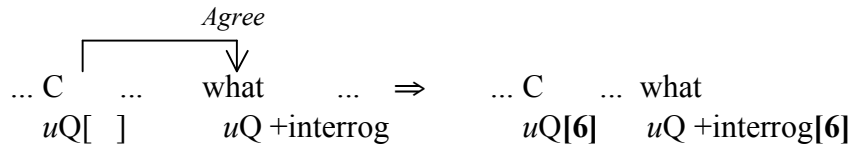
In effect, the process seen in (13) is an Agree account of the "clause typing" attributed to *wh*-phrases in the work of Cheng (1991).¹³

If a C has an unvalued Q feature that is *not* interpretable, it will participate in the same Agree process seen in (13), except that the result will not affect the semantics. This type of C is arguably the kind of element that supports successive-cyclic *wh*-movement.¹⁴

¹³ There is some controversy in the current literature (which we ignore here) about whether syntactic clause typing provides the correct account of clause types. See Portner and Zanuttini (2000; 2003), Ginzburg & Sag (2002), among others, for discussion.

¹⁴ One might ask whether it is the *wh*-phrase in Spec,CP that directly types a clause as a question, relative clause, etc. — rather than C, whose Q feature is valued by the *wh*-phrase (John Frampton, personal communication). The behavior of clauses that host intermediate steps of

(14) **Formation of a declarative CP that supports successive-cyclic *wh*-movement**



If other categories identifiable as *phases* (Chomsky (2000; 2001)) also host successive-cyclic *wh*-movement (for example, *vP*), the heads of these categories may also be taken to bear $uQ[]$, like C in (14).

Since Q on C exists in three out of the four variant feature-types listed in (9), it is natural to ask about the fourth type: interpretable and valued. This type of Q on C might be represented by elements like *if*, which appear to yield the interpretation of a yes/no question — possibly without the assistance of a *wh*-phrase (Emonds (1985, 286); Larson (1985)). If this approach is correct, the repertoire of *wh*-constructions allows us to see the full typology predicted in (9).

At this point, one might ask why an uninterpretable valued feature like T on *v must* enter an Agree relation with interpretable T on Tns, or why uninterpretable Q on a *wh*-phrase must enter an Agree relation with interpretable Q on C. Empirically, this amounts to asking such questions as why we do not find verbs with semantically uninterpreted present or past tense morphology in non-finite contexts — for example, below a finite auxiliary verb (e.g. **John has walks*). It is not sufficient to answer this question with reference to the selectional properties of higher verbs, since such an answer would beg the question of why the selectional properties are not otherwise. Likewise, why do we not find *wh*-phrases with the interpretation of non-*wh*-phrases (e.g. **Mary bought which book* with the meaning 'Mary bought this book')?¹⁵

It seems that a central empirical claim of the MI/DbP framework is factually correct: an uninterpretable feature must indeed enter an Agree relation with an interpretable counterpart. A plausible hypothesis about the "must" in this statement is the MI/DbP proposal: that this Agree relation is a precondition for a deletion operation, which in turn is a precondition for semantic interpretation at the relevant interface. In the MI/DbP framework, the connection between agreement and deletion is stipulated. Deletion applies to an uninterpretable feature (in this

successive-cyclic *wh*-movement argues against this alternative, since (as noted in the text) it is clear the interpretability of the C that determines whether the *wh*-phrase makes a contribution to the typing of the clause.

¹⁵ It might be interesting, of course, to ask where the indefinite or negative polarity interpretation of *wh*-in-situ found in many languages (Kuroda (1965); Nishigauchi (1990); Cheng (1991); Aoun & Li (1993a; 1993b; 1993c); Tsai (1994)) fits into our proposals. Likewise, the typing of a CP as a relative clause in a head-internal relative construction (Cole (1987); Williamson (1987); among many others) should inform us about the nature of the relevant feature and its interpretability.

framework), but applies to this feature only once it has been valued — as a consequence of Agree. (Of course, the biconditional in (3) within the MI/DbP framework entails that this is the only source for valuation of an uninterpretable feature.) The MI/DbP approach leaves unexplained why feature deletion should have this restriction — why, for example, an uninterpretable feature cannot delete freely, without ever being valued.

It is at this point that the view of Agree as feature sharing sketched in section 2 connects crucially with our proposals about the distinctness of valuation and interpretability. One question relevant to our approach that does not arise in the MI/DbP framework is the following. Does deletion apply to an entire feature (i.e. an occurrence, which may have multiple instances) or just to individual instances of a single occurrence of a feature? An important proposal by Brody (1997), if correct, entails the latter possibility — that deletion applies to instances of a feature, not to entire occurrences. This is Brody's thesis of *Radical Interpretability*, which we may state as follows:

(15) **Thesis of Radical Interpretability** (Brody (1997))

Each feature must receive a semantic interpretation in some syntactic location.¹⁶

Consider now the consequences of this thesis for deletion in the context of our current proposals. As Brody (1997, 143-4) points out, "radical interpretability requires all syntactic elements to be semantically interpretable, but not necessarily actually interpreted in a given [piece of] structure." If this is true, then it is not uninterpretable *features* that delete at the interface with the semantic component — because there can be no uninterpretable features at the semantic interface. There are only uninterpretable *instances* of features, and every feature must have at least one interpretable instance.

Radical Interpretability in conjunction with the feature sharing view of Agree also offers an immediate explanation for the fact that an uninterpretable valued feature (like [*uT val*] on the finite verb) must enter an Agree relation with an interpretable counterpart ([*iT []*] on Tns). If this Agree relation were not established, then the T feature would not receive an interpretation in any syntactic location, in violation of Radical Interpretability.

¹⁶ Note that the Thesis of Radical Interpretability is, in effect, a conditional, not a biconditional. It requires that all grammatical features contribute to interpretation, but leaves open the possibility that aspects of the semantic interpretation of a sentence might be conditioned by factors other than the interpretation of grammatical features. For example, a feature relevant to a semantic property P might be absent from a structure, and default rule of semantic interpretation might supply information about P nonetheless. Such a possibility is envisaged by Starke (2001; 2004), for example, within a system somewhat different from that discussed here. (See also Fitzpatrick (2005; to appear) for an interesting case, involving default interpretation of tense and aspect — the so-called Factitive Effect (Dechaine (1991).) If we countenance not only feature valuation but also the possible absence of features, the ideas discussed here might require some modification, a task we have not undertaken here. We are grateful to Anne Zribi-Hertz (personal communication) for bringing the importance of these issues to our attention.

