Φ-Feature sharing

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1. Copying vs. sharing in φ-Agree

In φ-agreement dependencies, the φ-features (typically person, number, and gender or class) of one element condition the morphological form of another element. The canonical example is subject-verb agreement as illustrated in (1), where the form of the auxiliary covaries with the features of the subject DP.

(1) a. The child is running.
    b. The children are running.

Since Chomsky (2000, 2001), such dependencies have been standardly analyzed in terms of the operation *Agree*, which copies feature values from one element to another. Verbal agreement is treated as the manifestation of a verbal head (in English, T) that initially contains an unvalued, uninterpretable feature (called the *probe*). The probe searches for a valued, interpretable counterpart on another element, typically a DP (the so-called *goal*). Agree between the probe and the goal results in the copying of the feature value from the goal to the probe. This is schematized for the general case in (2). H corresponds to some functional head that contains an unvalued φ-feature [φ : □] (I use the symbol "□" to indicate the absence of a value). The DP bears a φ-feature with some value δ. Agree between H and the DP results in copying the value δ from DP to H. After Agree, the structure contains two separate φ-features [φ:δ]. Because H acquires the φ-feature of the DP, the two are necessarily identical, resulting in agreement.

(2) $[\ \underset{[\varphi:\square]}{\text{H}}\ \ldots\ \underset{[\varphi:\delta]}{\text{DP}}\ ] \xrightarrow{\text{AGREE(H,DP)}} [\ \underset{[\varphi:\delta]}{\text{H}}\ \ldots\ \underset{[\varphi:\delta]}{\text{DP}}\ ]$

Applied to the example in (1), H in (2) corresponds to T, and the DP to the subject DP *the child(ren)*. "δ" corresponds to person and number features. In (1b), *the children* contains the feature [φ:3PL]. Agree copies the value [3PL] to T, where it conditions the morphological form of the auxiliary *are*.

A central component of this analysis is that the feature on the goal and the feature on the probe remain separate entities and that Agree involves *copying* of feature values. The reasons for this view are primarily theory-internal: Chomsky (2000, 2001) assumes that the probe feature is uninterpretable and, by assumption, would crash the derivation if it reached the conceptual-intensional (CI) interface. By assumption, the probe feature may undergo deletion when it receives a value through Agree, and this deletion avoids the crash.[1] As a result, Agree and subsequent deletion of the probe features are required in order to avoid ungrammaticality at the interface. At the same time, the corresponding goal feature on the DP clearly feeds into the semantic interpretation (e.g., the singular DP *the child* and the plural DP *the children* are clearly semantically distinct), and so the φ-feature on the DP must not undergo deletion. This implies that the probe feature and the goal feature, as well as their values, must be distinct entities, as only then is it possible to delete one without also deleting the other.

While the view that Agree involves feature copying has been explicitly or implicitly adopted in much of the literature following Chomsky (2000, 2001), there is a growing class of proposals that Agree results not in feature *copying* but in feature *sharing* (Frampton and Gutmann 2000, 2006, Legate 2005, 2014, Reuland 2005, 2011, Pesetsky and Torrego 2007, Kratzer 2009, Camacho 2010, Danon 2011, Abels 2012, Ackema and Neeleman 2013, Chung 2013, Kalin 2014, 2018, Landau 2015, Preminger 2017, Stone 2018), as stated in general terms in (3).

(3) *Feature sharing*
Agree between a probe and a goal unifies the probe feature and the goal feature, yielding a representation in which they are token-identical: one and the same feature is simultaneously associated with two elements.

Feature sharing is represented in schematic form in (4). After Agree is established, the same feature [φ:δ] is simultaneously associated with both H and DP and, in other words, shared between the two. Here and throughout, I use association lines to indicate that a single feature is present on, or associated with, more than one element (Frampton and Gutmann 2000, 2006, Ackema and Neeleman 2013).

(4) *Feature sharing*

$$[\ \underset{[\varphi:\square]}{\mathrm{H}}\ \ldots\ \underset{[\varphi:\delta]}{\mathrm{DP}}\ ] \xrightarrow{\text{AGREE(H,DP)}} [\ \mathrm{H}\ \ldots\ \mathrm{DP}\ ]$$
$$[\varphi:\delta]$$

Another notation used in the literature to indicate sharing is through coindexation of features (e.g., Pesetsky and Torrego 2007, Kalin 2014, 2018, Landau 2015). In this notation, sharing as in (4) would be represented as two instances of [φ : δ], once on H and once on DP, but coindexed with each other, indicating that they are token-identical.

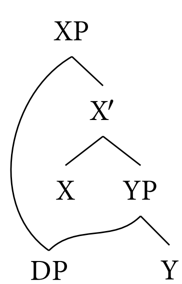
Like Agree-as-copying, feature sharing results in covariation between two elements. Applied to the example in (1b), a single [φ:3PL] feature is associated with both T and DP, and it affects the morphology of both of these elements: the DP is realized as *the children* and T is realized as *are* because the feature is associated with both of these elements. Thus, like copying, feature sharing results in agreement. On a copying analysis, this agreement is the result of two distinct features bearing the same value; on a feature-sharing analysis, agreement is the result of a single feature associated with two elements.

[1] This deletion applies at the phase level; for discussion of some of the intricacies involved, see Epstein and Seely (2002), Richards (2007), and Chomsky (2008), among others.