Note as well that semantic interpretation of a feature requires valuation of that feature as a precondition. The fact that a nominal has an unspecified person feature is not relevant to the semantics; the semantics needs to know whether it is first person, second person, etc. It thus follows from Radical Interpretability that a feature, including a feature with uninterpretable instances, must be valued.¹⁷ We thus come close to deriving the claim stipulated in the MI/DbP framework that an uninterpretable instance of a feature (in MI/DP, this is the same as the feature itself) must not only undergo Agree with an interpretable counterpart, but must be valued.¹⁸ We defer for a while discussion of a further claim of the MI/DbP framework: that an instance of this sort deletes. In section 5, we will offer an argument that this claim is empirically correct, and suggest a reason why this deletion happens.

¹⁷ We have followed Brody in positing a thesis of Radical Interpretability relevant to the semantics. A very similar thesis is plausible for the phonological/morphological side as well. If PF interpretation cannot apply to an element that bears an unvalued feature, consequences similar to those discussed in the text would follow.

¹⁸ One exception is left open in the present approach. Consider a situation in which an occurrence of an unvalued uninterpretable feature F in location α undergoes Agree with a distinct occurrence of unvalued uninterpretable F in location β , yielding a single unvalued feature F with two uninterpretable instances, α and β . It might be possible for one of these instances — for example, β — to delete immediately, so long as the remaining instance (α) undergoes Agree with a valued interpretable instance of the same feature at location γ . Alternatively, one might imagine that valuation is a precondition not only for interpreting a feature, but also for identifying it as interpretable or uninterpretable in the first place — which in turn is a precondition for deletion. On this view, the instance β of the feature F could not delete until F is valued. We will not decide this matter here, but see the concluding paragraphs of section 5 for some tentative discussion.

4. "Defectivity"

In Pesetsky and Torrego (2001; 2004), as noted above, we argued at length that structural case on DP is actually an uninterpretable instance of T (*u*T). We showed that this view of case predicted a wide range of syntactic phenomena previously attributed to a variety of different syntactic mechanisms. The phenomena unified by this view of case included the *that*-trace effect, a comparable restriction on auxiliary fronting, an asymmetry in the availability of sentential subjects (to which we return in section 5), and the distinct patterns of complementation characteristic of nouns, verbs and adjectives.¹⁹ In this section, we will offer a similar demonstration, relevant to our current proposals. We will argue that the view of structural case as *u*T has special advantages in the context of this paper. In particular, it allows the elimination of the special notion of "defectivity" invoked in the MI/DbP framework as an account of the properties of raising and certain other constructions. Our discussion focuses on raising.²⁰

In a language like English, an infinitival complement to a raising verb like *seem* in (16) has the following special properties:

- (i) Structural case is not licensed on the subject of the infinitive within the embedded clause, but is licensed in a higher clause.
- (ii) Infinitival Tns appears to attract the external argument DP from Spec,*v*P into its own specifier. Later in the derivation the same DP is attracted by a higher Tns into its specifier (the phenomenon known as Raising to Subject).
- (iii) The embedded clause does not display tense distinctions; instead, the temporal semantics of the embedded clause are determined by properties of the higher clause.

For example, *Mary* in (16) must raise from Spec,*v*P in the embedded clause to form the specifier of the embedded infinitival Tns, and then must form the specifier of the higher Tns — here, the Tns of a matrix finite clause. We omit for the sake of simplicity possible intermediate steps:

¹⁹ We return to this last topic in an expanded version of this presentation, in preparation. We show that certain odd features of our (2004) proposal disappear if the suggestions of this paper are adopted.

²⁰ Our discussion of raising-to-subject infinitivals should extend in a natural fashion to raising-to-object (ECM) constructions as well. We do not discuss ECM here, because it will require a prior discussion of accusative case, a topic that we cannot address here for lack of space.

(16) **Raising**

[to [_{VP} Mary like the play]] →

Step 1: form specifier of infinitival Tns

[Mary to __ like the play] →

Step 2: form specifier of higher, finite Tns

Mary Tns seemed [__ to like the play]

Example (16) illustrates point (ii) above. The obligatoriness of the raising illustrates point (i). In addition, the past tense morphology of the matrix clause appears to determine past tense interpretation of the infinitival clause as well, thus illustrating point (iii).

Evidence for Step 1 (movement to the specifier of the infinitival clause) includes data from binding phenomena (Fox (1999a; 1999b); Grohmann, Drury & Castillo (2000); Lasnik (to appear); and Legate (2003); among many others) and from various stranding phenomena such as Q-float (on certain analyses; Sportiche (1988); but see Torrego (1996), Bobaljik (1995; 2003)). If we are correct in assuming that Step 1 takes place, we should ask the obvious question: what properties of the infinitival Tns (*to*) force this step to take place? Some feature of infinitival Tns with an EPP property appears to act as a probe, entering an Agree relation with some feature of the subject — but this Agree relation does not seem to satisfy the subject's featural requirements, necessitating Step 2.

What feature of infinitival Tns acts as a probe? In the MI/DbP framework, the relevant feature, as we have seen, cannot be T itself, but must be something else. Chomsky suggests that it is the φ -features of Tns that act as probes in all types of TnsPs. He thus attributes the special behavior of raising infinitivals summarized in (i)-(ii) above to a special property of its φ -features. The name given by Chomsky to this property is *defectivity*. The notion of defectivity is linked by Chomsky to another notion, implicit in the discussion: the idea that certain sets of features are bundled together, and that such bundles have properties of their own. Such features as person and number (and perhaps gender) form part of a bundle called φ .²¹ It is possible to enumerate the features that constitute a complete φ -bundle. The members of such a bundle undergo Agree as a unit. A φ -bundle is *defective* if it lacks one or more of its features. Chomsky suggests that the features of a defective feature bundle have one special limitation: though they may act as probes when unvalued, participating in Agree (and deleting if they get valued), they may not supply a value to other features as a consequence of Agree. The Tns of a raising infinitival, Chomsky suggests, contains a φ -bundle that is defective in just this sense. It is " φ -incomplete",

²¹ This idea could be instantiated in terms of feature geometry (Sagey (1986; 1990) or in a system like HPSG (e.g. in the variant presented by Pollard & Sag (1994), Sag, Wasow & Bender (2003)) and others, in which features may have sets of features as their values. Thus φ would be understood in such a framework as a feature whose values are the features person, number, etc., which in turn would take values of their own.

lacking at least one (or possibly more) φ -features. Chomsky (2001, 7) suggests that the only φ -feature present in Tns of a raising infinitive is person, and that other features such as number are missing. Person on a raising infinitival Tns is unvalued, acts as a probe, and participates in Agree with a goal that has a person feature. An EPP property triggers pied piping of the goal to Spec,Tns. Crucially, because of the defectivity of the φ -bundle of raising infinitival Tns, no feature of the goal can get valued by such an operation. The unvalued feature of the goal relevant to this discussion is *case*.