While both copying and sharing thus result in agreement, they are not equivalent. Agree as feature sharing makes available analytical options that are not available with Agree as feature copying, albeit at the cost of requiring richer and more complex syntactic representations. Some of the literature on case, agreement, and related phenomena has argued that these additional analytical options offer new ways of analyzing a range of empirical phenomena. The goal of this article is to provide an overview of the kinds of phenomena and questions that have played a role in these discussions. I will focus on sharing of φ-features and, to some extent, case features (which the relevant literature typically treats as going hand in hand with φ-sharing). My goal is not to argue whether or not sharing is the correct way of analyzing φ-agreement, but rather to illustrate some of the analytical ramifications of the choice between Agree-as-sharing and Agree-as-copying. I will do so by illustrating what types of analyses become available under Agree-as-sharing that are not available under Agree-as-copying. Ultimately, a comprehensive assessment of feature sharing vis-à-vis feature copying depends on whether these types of analyses are empirically justified and whether they warrant the added structural complexities that feature-sharing representations entail. In order to streamline the discussion, I will put this question aside for the main part of this paper, but I will return to some alternative analyses in section 5.1. In order to have a uniform notation throughout the paper, I will use association lines as in (4) to indicate feature-sharing dependencies, since this is the standard way of indicating sharing in other linguistic areas (e.g., autosegmental phonology and multidominance). As noted, not all the work on feature sharing employs this notation, but I believe that nothing of substance is lost by translating such analyses into this notation.

It is worth noting that in many respects, feature sharing may be viewed as the feature-level counterpart of multidominance at the phrase level. Multidominance theories of displacement hold that a constituent may be merged in more than one position—that is, that a node may have more than one mother (see Starke 2001, Gärtner 2002, Frampton 2004, Citko 2005, Wilder 2008, Bachrach and Katzir 2009, 2017, De Vries 2009, Abels 2012, Johnson 2012, O'Brien 2017, Poole 2017, and Citko and Gračanin-Yuksek 2021, among others). This view differs from the copy theory of movement (Chomsky 1995) in a way that mirrors the relationship between feature sharing and feature copying. In the copy theory of movement, each position in a movement chain is occupied by a distinct entity (a copy). By contrast, in a multidominance account of movement, there is only a single element that occurs in several positions, as schematized for movement of a DP in (5).

(5) *Multidominance*



Feature sharing and multidominance have in common that a single entity occurs in two positions, but they differ in the granularity of the type of element that undergoes this sharing. As we will see, different levels of sharing can be distinguished even within a feature-sharing account, depending on the internal structure of features. For example, it is customary to distinguish between a feature and its value, and so, all else equal, sharing could also apply at the value level, as schematized in (6). While (4) involves sharing of the entire feature (including the value), (6) involves two distinct features that share between them a single value token.

(6) *Value sharing*

$$[\ \underset{[\varphi:\square]}{\text{H}}\ \ \dots\ \ \underset{[\varphi:\delta]}{\text{DP}}\ ] \xrightarrow{\textsc{Agree}(\text{H,DP})} [\ \underbrace{\underset{[\varphi:\ \ ]}{\text{H}}\ \ \dots\ \ \underset{[\varphi:\ \ ]}{\text{DP}}}_{\delta}\ ]$$

In practice, it is often difficult to distinguish between sharing of a value and sharing of a feature, and existing sharing proposals often do not explicitly distinguish between the two levels of sharing. I will use the term "feature sharing" as a cover term for feature and value sharing here, noting the difference where the two diverge in contentful ways.

While I will focus on recent feature-sharing proposals within minimalism, it is important to note that feature sharing itself is largely framework-independent. The view that agreement is feature sharing has also been argued for within HPSG (e.g., Kathol 1999, Sag et al. 2003) and LFG (Haug and Nikitina 2016). To illustrate, Sag et al. (2003) formulate the specifier–head agreement rule in (7). In this rule, the agreement (AGR) value of the head is identical to the AGR value of its specifier (SPR), encoded as both sharing the feature identifier $\boxed{1}$. (7) involves feature sharing because the two occurrences of $\boxed{1}$ are token-identical, that is, the relevant feature is present in both locations.

(7) *Specifier–head agreement in Sag et al. (2003:238)*

$$\begin{bmatrix} \textsc{syn} & \begin{bmatrix} \textsc{head} & \begin{bmatrix}\textsc{agr} & \boxed{1}\end{bmatrix} \\ \textsc{val} & \begin{bmatrix}\textsc{spr} & \left\langle \begin{bmatrix}\textsc{agr} & \boxed{1}\end{bmatrix} \right\rangle\end{bmatrix} \end{bmatrix} \end{bmatrix}$$

I will proceed as follows: In section 2, I will present feature-sharing analysis of what I call "parasitic agreement": agreement between two elements A and B that also affects a third element C, which I will illustrate in a number of domains. Parasitic agreement has been taken as one of the key empirical motivations for feature sharing. In section 3, I present a consequence of feature sharing for locality principles, in particular phase theory. In section 4, I present applications of φ-feature sharing to phenomena other than φ-agreement. These applications capitalize on the fact that φ-feature sharing establishes a permanent record of an Agree relation, which can then be utilized at the interfaces for the computation of other dependencies. In section 5, I place feature sharing in a more general context: I first briefly lay out possible alternative analyses that do not involve feature sharing; then I return to the question of what levels sharing may apply at and the relationship between feature sharing and multidominance.