The MI/DbP framework does not view structural case as the uninterpretable counterpart of an otherwise interpretable feature. Instead, it is a *sui generis* feature with a special relation to the φ -features: it gets valued only as a by-product of φ -feature agreement. Thus, when the unvalued φ -features of finite Tns probe, on this approach, and find a suitable goal — for example, a DP with a full set of φ -features — the unvalued case feature of that DP gets valued as a kind of "bonus".

This proposal has a number of peculiar features that we will attempt to improve on. First, the view of defectivity advanced in the MI/DbP framework attributes a crucial role to the bundling of features and to the completeness of the relevant bundle. It is not obvious that the φ -features constitute a bundle, and it is especially unclear why the features of a bundle that is incomplete should be unable to value other features. In addition, the MI/DbP view of structural case valuation as parasitic on φ -feature valuation is odd in its own right, and particularly odd in the context of the MI/DbP view of defectivity. A non-expletive DP has a full set of valued φ -features, and thus has no φ -featural need that must be satisfied by the φ -features of Tns. It is particularly strange, therefore, that an incomplete set of φ -features on Tns should affect Tns's ability to value case on DP.

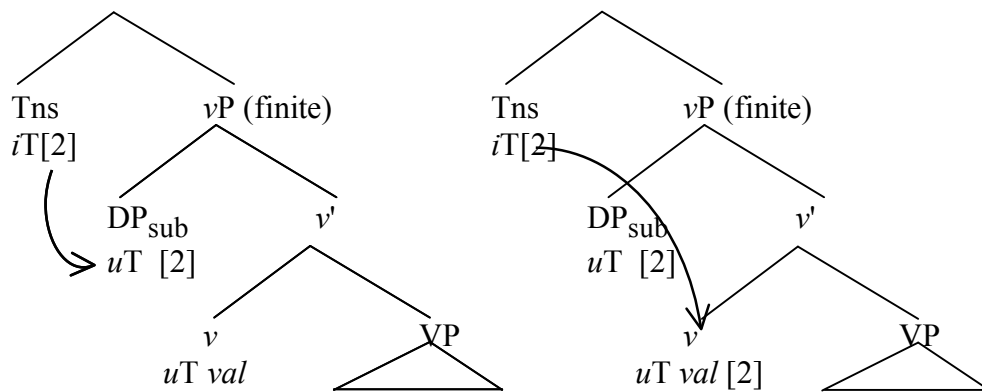
Our own earlier proposals, which identified structural case as uT , inherited certain aspects of these problems from the MI/DbP framework. Our current approach, we will suggest, may eliminate these problems. In our previous work, we did assume that it is the T feature of Tns that probes and enters an Agree relation with the subject DP. This was because we adopted the Valuation/Interpretability Biconditional of the MI/DbP framework. We assumed there (along with the MI/DbP framework) that it is uninterpretable φ -features on T ($u\varphi$) that act as probes and enter an Agree relation with the φ -features of the subject DP — even though it is uT that is crucially valued and later deleted. One puzzling property of this assumption was the reversal of the usual probe/goal c-command relation between uT on DP and iT on Tns, assumed to be made possible by the simultaneous process of φ -feature agreement, which shows the usual c-command relation. This communication between φ -feature agreement and T-feature agreement in our earlier work was as mysterious as the communication between φ -feature agreement and the *sui generis* case feature posited in the MI/DbP proposal.

In the approach of this paper, however, the probe-goal relation relevant to case that holds between Tns and a subject DP does not involve φ -features at all. In section 3, we presented a reason for assuming that the T-feature of Tns is unvalued, though interpretable: the fact that Tns appears to learn its value in finite clauses from the finite verb. If this is true, there is no need to

appeal to φ -feature agreement to explain the licensing of nominative case in finite clauses. Instead, we may simply assume that it is the unvalued T-feature of Tns itself that acts as the probe relevant to case licensing on the subject DP.

In a finite clause, the interpretable but unvalued $iT[]$ feature on Tns probes and finds as its goal the uninterpretable, unvalued $uT[]$ feature on the subject DP. Agree takes place, establishing a link between the T-properties of these two elements (which are now instances of the same feature). This is represented as step 1 in (17) below. After Agree between these two features takes place, the resulting shared feature is still unvalued. Consequently, $iT[]$ on Tns probes again and enters an Agree relation with valued $uT\ val$ on the finite verb, as illustrated in step 2. Since the T-feature on the subject DP underwent Agree with its counterpart on Tns, Agree between T on Tns and T on the finite verb results in valuation of T on the subject DP as well (since these are now all instances of the same feature). Consequently, structural case (i.e. uT) on DP is now valued — as required, given the considerations discussed in the previous section.²²

- (17) **T and nominative case in a finite clause**
step 1: Agree with subject (no valuation) *step 2: Agree with finite verb* (valuation occurs)



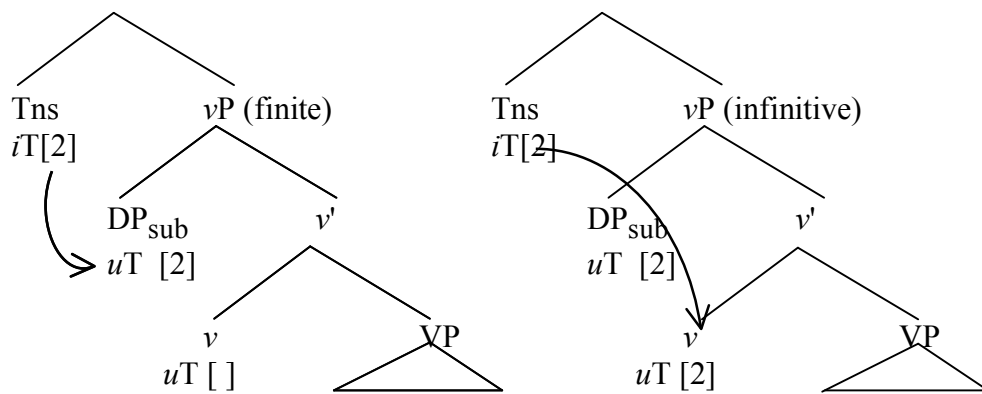
On this approach, an infinitival raising clause can be understood as differing minimally from a finite clause. No special notion of defectivity, nor any associated notion of feature bundle

²²One open question for our approach is why it is crucially the subject argument (e.g. a DP or CP in Spec,vP) that satisfies EPP on $iT[]$ in languages like English, and why the finite verb does not at least have the option of raising instead.