2. Parasitic agreement

As noted in particular by Frampton and Gutmann (2000, 2006) and Pesetsky and Torrego (2007), one of the most salient difference between feature copying and feature sharing is that feature sharing allows sharing of unvalued features, which has no clear analogue in feature-copying models. To see this, consider configurations in which two elements Y and Z bear some unvalued feature $[\mathrm{F}:\square]$. On a feature-sharing conception of Agree, Y and Z may agree with each other, yielding a single instance of $[\mathrm{F}:\square]$ that is shared between Y and Z, as shown in (8). Subsequent Agree between Y and a third element X that bears a valued feature $[\mathrm{F}:\delta]$ then leads to feature sharing between X, Y, and Z. In this derivation, X provides a value for the occurrences of $[\mathrm{F}:\square]$ on both Y and Z. In other words, Agree between X and Y has the effect of "covaluing" the occurrence of F on Z as well. I will refer to such agreement as "parasitic" because Z obtains a value for F despite not being part of the Agree relation (which only holds between X and Y).

(8) $$\left[\begin{array}{ccccc} \mathrm{X} & \ldots & \mathrm{Y} & \ldots & \mathrm{Z} \\ [\mathrm{F}:\delta] & & [\mathrm{F}:\square] & & [\mathrm{F}:\square] \end{array}\right] \xrightarrow{\textsc{Agree}(\mathrm{Y,Z})} \left[\begin{array}{ccccc} \mathrm{X} & \ldots & \mathrm{Y} & \ldots & \mathrm{Z} \\ [\mathrm{F}:\delta] & & & [\mathrm{F}:\square] & \end{array}\right] \xrightarrow{\textsc{Agree}(\mathrm{X,Y})} \left[\begin{array}{ccccc} \mathrm{X} & \ldots & \mathrm{Y} & \ldots & \mathrm{Z} \\ & & [\mathrm{F}:\delta] & & \end{array}\right]$$

As noted in section 1, sharing may in principle be stated either at the level of the feature or the level of the value. If unvalued features are characterized by the absence of a feature value, as seems natural, then sharing of an unvalued feature must apply at the level of the feature rather than the value: what is shared in (8) is a feature that happens to lack a value.

Agree as copying does not give rise to the equivalent of (8). If Agree results in copying of a feature value, then Agree between two unvalued features is either vacuous or impossible (Pesetsky and Torrego 2007:269). In what follows, I present several empirical patterns that have been analyzed as parasitic agreement and sharing-based accounts that have been proposed for them.

2.1. Parasitic φ-agreement

The first example of parasitic agreement comes from Hindi-Urdu long-distance agreement, based on the analysis in Bhatt (2005) and the extension in Keine and Dash (2018) (see Davison 1991, Mahajan 1989, Butt 1993, 1995, and Chandra 2007 for additional discussion and alternative analyses of long-distance and infinitival agreement in Hindi-Urdu). In Hindi-Urdu, a matrix verb may agree with the object of an embedded infinitival clause if the matrix subject bears ergative case, as shown in (9a). In this case, the embedded infinitival verb (*kaaṭ-nii*) also agrees with its object. Crucially, infinitival agreement is possible only if the matrix verb shows LDA. This restriction is seen most clearly in cases in which the matrix subject does not bear ergative case, such as (9b,c). In this case, the matrix verb must agree with its local subject, and the embedded verb must show masculine singular default agreement. In particular, the infinitival verb may not agree with the embedded object (9c).[2]

[2] The infinitival verb may also not agree with the matrix subject in (9c).

(9) *Hindi-Urdu*

a.

laṛkõ-ne	[**ṭehnii**	kaaṭ-**nii**]	chaah-**ii**	**thii**
boys.M-ERG	branch.F	cut-INF.F.SG	want-PERF.F.SG	be.PST.F.SG

'The boys had wanted to cut the branch.'

b.

laṛke	[ṭehnii	kaaṭ-**naa**]	chaah-*te*	*the*
boys.M	branch.F	cut-INF.DFLT	want-IMPERF.M.PL	be.PST.M.PL

'The boys want to cut the branch.'

c.

**laṛke*	[**ṭehnii**	kaaṭ-**nii**]	chaah-*te*	*the*
boys.M	branch.F	cut-INF.F.SG	want-IMPERF.M.PL	be.PST.M.PL

Intended: 'The boys want cut the branch.'

[adapted from Bhatt 2005:761–762, ex. (6a), (7a,b); Rajesh Bhatt, p.c.]

Bhatt (2005) concludes that if the embedded verb was associated with its own independent φ-probe, then infinitival agreement would be possible in (9c), just as it is in (9a). The analytical challenge is to allow the embedded verb to agree with its object only if the matrix verb agrees with this object as well. Bhatt (2005) proposes a covaluation analysis. He suggests that the embedded clause contains what I will call a "defective" φ-probe, which is unvalued but which may not initiate Agree (see also Abels 2012:92). The resulting derivation for (9a) is given in (10). The matrix φ-probe on T lacks a value, searches through its c-command domain, and finds the embedded defective φ-probe on Inf (the topmost head of the infinitival clause). The two agree and a dependency is created between them. While Bhatt does not specify the nature of this dependency, it has the hallmark properties of feature sharing, and Keine and Dash (2018) extension of Bhatt's (2005) account explicitly employs feature sharing. The matrix φ-probe on T and the defective φ-probe on Inf thus enter a sharing relationship. Because the resulting shared feature is still unvalued, search by T continues and finds the embedded object with the φ-value δ (feminine singular in (9a)). Feature sharing then results in [φ:δ] being shared among all three elements, and agreement morphology appears both on T and on Inf.

(10) $[\,\underset{[\varphi:\square]}{\mathrm{T}} \;\ldots\; \underset{[\varphi:\square]}{\mathrm{Inf}} \;\ldots\; \underset{[\varphi:\delta]}{\mathrm{DP}}\,] \xrightarrow{\textsc{Agree}(\mathrm{T,Inf})} [\,\underbrace{\mathrm{T} \;\ldots\; \mathrm{Inf}}_{[\varphi:\square]} \;\ldots\; \underset{[\varphi:\delta]}{\mathrm{DP}}\,] \xrightarrow{\textsc{Agree}(\mathrm{T,DP})} [\,\underbrace{\mathrm{T} \;\ldots\; \mathrm{Inf} \;\ldots\; \mathrm{DP}}_{[\varphi:\delta]}\,]$

By contrast, in (9b,c), T agrees with the matrix subject and receives a value from it. Having been valued, T's φ-feature stops probing and does not agree with Inf in the embedded clause. [φ : □] on Inf therefore remains unvalued and is realized as default agreement morphology (Preminger 2009, 2014). In a nutshell, Inf-agreement is thus parasitic: due to its defective nature, Inf may not itself agree but it may obtain a φ-value if it stands in a sharing relationship with T. Agree between T and a DP then produces a φ-value on Inf as a byproduct.

2.2. Parasitic case agreement

The second example of parasitic agreement comes from Icelandic participial agreement (Frampton and Gutmann 2000, 2006). In A-movement chains in Icelandic, adjectives and participles along the movement path agree with the moved DP in φ-features and case. Examples are provided in (11). Here, both the adjective *ríkur* 'rich' and the verbal participle *trúa* 'believed' agree with *hana* 'her' and *hún* 'she' in number, gender, and case. Most significant is the agreement in case, which holds even if the agreeing element is deeply embedded and the DP's case is not assigned until the topmost clause is built: accusative in the ECM construction (11a) and nominative in the passivized ECM construction (11b).

(11) *Icelandic*

a.

Ég	álít	[**hana**	vera	**talda**	[hafa	verið	**ríka**	]]
I	consider	her.F.SG.ACC	be	believed.F.SG.ACC	have	been	rich.F.SG.ACC	

'I think that she is believed to have been rich.'

b.

Hún	er	**álitin**	[vera	**talin**	[vera	**rík**	]]
she.F.SG.NOM	is	considered.F.SG.NOM	be	believed.F.SG.NOM	be	rich.F.SG.NOM	

'People think that she is believed to have been rich.'

[Thráinsson 2007:438, ex. (8.110d,e)]

Assuming, then, that the raised DPs *hana* 'her.ACC' and *hún* 'she.NOM' receive case from the matrix v or T, respectively, how do lower adjectives and participles come to bear the same case? Frampton and Gutmann (2000, 2006) propose a feature-sharing analysis of this pattern, a simplified version of which is schematized in (12).[3] They assume, following Chomsky (2000), that case assignment is a byproduct of φ-Agree. On this assumption, the nominative/accusative case on the adjective (A) and participle (Prt) in (12) indicates φ-Agree with v or T in the matrix clause. Frampton and Gutmann (2000, 2006) suggest that agreeing elements enter into a feature-sharing dependency with the moving DP. (12) depicts this for (11a). The adjective and participle are generated with unvalued φ- and case feature, and DP is generated with a valued φ-feature and an unvalued case feature. The adjective and participle agree with the DP, leading to sharing of both φ- and case features among them (case remaining unvalued). In the matrix clause, the DP then agrees with matrix v (as in (12), yielding accusative case in (11a)) or matrix T (yielding nominative case in (11b)). This Agree leads to sharing of the φ- and case features of all elements that the DP has entered into a feature-sharing relationship with.

[3] My presentation simplifies Frampton and Gutmann's (2000, 2006) analysis in two important respects. First, they follow Chomsky (2000, 2001) in assuming that case does not come valued on a functional head but is instead assigned as a byproduct of φ-Agree. Applied to (12), v would not bear a valued ACC feature, but instead case on DP, A, and Prt would receive ACC as a value as a byproduct of φ-Agree between DP and v. As far as I can see, this issue is orthogonal to the role of feature sharing in the account. Second, Frampton and Gutmann (2000, 2006) suggest that once feature sharing is part of the analysis, case does not need to be represented as a syntactic feature at all, a point to which I return in section 4.

(12) $$\Big[\ \underset{\begin{bmatrix}\varphi{:}\square\\ \text{Case:}\textsc{acc}\end{bmatrix}}{\text{v}}\ \dots\ \underbrace{\text{DP}\ \dots\ \text{Prt}\ \dots\ \text{A}}_{\begin{bmatrix}\varphi{:}3\textsc{f.sg}\\ \text{Case:}\square\end{bmatrix}}\ \Big] \xrightarrow{\textsc{Agr}(\text{v},\text{DP})} \Big[\ \underbrace{\text{v}\ \dots\ \text{DP}\ \dots\ \text{Prt}\ \dots\ \text{A}}_{\begin{bmatrix}\varphi{:}3\textsc{f.sg}\\ \text{Case:}\textsc{acc}\end{bmatrix}}\ \Big]$$

The derivation in (12) again involves parasitic agreement, but this time for case: Because a single unvalued case feature is shared between DP and A, Agree between the DP and the matrix v/T associates A with a valued case feature. As a result, the case morphology of the embedded adjective in (11) reflects whether the DP has agreed with the matrix v (resulting in accusative case) or matrix T (resulting in nominative case).