It may be that verb movement to Tns is blocked for independent reasons, though this approach might lead one to expect that an auxiliary verb (which can and often must raise to Tns) could satisfy this requirement. Alternatively, perhaps Tns needs a phrasal specifier, for some reason stronger than EPP. It is also worth noting the hypothesis that in some languages v -to-T movement arguably *may* satisfy the requirement of Tns (Alexiadou and Anagnostopoulou (1998)). We leave these matters open.

is involved. In finite clauses, as we have just seen, Agree between $iT[]$ on Tns and $uT[]$ on a subject DP leaves the T-feature unvalued. Subsequent Agree involving the finite verb simultaneously tells T on Tns what its value is and gives the subject DP its structural case. This happens because T on the finite verb is valued. If T on v were not valued, Agree between T on v and T on Tns would neither value T on Tns nor assign structural case to the subject DP. This is exactly the state of affairs that we find in a raising infinitival. We thus propose that the verb of a raising infinitival bears unvalued T, in contrast to the verb of a finite clause, which bears valued T. "Defectivity", on this view, is simply absence of valuation, an entirely familiar notion. The results of T-agreement within an infinitival raising clause are sketched in (18), which differs minimally (as is readily apparent) from its finite counterpart in (17):

- (18) **T and (non-assignment of) nominative case in a raising infinitival clause**
step 1: Agree with subject (no valuation) *step 2: Agree with finite verb (no valuation)*

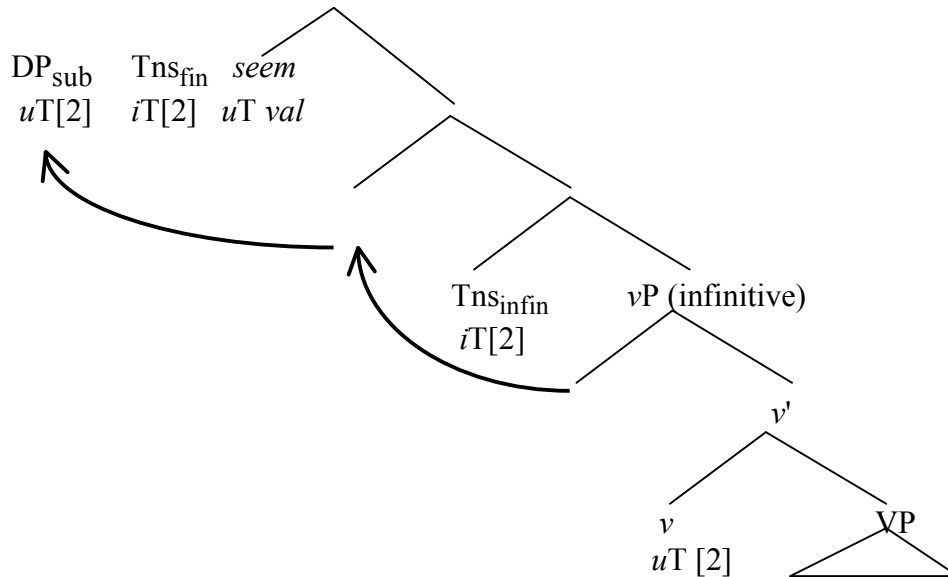


As the derivation sketched in (18) proceeds, some later process of Agree must value T in the various locations where it is found in (18), including infinitival Tns and the subject DP. If a later two-step process like that seen in (17) has the result of valuing $uT[]$ on the subject DP, $iT[]$ on the infinitival Tns (and $uT[]$ on infinitival v) will also be valued, because of the feature-sharing view of Agree that we have adopted. This is the desired result. We propose that raising of the subject DP provides evidence of this later process. The subject DP seen in (18), by moving into a higher finite clause, can be probed by a higher finite instance of unvalued T, which then probes a finite verb whose T is valued, just as in (17). As a result, not only the Tns of the higher finite clause, but also the infinitival Tns seen in (18) will become valued, as will uT on the subject DP (this is structural case assignment) and uT on the infinitival v .

For present purposes, we will leave open the exact structural position to which the subject DP moves in the process of raising. We may assume for now that the relevant landing site is the specifier of the higher vP , where it is $iT[]$ on the higher finite Tns that acts as the crucial probe. In work in progress, we present a slightly different proposal, integrated into a theory that distinguishes vP from VP in a variety of ways. The important observation relevant to this paper is the fact that the feature sharing approach to Agree is what allows the T-feature of the

constituents of a "defective" embedded clause to be valued — as a consequence of a relation established between just one of these constituents and higher instances of T.

(19) **Continuation of (18)**



A consequence of this view of raising is the fact that T ends up with the same value in both the infinitival and the finite clause. This fact, we suggest, is reflected in the semantic dependence of tense interpretation in the embedded clause on the interpretation of tense in the higher clause (point (iii) above). This is a complex topic that we will not explore further, though we will have some additional general remarks in the next section about tense interpretation under feature sharing.

One final note about raising and defectivity that is relevant to a comparison of the various approaches discussed here. We have suggested that "defectivity" is simply lack of valuation for T on v . Agreement in φ -features, though certainly a real phenomenon, is irrelevant to the questions of case and tense that give raising constructions their characteristic appearance. It is a fact (not explained in our system) that raising infinitivals in English and many other languages fail to show morphological signs of φ -feature agreement.²³ Nothing, however, leads us to expect that the embedded verb of a raising construction in some other language might not show full φ -feature agreement. Such is the case in the languages of the Balkan *Sprachbund*, where the verb in a clause from which raising proceeds is morphologically subjunctive and shows full φ -feature

²³ It is worth noting in this context that the verb in a raising infinitival does not show morphology that would provide direct evidence for the MI/DbP approach, e.g. agreement in person but not number. This is not evidence against the MI/DbP approach, but does indicate what data would have constituted strong evidence in favor of it.

agreement with the subject. Significantly, as noted by Iatridou (1993) and Alexiadou & Anagnostopoulou (1999), the verb in such constructions does not show independent tense morphology, a fact that is in accord with the general view taken here that it is T that is special in a raising construction.^{24,25}

5. Feature deletion and the subject omission asymmetry

In the preceding sections, we argued for an approach that dispenses with the Valuation/Interpretability Biconditional and adopts a feature-sharing view of Agree. In sections 2 and 3, we saw some empirical arguments for this approach, and also demonstrated that the logic of our approach (when combined with Brody's thesis of Radical Interpretability) explains some of the ways in which features interact and the requirements imposed upon them. To a great extent, the overall scenario resembles that of the MI/DbP system, but we believe that we have explained properties of this scenario that MI/DbP essentially stipulates. In section 4, we focused more narrowly on properties of Tns in this system, arguing that the distinctive properties of raising infinitivals are predicted by a system like ours if T on v , like other features, comes in both valued and unvalued flavors. In this section, we continue our discussion of the properties of Tns, developing an argument in favor of the deletion of uninterpretable features.

In section 3, we took for granted an assumption of the MI/DbP approach: that uninterpretable (instances of) features must delete as a precondition for successful semantic interpretation. This assumption, in combination with Radical Interpretability, derived the

²⁴ Precisely this fact led Rivero & Geber (to appear) to the conclusion that "only the matrix verb with a complete T determines nominative", a conclusion that, as they note, extends to nominative in Raising constructions the proposal earlier made by Iatridou for "null case" in Control. They retain Chomsky's view, however, that φ -feature agreement plays a key role in the process.

²⁵ Padilla (1990, 19ff.) discusses cases of tense agreement between matrix and subjunctive clauses in non-raising constructions in Spanish, which is observed most fully with clausal complements to verbs such as *querer* 'want', *ignorar* 'not know' and *temer* 'fear'. These examples might demonstrate situations in which an unvalued iT on Tns is valued by elements of a higher clause without raising. If subjunctive mood in Spanish may show unvalued T, it becomes an interesting puzzle why languages like Spanish do not allow raising from subjunctives on the Balkan model. One might relate this Spanish/Balkan contrast to the fact that Spanish has infinitival verb forms in addition to subjunctives, while the Balkan languages generally lack the infinitive. (Romanian, however, does show infinitives as well as subjunctives in Raising constructions, as noted by Rivero & Geber (to appear) — though it is possible that infinitives are restricted to Restructuring clauses, as suggested to us by Emanuel Stoica (personal communication).) If the difference between the relevant subjunctive forms and infinitivals lies in the presence vs. absence of unvalued φ -features (i.e. if there is no difference in the status of T), then we might need to incorporate within our proposal some role for φ -features on Tns in the analysis of the phenomena considered here. We return to this issue in future work.

apparently true fact that an uninterpretable occurrence of a feature must enter an agree relation with an interpretable counterpart. This allows it to delete without violating Radical Interpretability. In this section, we use the hypotheses about T that have been supported in previous sections to simplify the analysis of *that*-omission phenomena presented in our previous work. This analysis, in turn, will provide us with a strong argument that uninterpretable features must undergo deletion. In the final section of this paper, we conclude the paper with some speculations about the nature of this deletion operation, made possible by the framework developed here.

The phenomenon in question is the contrast seen in (20). In English, CP-initial *that* is generally optional in a complement clause, but is obligatory in a CP that is functioning as the subject (a *sentential subject*):

(20) **"That-omission" asymmetry** (Stowell (1981); Kayne (1981))

[non-subject CP--> optional *that*]

- a. Mary thinks [that Sue will buy the book].
- b. Mary thinks [Sue will buy the book].

[subject CP--> obligatory *that*]

- c. [That Sue will buy the book] is obvious.
- d. *[Sue will buy the book] is obvious.

In Pesetsky & Torrego (2001), we offered an account of this contrast that relied on the proposal that nominative case is an instance of *uT* and on a particular hypothesis about C and the nature of the element *that*. In particular, we suggested that CP-initial *that* is not an instance of C, but rather a pronunciation of Tns moved to C (which cooccurs with full pronunciation of its trace) — a consequence of a *uT*[] feature on C with an EPP property.²⁶

One argument for this view of *that* was the similarity we noted, following Koopman (1983), between the impossibility of auxiliary verb movement to C in subject *wh*-questions (the "Tns-to-C" asymmetry) and the comparable impossibility of beginning a clause containing subject *wh*-movement with the word *that* (the so-called *that*-trace effect):

²⁶ This proposal, when combined with our (2004) argument that prepositions are types of Tns, strongly echoes the proposal of Emonds (1985, 49) that words such as *that* belong to the category P. For us, however, there is an independent category C, to which *that* moves, which is more similar to D (Szabolcsi (1987)) than it is to P.

(21) **Tns-to-C asymmetry in matrix questions** (Koopman (1983))

[non-subject wh --> "optional" Tns-to-C]

- a. What a nice book Mary read ___!
- b. What did Mary read ___?

[subject wh --> no Tns-to-C]

- c. Who ___ read the book?
- d. *Who did ___ read the book?/*What a nice person did read the book!

(22) **Belfast English: Tns-to-C asymmetry in embedded declaratives**

(Henry (1995, 108-9; p.c.))

[non-subject wh --> (optional) Tns-to-C movement]

- a. Who did John say [did Mary claim [had John feared [would Bill attack ___]]?

[subject wh --> no Tns-to-C movement]

- c. Who did John say [___ went to school]
- d. *Who did John say [did ___ go to school]? (bad unless *do* is emphatic)

(23) **"That-trace effect"** (Perlmutter (1971))

[non-subject wh --> optional *that*]

- a. What do you think [Mary read ___]?
- b. What do you think [that Mary read ___]?

[subject wh --> no *that*]

- c. Who do you think [___ read the book]?
- d. *Who do you think [that ___ read the book]?

We argued that the effects seen in (21)-(23) arise from a competition between Tns-to-C movement and nominative DP-to-Spec,CP movement as alternative methods of satisfying an EPP property of *uT*[] on C in circumstances in which C also bears a feature that invokes *wh*-movement. We will not review the details here, except to recall that the competition disappears when no subject *wh*-movement occurs, as in simple embedded declarative sentences. (See Pesetsky & Torrego (2001) for details.) Under these circumstances, either Tns-to-C movement or subject-to-Spec,CP movement should be possible. The former yields an embedded clause introduced by *that*. The latter yields an embedded clause introduced by the subject:

(24) **Optionality of *that* in declarative CP complement to V**

a. *option 1. Move Tns to C (that)...*

Mary thinks [_{CP} [_{Tns} *iT* +fut[5]]+[C, *uT*[5]] [_{IP} [Sue, *uT*[5]] ___ buy the book.]]
Mary thinks *that* *Sue* *will buy the book*

b. *option 2. Move the nominative subject to Spec,CP:*

Mary thinks [_{CP} [_{Sue, *uT*[5]}] [_{C, *uT*[5]}] [_{IP} ___ [_{Tns *iT* +fut[5]}] buy the book].