Other covaluation analyses of agreement, concord, and case have been proposed by Haug and Nikitina (2016), Preminger (2017), and Stone (2018) (Preminger refers to the phenomenon as "delayed valuation"). Keine and Dash (to appear) extend feature sharing to configurations in which one occurrence of the feature dominates the other. Ackema and Neeleman (2013) develop a feature-sharing account of "unagreement," a phenomenon where the agreement features on a verb constrain the interpretation of the agreeing DP. Pesetsky and Torrego (2007) develop an account that involves parasitic sharing of a Tense feature between T, V, and the subject DP. This Tense feature underlies (i) tense morphology on English main verbs, (ii) nominative case on subjects (they analyze nominative case as the realization of a Tense feature on DP), and (iii) the temporal semantic relation between clauses. They propose that T and the subject DP agree and share an unvalued Tense feature as a result. T then agrees with the lexical verb, which bears a valued Tense feature. As a result of Agree between T and the verb, the subject's Tense feature is valued as well, and realized as nominative case. Pesetsky and Torrego's (2007) account is complex, and because it does not involve sharing of φ-features as such, I will not present the details here.

2.3. Differential object marking and φ-sharing within DP

Sharing of φ-features is applied to the nominal domain by Danon (2011) and Kalin (2014, 2018, 2019). Danon (2011) observes a tension between work on DP-internal structure that has argued that the various φ-features are introduced by different heads for person, number, and/or gender (see, e.g., Abney 1987, Carstens 1991, 2000, Ritter 1991, 1993, Valois 1991, Szabolcsi 1994, Koopman 2003) on the one hand, and Chomsky's (2000, 2001) model of Agree, which assumes φ-Agree between a verbal head and a DP node that contains all φ-features (person, number, gender), on the other. In other words, Danon (2011) notes a tension between work on clause-level φ-Agree, which largely treats the DP's φ-features as acting like a unit, and work on DP-internal structure that treats the various φ-features as being introduced by distinct heads within the DP.

To resolve this tension, Danon (2011) proposes that all DP-internal φ-features are shared on the D head regardless of where inside the DP they originate. In other words, the various φ-features "accumulate" on the D head through DP-internal Agree relations. This makes them available at the DP level, where can jointly agree with a verbal functional head. The simplest version of this proposal is schematized in (13). Here, valued number and gender features originate on N, whereas a valued person feature originates on D. D furthermore contains unvalued number and gender features, which Agree establishes a feature-sharing relationship for.

(13) *DP-internal φ-feature sharing*

$$[_{\text{DP}}\ \underset{\begin{bmatrix}\text{person: }\alpha\\ \text{number:}\square\\ \text{gender:}\square\end{bmatrix}}{\text{D}}\ [_{\text{NP}}\ \underset{\begin{bmatrix}\text{number: }\beta\\ \text{gender: }\gamma\end{bmatrix}}{\text{N}}\ ]\,]\ \xrightarrow{\text{Agr(D,N)}}\ [_{\text{DP}}\ \underset{[\text{ person: }\alpha\text{]}}{\text{D}}\ [_{\text{NP}}\ \underset{\begin{bmatrix}\text{number: }\beta\\ \text{gender: }\gamma\end{bmatrix}}{\text{N}}\ ]\,]$$

As Danon (2011) mentions, it is possible to further separate the original locations of the various φ-features, such as placing the number feature on a Num head rather than the N head.

Building on Danon's proposal, Kalin (2014, 2018, 2019) develops a feature-sharing-based account of differential object marking (DOM). DOM refers to the phenomenon that objects with certain features receive overt morphological marking or must control verb agreement whereas objects without those features do not. (14) provides an illustrative example from Hindi-Urdu. Here, the object may or may not bear the marker =*ko* (glossed as "ACC"), which correlates with the specificity/definiteness of the direct object *gaṛi* 'car': If *gaṛi* is specific/definite, it must bear =*ko*; if it is indefinite/nonspecific, it must not bear =*ko*.

(14) *Differential object marking in Hindi-Urdu*

a. nadya=ne **gaṛi** cɑla-yi hɛ
   Nadya=ERG car drive-PERF.F.SG be.PRES.3SG
   'Nadya has driven a car.'

b. nadya=ne **gaṛi=ko** cɑla-ya hɛ
   Nadya=ERG car=ACC drive-PERF.M.SG be.PRES.3SG
   'Nadya has driven the car.' [Butt and King 2004:161, ex. (5)]

Analogous asymmetries can be observed with verbal agreement instead of case marking. Kalin (2014, 2018) discusses in detail verb agreement in Senaya. Here, specific objects require verb agreement whereas nonspecific objects do not agree. As shown in (15), Senaya verbs may in principle show object agreement in the imperfective aspect, and they must do so if the object is specific (15a) but may not do so if the object is nonspecific (15b).[4]

(15) *Differential object marking in Senaya*

a. Āna ō ksūta kasw-an-**ā**.
   I that book write.IMPERF-1PL-**3SG.F**
   'I (will) write that book.'