Mary thinks Sue will buy the book

In (24a), once interpretable T has undergone head movement to C, it constitutes a morpheme of C, perhaps by the process described by Matushansky (to appear a).²⁷ (See also Pesetsky and Torrego (2004, 508-509).) Thus, C contains interpretable T in a clause introduced by *that*. In (24b), however, C contains the uninterpretable T-feature with which it was endowed in the lexicon (now valued in agreement with T of the subject and Tns), but does not contain any instance of interpretable C. Let us now imagine that at the end of the CP phase, uninterpretable features are deleted subject to Radical Interpretability (i.e. if they have been valued), as discussed in section 3. After deletion applies, C in a CP like (24b) will no longer contain any instance of T. By contrast, C in a CP like (24a) (a *that*-clause) will contain an instance of T. The *u*T present on C in the lexicon will delete in (24a), but the *i*T that forms part of Tns that moved to C will remain. In (25), we indicate deleted instances of the T-feature with dashes, and highlight the remaining instance of the T-feature on C with boldface:

(25) (24) after deletion

a. *option 1. Move Tns to C (that)...*

... [CP [_{Tns} ***i*T +fut[5]**] + [C, ----] [IP [Sue, ----] ___ buy the book.]]
that Sue will buy the book

b. *option 2. Move the nominative subject to Spec,CP:*

... [CP [Sue, ----] [C, ----] [IP ___ [_{Tns} *i*T +fut[5]]] buy the book].
Sue will buy the book

Let us return now to the discussion of sentential subjects. In what follows we will use a subscript H to refer to elements of the highest clause (e.g. Tns_H for Tns of the highest clause) — the matrix clause in our examples — and a subscript SS for elements of the sentential subject.

Imagine now that *i*T[] on Tns_H is acting as a probe, and that a CP (a sentential subject) occupies Spec, vP_H. This probing by *i*T[] on Tns_H will, by hypothesis, take place after the deletion seen in (25). As is clear from (25), a *that*-clause may serve as a goal, but a finite CP not introduced by *that* may not — since no instance of T remains on C_{SS} in the latter case. If we are correct in proposing (for other reasons) that *i*T on Tns in a language like English comes from the lexicon unvalued, the *that*-omission asymmetry in (20c-d) is immediately explained. A *that*-

²⁷ A consequence of this analysis is the existence of polymorphemic words (e.g. Tns+C) with word-internal agreement relations among the features of their morphemes. See Gračanin-Yuksek (2004) for an extended discussion of word-internal agree in Italian and Croatian compounds, developing a framework similar to that proposed in this paper.

clause may be the goal for $iT[]$ on Tns_H , and thus become a subject of the higher clause, but a finite CP not introduced by *that* may not.^{28,29}

Our abandonment of the Valuation/Interpretability Biconditional is crucial to the simplicity of this account. If we were to assume, with MI/DbP, that an interpretable feature necessarily comes with a value, then we could not assume that the iT feature of Tns_H behaves as a probe, and would need to assume that agreement between Tns_H and a subject involves features other than T, e.g. φ -features. This was, in fact, our assumption in earlier work (Pesetsky & Torrego (2001)). Consequently, our account of the *that*-omission asymmetry had to invoke a "Match Condition" that stipulated that agreement in φ -features is only possible when all other features of the probe (T in the present case) are present on the goal. In the framework of the current paper, no Match Condition is necessary. The $iT[]$ feature of Tns_H simply probes and Agrees with the iT *val* feature of the CP introduced by *that*.³⁰

As a consequence of this agreement process, T on Tns_H and T on Tns_{SS} become instances of the same feature. This raises one obvious question. Do T on Tns_H and T on Tns_{SS} actually behave for the semantics or morphology as if co-valued?

At first sight, the answer appears to be no, which poses a clear problem for this analysis. It is perfectly possible, for example, for the higher clause to show past tense, while the embedded clause is present. Other similar combinations are freely allowed as well:

²⁸ If a DP occupies Spec,vP (as in *Mary saw John*), its $uT[]$ feature will not be valued (and thus cannot delete) until it is probed by $iT[]$, which is (in turns) later valued by uT on v . That is why a DP subject may serve as a goal of $iT[]$ on Tns , in contrast to a sentential subject without *that*.

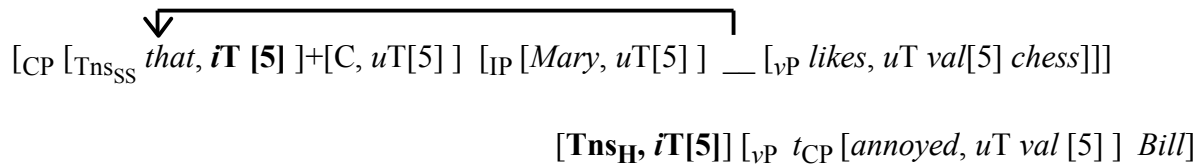
²⁹ In a transitive sentence, a complement clause like those seen in (20a-b), does not need to serve as a goal for iT on Tns , since the external argument serves that purpose. If the clause does not contain any other instance of uT that requires an object CP to function as a goal, we expect the complement clause to be acceptable with or without *that*. This raises certain questions about accusative case (in particular if the analysis of Pesetsky & Torrego (2004) is assumed) that we cannot discuss here, but address in forthcoming work.

³⁰ On this approach, both CPs introduced by *that* and CPs not introduced by *that* in English have a phonologically null C (to which Tns moves in the variant with *that*). An alternative discussed in earlier literature treats *that* as a (non-null) instance of C, and posits a null C only for the variant without *that*. This view was proposed by Stowell (1981a; 1981b) and developed further by Pesetsky (1991)), among others. Most recently, Boškovic and Lasnik (2003) extend Pesetsky's variant of this analysis within the MI/DbP framework. In Pesetsky and Torrego (2001, 388-393), we argued against this overall approach, noting that the phonological nullness of C appears to be irrelevant to the phenomenon, both cross-linguistically and internal to English.

- (26) a. That Mary likes chess annoyed Bill.
 b. That John ate dinner makes Tom happy.
 c. That the world will end tomorrow frightened everyone.

This is unexpected if present, past, future, etc. are the values that the feature T may bear, given the co-valuations expected in our system, as seen in (27):

(27) **Shared valuation of T in sentential subject and higher clause**



Let us therefore suggest that the values of T relevant to Agree are not in fact the various tenses, but simply plus and minus. If this is so, then the various tenses do not correspond to values of a grammatical feature, but constitute different sorts of *encyclopedic* information that may be associated with a T feature that has a positive value (i.e. [iT +]). In this sense, present or past tense semantics stand to the positive value for T much as the differing denotations of *dog* and *giraffe* stand to a positive value for an animacy feature. The lexical entry for *dog* contains not only its grammatical features, but *encyclopedic specifications* (ES) associated with these features. The ES for the animacy feature of *dog* is what allows the word to pick out dogs to the exclusion of giraffes and other animate entities. The property of ES that is important to the present discussion is the fact that it appears to adhere to particular *instances* of features. Consequently, the ES of a feature of a lexical item does not participate in morphological agreement. When Agree applies to two occurrences of a feature, only one of which is associated with an ES, the ES information is not shared by the two positions in the output of Agree.

In addition to helping us with the problem at hand, these considerations help us to understand the fact that morphological agreement in a language may be sensitive to animacy, number, person, etc., but is typically not sensitive to fine-grained distinctions such as "dog" vs. "giraffe".³¹ In general, the distinctions visible in agreement systems are far fewer than the

³¹ Languages often impose language-specific categorization schemas (e.g. grammatical gender) on the lexical items of the language. Thus, the words for 'book' and 'table' might find themselves in distinct categories, reflected in differing agreement patterns (as they do in Spanish, where *libro* 'book' is masculine and *mesa* 'table' is feminine. This situation is not the one discussed in the text (and viewed as non-existent) in which every semantically relevant distinction would have a reflection in morphological agreement.

Language-specific classification schemas raise important questions about the concept "interpretability", especially if the thesis of Radical Interpretability is correct — given our observation in section 1 that gender acts like other features for agreement. Tentatively, we suggest, with Bouchard (1984, 14-17) that the features relevant to such classification systems are

distinctions made among the denotations of lexical items.³² We are simply extending this observation to tenses, by suggesting that T-agreement is sensitive to positive vs. negative value, but not to fine-grained distinctions among the actual tenses.³³ This suggestion eliminates the immediate problem with such cases as (27), and has some further important consequences, to which we now turn.³⁴

interpretable — but that the interpretation in question involves something like the "Domain D" of Chomsky (1981, 324). Chomsky characterizes Domain D as an "essentially syntactic" level of representation that connects to "real semantics" but is not itself part of the mapping between linguistic and real-world entities. In Domain D, it may be as much a fact that 'table' is feminine and 'book' masculine as it is that 'table' is singular and 'books' plural — despite the fact that the former classification appears to be irrelevant outside language, while the latter is meaningful in a more general sense. See also Emonds (1985, 23-24 note 25) for discussion.

³² We leave open an obvious question concerning the diversity of *wh*-elements and their relation to C, discussed in section 3: whether the individuation of *wh*-elements as interrogative, relative, etc. is a matter of valuation of Q as suggested or actually an ES associated with Q.

³³ The feature T on this view does not coincide with the traditional notion of *finiteness*, because certain infinitival clauses may serve as subjects of finite clauses (as we discussed in Pesetsky & Torrego (2001), borrowing from Stowell (1982)), and thus for us must have a positive value for T. This raises the question of what (if any) elements show a negative value for T. A natural suggestion is to identify the negative value of T with the class of elements called *prepositions/postpositions*, which in previous work (Pesetsky & Torrego (2004)) we argued were flavors of T. We leave this as a speculation for now.

Note as well that we are in (tentative) disagreement with the suggestion of Iatridou, Anagnostopoulou & Izvorski (2001) that otherwise bears similarity to our proposals. Iatridou et al. suggest that T on Tns as well as T on *v* is (to use our terminology) unvalued, and gets its value by agreement with an overt or covert temporal adverb. (A similar proposal concerning past tense is made by Stowell (1995)). If this proposal is correct, then the actual distinctions among the tenses might be visible to Agree after all, though one imagine ways of making the proposals compatible that would preserve their various advantages. We are grateful to Kai von Stechow for discussion of this issue.

³⁴ These considerations bear on a problem that we first noted in Pesetsky and Torrego (2001, 365-367). If structural case is $uT[]$ on DP, and is valued by the main tense of the clause, why do we not find widespread correlations between the actual phonological form of structural case and the tense of the clause in which it occurs? We did note a few possible examples in that paper, including possible future agreement on DP in Pitta-Pitta (brought to our attention by Ken Hale) and an intriguing correlation between present/past and nominative/accusative in Classical Arabic (pointed out to us by Abbas Benmamoun) — but the significance of these examples is somewhat unclear, and the phenomenon does not appear to be widespread. If tense distinctions are a matter of encyclopedic information and do not participate in Agree, we can now understand

Although the ES of a lexical item does not participate in Agree, Radical Interpretability holds of ES as it does of other features. We cannot use the word *dog* to pick out a giraffe.³⁵ Likewise, we cannot use past tense morphology freely to yield future tense semantics. This leads us to ask how semantic interpretation can apply to an ES that is associated with an *uninterpretable* instance of a feature — as is the case when specific tense morphology is found on *v*. If we are correct, this morphology corresponds to the ES associated with [*uT* +] on *v*. The ES is not shared with *iT*[] on the nearby Tns as a consequence of Agree, yet must play a role in the interpretation of *iT* on Tns. Clearly, when the process of semantic interpretation cannot find an ES associated with an interpretable instance of a feature, it accesses an ES associated with another instance of the same feature. We must thus assume that although the ES of a feature is not *shared* by the feature's various locations, it may be accessed at any of these locations, provided that the semantics requires it.

Let us see how these considerations interact with the analysis of (27). When *iT* on Tns_H is interpreted, it takes its ES from the T-feature of *v*_H. It does not take its ES from T on Tns_{SS}. Thus, (27) as a whole is understood as a proposition in the past tense, not in the present tense. Our observations in the previous paragraph help explain this fact. If *iT* on Tns_H did not "borrow" its ES from the instance of T on *v*_H, that ES would never be interpreted, in violation of Radical Interpretability. On the other hand, the ES associated with T on Tns_{SS} has already been interpreted as part of the semantic interpretation of the sentential subject itself, and does not need to be interpreted a second time.

Slightly more complex questions arise when we juxtapose the results of this section with the discussion of raising in the previous section. Consider once more the derivation sketched in (16), which showed DP raising from an infinitival clause. (We will use subscript INF to indicate elements of such a clause.) Recall that T on both *v*_{INF} and Tns_{INF} is unvalued. The *uT* feature on the subject DP_{INF} (i.e. its case feature) enters an Agree relation with T on *v*_{INF} and Tns_{INF}, which does not result in valuation. Once the DP moves into the higher clause, however, its T-feature is able to enter an Agree relation that does result in valuation, and thus ends up providing a value for T on Tns_{INF} (and *v*_{INF}) as well. In effect, the raised DP transmits information about the valuation of T from the higher clause to the infinitival clause. We observed that one effect of this process is the co-valuation of the higher and lower T on Tns, and noted that this co-valuation was reflected in the tense semantics of the construction. This now means that the ES associated with the valued T feature is accessed in both clauses as well. This shows that nothing *prevents* the semantics from accessing the same information more than once.

why non-correlation is the general case. We will need, of course, an alternative account of the Pitta-Pitta and Classical Arabic phenomena.