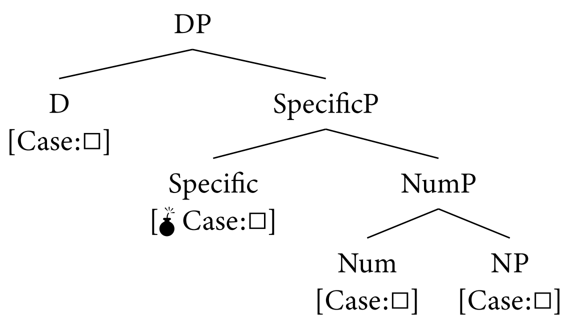
[4] My illustration here is limited to the imperfective aspect and hence somewhat of an oversimplification. In the perfective aspect, object agreement is entirely impossible, and correspondingly specific objects are altogether impossible. See Kalin (2014, 2018, 2019) for detailed empirical discussion and analysis.

b. Āna (xa) ksūta kasw-an.
I a book.F write.IMPERF-1SG.F
'I will write a book (e.g., someday, about something, I don't know what).'
(Object is nonspecific, indefinite, inanimate, unaffected)

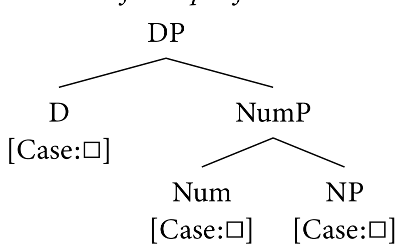
[Kalin 2018:119, ex. (10b), (11a)]

Assuming that case assignment and φ-agreement both reflect a φ-Agree dependency, Kalin (2014, 2018) develops an account of patterns like (14) and (15) in terms of the licensing needs of specific DPs. The analysis is based on Danon's (2011) account of DP-internal φ-sharing but assumes a radical version of the articulated-DP hypothesis, according to which every feature of the DP is introduced by a designated functional head. For example, specific DPs contain a SpecificP that hosts the relevant feature (see (16)), whereas nonspecific DPs lack this projection (see (17)). Furthermore, all of these heads bear unvalued case features, and some of these case features are subject to a special licensing requirement that demands that they be valued by φ-Agree with a verbal functional head. Kalin (2014, 2018) calls such case features "uninterpretable" though she notes that this designation is thoroughly nonsemantic in nature. To avoid confusion, I will use Kalin's (2019) "time-bomb" notation (💣) instead. Features with the time-bomb property must be "defused" through Agree and valuation; otherwise the structure crashes. Applied to the example structures in (16) and (17), the Specific head bears a time-bomb case feature, and hence specific DPs must undergo φ-Agree with a verbal head in order to be licensed. No such requirement exists for nonspecific DPs, as no feature within them bears the time-bomb property.

(16) *Structure of specific DPs*

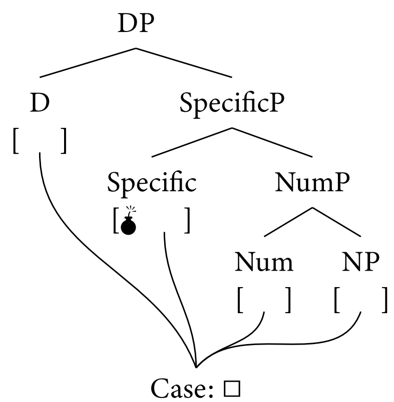


(17) *Structure of nonspecific DPs*



The DOM contrasts in (14) and (15) are then analyzed as the result of the structural distinction between (16) and (17). Specific objects must be licensed through Agree with a verbal head; non-specific objects do not. In line with Danon's (2011) analysis, Kalin (2014, 2018) assumes that verbal heads agree with the DP node, not with DP-internal material directly. As a result, Specific in (16) does not directly agree with a verbal functional head, and so its [Case:□] feature cannot be licensed directly. Instead, this Agree (and hence licensing) relation is mediated via DP, and hence indirect. To implement this indirect licensing, Kalin (2014, 2018) adopts a feature-sharing analysis, according to which the case features of the various DP-internal heads are shared via Agree. The result is a single case feature that is associated with all DP-internal heads, including with D itself, as shown in (18). Kalin (2014, 2018) assumes that the sharing of the case feature in (18) is accompanied by φ-sharing in line with Danon's (2011) proposal so that DP-internal case sharing goes hand in hand with φ-sharing. The link to φ-Agree is particularly clear in Kalin (2019), where the time-bomb property is directly associated with a φ-feature. To maximize similarity with the representations in Kalin (2018), I do not represent φ-feature sharing in (18).

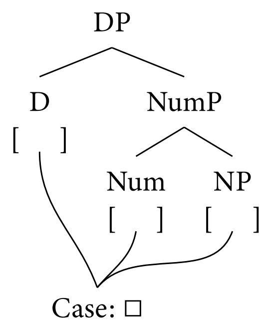
(18) *Case-feature sharing in specific DPs*



Agree between the DP and a verbal functional head then values this shared case feature in virtue of its appearing on D. Due to feature sharing, the occurrence of this case feature on Specific is now automatically valued as well, defusing its time-bomb property. For Hindi-Urdu objects, this case is then overtly realized =*ko*. Because specific objects contain a SpecificP, case assignment (and hence =*ko*) is obligatory. In Senaya, the syntactic sharing configuration is analogous, but the sharing dependency is morphologically realized as verb agreement rather than case on the object. Like in Hindi-Urdu, because the time-bomb property inside specific objects must be defused through case and φ-Agree, agreement is obligatory with specific objects in Senaya.

Nonspecific objects, on the other hand, lack a SpecificP. The DP-internal heads again contain a case feature which is shared with D, as shown in (19). But no instance of this feature is a time bomb, and so the object DP can survive without being assigned case. As a result, =*ko* does not mark nonspecific objects in Hindi-Urdu, and such objects do not need to control verb agreement in Senaya.[5]

(19) *Case-feature sharing in nonspecific DPs*



Overall, the role of feature sharing in this analysis is again that it enables parasitic case agreement. Agree between DP and a verbal functional head values the D's case feature. Because this case feature is token-identical with the case feature on Specific, this process also defuses the otherwise fatal time bomb on Specific, without requiring direct Agree between Specific and the verbal head.

An interesting implication of the representation in (18) is that it might require a level of sharing in between the value and the feature as a whole. One the one hand, sharing of an unvalued feature presumably cannot apply at the value level (given that there is no value). On the other hand, if the time-bomb property is only a property of the occurrence of the case feature on Specific, then it cannot be part of what is shared. This seems to imply that sharing needs to take place at some intermediate level.

In summary, parasitic-agreement effects clearly distinguish (feature) sharing from Agree-as-copying. The crucial component of such analyses—namely, that two unvalued features can be token-identical and linked for the remainder of the derivation, leading to parasitic valuation of one through Agree of the other—is not available on an Agree-as-copying account, which must therefore analyze the phenomena just discussed in some other way.

2.4. Overcopying and segment sharing

The various cases of parasitic agreement discussed so far involve parasitic agreement on a third element that is not part of the Agree relation itself. That is, Agree between two elements A and B also provides a value on a separate element C. Another, though quite different, type of parasitic agreement involve the amount of material that undergoes sharing. A common assumption in the recent literature on φ-features is that feature values are themselves composed of smaller subfeatures, which are hierarchically organized (see Harley and Ritter 2002, Béjar 2003, and much subsequent work). Following Béjar and Rezac (2009), I will call these subfeatures *segments*. A sample hierarchy for person is shown in (20).

[5] A further component of Kalin's (2014, 2018) analysis is that case is assigned to the object only if necessary, hence if the object contains a time-bomb feature. Case assignment to, and verb agreement with, nonspecific objects is then ruled out.

(20) *Person geometry*

[Person]
|
[Participant]
/ \
[Speaker] [Addressee]

Based on (20), all person values share the segment [Person]; 1st and 2nd person additionally bear the segment [Participant] and either [Speaker] or [Addressee].[6] These segments thus stand in an entailment relation, such that [Speaker] and [Addressee] entail [Participant], which in turn entails [Person].

Against the background of such feature geometries, another type of parasitic agreement involves what I will call *overcopying effects*. In such cases, a probe searches for segment X but additionally receives other segments that geometrically entail X. Of interest are theories in which probes are specified for individual segments as well (Béjar 2003, 2008, Béjar and Rezac 2009, Preminger 2014, Béjar and Kahnemuyipour 2017, Coon and Keine 2021, among others). For the sake of concreteness, I will illustrate based on Preminger's (2014) analysis of verbal person agreement in the Kichean Agent Focus construction (though Preminger 2014 does not commit to feature sharing so this is not an integral part of his analysis). The same situation arises in other analyses that involve segment-based Agree (e.g., Béjar 2003, Béjar and Rezac 2009, Béjar and Kahnemuyipour 2017, Coon and Keine 2021).

In the Kichean Agent Focus construction, combinations of a 1st or 2nd person argument and a 3rd person argument result in verb agreement with the 1st or 2nd person DP, regardless of whether it is the subject or object, as shown in (21).

(21) *Kichean Agent Focus*

a. i. ja yïn x-**in**/***Ø**-ax-an ri achin *1→3*
foc me com-**1sg.abs**/***3sg.abs**-hear-af the man
'It was me that heard the man.'

ii. ja ri achin x-**in**/***Ø**-ax-an yïn *3→1*
foc the man com-**1sg.abs**/***3sg.abs**-hear-af me
'It was the man that heard me.'

b. i. ja rat x-**at**/***Ø**-ax-an ri achin *2→3*
foc you.sg com-**2sg.abs**/***3sg.abs**-hear-af the man
'It was you (sg) that heard the man.'

ii. ja ri achin x-**at**/***Ø**-ax-an rat *3→2*
foc the man com-**2sg.abs**/***3sg.abs**-hear-af you.sg
'It was the man that heard you (sg).' [Preminger 2014:18, 20, ex. (15), (18)]

[6] The exact shape of the feature geometry differs across accounts. For example, in Preminger's (2014) geometry, [Addressee] is absent and 2nd person is represented as just [[Person], [Participant]]. Béjar and Rezac (2009) propose that is likewise possible for the representation of 1st person to be proper subset of the representation of 2nd person. The exact shape of the geometry does not bear on what follows.

On the assumption that 3rd person DPs lack [Participant], (21) indicates that the Kichean agreement probe agrees only with [Participant] DPs, skipping DPs that lack this segment. To model this behavior, Preminger (2014:48–49) proposes that the verbal φ-probe requires that the root of the feature geometry that is copied over from the goal DP be [Participant]. In other words, the verbal φ-probe searches for a [Participant] segment. This allows the probe to agree with both 1st and 2nd person DPs, but renders 3rd person DPs invisible to it.