³⁵ We can of course use the word *dog* to pick out a human who we wish to insult. We ignore here the complications of idiomatic interpretation, metaphor, epithets, etc.

Consider now the derivation of a raising construction that is just like (16), except that the subject is sentential:

(28) **Raising to subject of a CP**

That Mary liked the play seemed to annoy Tom

[to [_{VP} [_{CP} that....] annoy Tom]] →

Step 1: form specifier of infinitival Tns

[[_{CP} that....] to __ annoy Tom] →

Step 2: form specifier of higher, finite Tns

[_{CP} that....] Tns seemed [__ to annoy Tom]

The semantic link between the interpretation of the higher clause and the infinitival clause is exactly the same here as when the subject is a DP. This means that T on Tns_{SS}, by entering an Agree relation with T on Tns_H, sends information about the valuation of T down into the infinitival clause in the same way a raised DP does. Crucially, this transmission of information also allows the ES of T on Tns_H (henceforth "ES_H") to be accessed when T on Tns_{INF} undergoes semantic interpretation — a general property of interpretation of ES, as we have seen.

Notice now, however, that it is crucially ES_H, and not the ES associated with T on Tns_{SS} (henceforth "ES_{SS}") that is transmitted to the infinitival. We cannot attribute this fact to Radical Interpretability applying to ES_H, since ES_H will be interpreted in the highest clause no matter how T on Tns_{INF} is interpreted. This fact can be explained, however, if we assume an *Economy condition* on ES interpretation that prefers not to re-use ES information that has been previously accessed in the process of semantic interpretation. If we assume that semantic interpretation applies incrementally, after each phase is constructed, then ES_{SS} has already been semantically interpreted when the sentential subject is merged into the higher structure. On the other hand, ES_{INF} and ES_H are interpreted at the same time — and no issue of re-use arises. Consequently, the Economy condition that blocks re-use of ES on *i*T of Tns_{SS} will not block the use of the same ES information in the interpretation of *i*T on Tns_H and Tns_{INF}.³⁶

³⁶ Our proposal does not in itself rule out derivations in which a sentential subject CP introduced by *that* remains within an infinitival raising clause, and values *i*T on Tns_{INF}. Such examples will, of course, require an expletive subject in the main clause:

- (i) *It seemed [[that Mary liked the play] to annoy Tom]

Possibly such examples are excluded independently by the same factors that exclude comparable examples with a DP subject in the embedded infinitival, e.g. (ii):

- (ii) *There seemed [a sundial to be in the garden].

Let us summarize the results of this section. If our ideas about the interaction of ES and Agree are correct, then our general proposals allow a straightforward explanation of the *that*-omission asymmetry that improves on our previous account of this phenomenon. This result, in turn, provides an argument not only for our general proposals about features and agreement, but also for the proposal by Chomsky (1995a; 2000; 2001) that uninterpretable (instances of) features can and must delete under particular circumstances. In section 3, we offered an explanation of the exact conditions under which this deletion may take place (developing ideas of Brody (1997)). It is also natural to ask whether we can identify the mechanisms responsible for deletion. We end this section with a conjecture on this topic.

Earlier, we adopted Chomsky's proposal (in a revised context) that it is unvalued features that act as probes, and cited an argument against a link between status as a probe and interpretability. As we discussed, Chomsky noted that valuation of a feature is plausibly a property that the syntax can identify on its own, while interpretability should be irrelevant to purely syntactic computations. This point has greater force if one follows Brody, as we did, in arguing that there are no uninterpretable features, merely uninterpretable instances of features that, by Radical Interpretability, must receive a semantic interpretation.

The same argument, however, has an impact on how we must think about the obligatory deletion of uninterpretable instances of features that we have argued for in this section. The syntax on its own presumably does not know whether or not a particular instance of a feature can or cannot be interpreted by the semantics. A perspective on this issue that might hold promise concerns the direction of information flow across the interface between the syntax and semantic interpretation. A much-discussed question concerns whether the flow of information between syntax and semantics is unidirectional or bidirectional (and, if unidirectional, which direction it takes). Much work within the tradition of Chomsky (1995b) and MI/DbP assumes that information flows unidirectionally from the syntax to the semantics, but there have been arguments for bidirectionality, e.g. Fox (1995a; 1999) and references cited there.

If Chomsky is correct in his observation that syntax probably lacks direct access to information about interpretability, there might be some reason to favor a bidirectional approach to the deletion of uninterpretable features. One might imagine the following procedure as a model of this interaction. The semantic system receives information about the syntactic derivation from the syntax, and attempts to interpret the various instances of features that have been assembled and reassembled during this derivation. When an instance of a feature F cannot be interpreted, the semantic system deletes this instance of F, subject only to the criterion of Radical Interpretability, which blocks deletion of an instance of a feature that also deletes the feature as a whole.

Chomsky (1995a) proposed that examples like (ii) are excluded because there is an alternative derivation in which *there* is externally merged in Spec,TnsP_{INF}, and a general preference for external over internal merge ("Merge over Move") favors such a derivation. Likewise, the same preference for external over internal merge would force the introduction of *it* in the infinitival clause of (i), preventing the raising of the sentential subject to this position.

The key novelty that one might consider is the following: the semantic system hands the interpreted structure back to the syntax. In this way, deletion of a feature by the semantic system entails the inaccessibility of that feature to further syntactic computation. It is in this sense that the view of deletion advanced in this section might provide another type of evidence for a bidirectional theory of the syntax-semantics interface. We leave further discussion of these matters for future work.

6. Conclusion

In this paper, we have argued for a modification of the MI/DbP framework and a revision of our own previous work that incorporates three closely linked ideas. First, we have argued in favor of a view of Agree as feature sharing. Second, we have argued for the abandonment of the Valuation/Interpretability Biconditional — a suggestion that predicts the existence of two new types of features. Third, we have argued that the first two proposals have particularly important consequences in the context of Brody's (1997) thesis of Radical Interpretability.

At a minimum, our suggestions offer a new way of thinking about certain phenomena that have fallen largely outside the discussion of agreement within the MI/DbP research tradition: in particular, the relation between Tns and the finite verb and the relation between C and the varieties of phrases that associate with C. In addition, we have argued that our proposal allows a simplification of existing accounts of two phenomena that have figured prominently in recent work: the analysis of "defective" Tns in Raising constructions, and the distribution of sentential subjects. In addition, we have hope to have shed light on the nature of agreement and the shadow it casts on syntax and its interaction with neighboring components.

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