Importantly, while the [Participant] specification of the φ-probe determines what goals the probe can agree with (i.e., 1st and 2nd-person DPs but not 3rd-person DPs), this articulation does *not* correlate with the values that agreement with this probe expresses morphologically. In Kichean, the verb agreement morphologically differentiates between 1st-person agreement (*in-* in (21a)) and 2nd-person agreement (*at-* in (21b)). To the extent that this agreement is genuine φ-agreement (which it might not be, see fn. 7), this entails that agreement with the probe must copy the [Speaker] or [Hearer] segments as well, despite the fact that the φ-probe is specified for only [Participant]. This φ-Agree would thus need to involve overcopying: more segments are copied onto the probe than the probe is itself specified for and searching for (Preminger 2014: 47–48).[7] In other words, the probe must receive not just the segment that it is specified for but also segments that are dominated by this segment in the hierarchy in (20). Analyses that invoke such behavior have indeed been proposed but typically treat it as axiomatic, requiring that copying a segment also copies other segments that are dominated by this segment (Béjar and Rezac 2009: 45, Preminger 2011:36–37, 2014:47–48, Kalin 2019:18–19, Coon and Keine 2021:665).

While Preminger (2011, 2014) does not employ feature sharing in his analysis of Kichean, once feature geometries and feature sharing are combined (Preminger 2017), another analysis becomes available, which involves sharing at the level of a segment in a feature geometry. The representation in (22) is inspired by Béjar (2003:81, 155), who recognizes that linking a segment to a probe entails indirect linking of other segments that are dominated by this segment.[8] Béjar (2003) does not explicitly adopt a sharing account, but the representations she gives quite naturally lend themselves to such an account. Applied to (21), and following Preminger's (2014) analysis, the Kichean φ-probe is specified solely for [*u*Participant] (I follow Béjar and Rezac's 2009 convention of indicating probe segments with a preposed "*u*"). The probe agrees with the closest DP bearing [Participant], by hypothesis resulting in feature sharing. The crucial consequence of a feature-sharing analysis is that because [Participant] dominates [Speaker] and [Addressee] in the hierarchical organization of the segments, sharing of [Participant] automatically leads to indirect sharing of [Speaker] or [Addressee] as well. This is schematized for agreement with a 1st-person DP in (22).

[7] For the Kichean example, it might be possible to avoid this conclusion by assuming that the probe searches not just for [Participant] but also for [Speaker] and [Hearer] (combinations of 1st and 2nd person DPs are ungrammatical in the Kichean Agent Focus construction, so it is not directly possible to observe the verb agreement in such cases). However, see Béjar (2003), Béjar and Rezac (2009), Béjar and Kahnemuyipour (2017), and Coon and Keine (2021) for accounts that involve overcopying for which this solution is not applicable. Thus, while I illustrate the problem using Kichean Agent Focus, it is in fact considerably more general.

An alternative analysis to overcopying, developed by Preminger (2014:50–63), is that the agreement markers in (21) are actually clitics, not the realizations of a φ-probe itself. Assuming that clitics are D heads that move onto the verb and that contain all of the DP's φ-features, overcopying is then not necessary.

[8] The relevance of sharing at the segmental level for analyzing overcopying effects was brought to my attention by Zachary Stone (p.c.), who I would like to thank.

(22) $$[\ \underset{[u\text{Participant}]}{\text{H}}\ \ \ldots\ \ \underset{\substack{[\text{Person}]\\ | \\ [\text{Participant}]\\ | \\ [\text{Speaker}]}}{\text{DP}}\ ]\ \xrightarrow{\text{AGREE(H,DP)}}\ [\ \underset{[\ \ \ ]}{\text{H}}\ \ \ldots\ \ \underset{\substack{[\text{Person}]\\ | \\ [\text{Participant}]\\ | \\ [\text{Speaker}]}}{\text{DP}}\ ]$$

After Agree, the φ-probe on H is directly associated with [Participant] and indirectly associated with [Speaker]. This is sufficient to condition 1st-person agreement morphology. Thus, a sharing account does not need to specifically stipulate that [Speaker] is shared/copied in (22) as a byproduct of Agree in [Participant]; this fact follows because [Participant] dominates [Speaker], and as a result sharing of [Participant] automatically leads to parasitic sharing of [Speaker].

Because this analysis involves sharing of segments, it expands the range of the possible levels at which feature sharing can apply. We already saw sharing at the feature level (4), at the value level (6), and potentially at an intermediate level (section 2.3). Segment sharing constitutes a fourth possible level, below the level of the value.

3. Obviation of phase locality

We have so far focused on effects of feature sharing on where agreement arises (parasitic agreement) and what feature segments are agreed with (overcopying). Legate (2005) employs feature sharing for a distinctive effect on the operation of syntactic locality constraints. Legate's (2005) proposal is based on phase theory (Chomsky 2000, 2001), according to which certain projections render their complement and material contained within the complement inaccessible to outside operations. The *phase edge* (comprising the phase head itself and its specifier(s)) remains accessible. This restriction is called the Phase Impenetrability Condition (PIC), stated in (23). The formulation is adapted from Chomsky (2000:108).

(23) *Phase Impenetrability Condition*
In phase α with head H, the complement of H (including material within the complement of H) is not accessible to operations outside of α; only α's edge (i.e., H and its specifier(s)) are accessible to such operations.

Following Legate (2003), Legate (2005) assumes that all vPs are phases, including vPs that occur with unaccusative verbs or in passive constructions (contra Chomsky 2000, 2001). All else being equal, because of the PIC in (23), it should then not be possible for an element outside of a vP to agree with an element within v's complement. This prediction conflicts with agreement in expletive constructions like (24). Here, matrix T agrees with the associate of the expletive (*ten trains* in (24)) in φ-features, and matrix T also assigns nominative case to the associate.

(24) There T^0 [$_{vP}$ seem to have [$_{vP}$ arrived ten trains into the station today]]
[Legate 2005:148]

Assuming that agreement in (24) involves Agree between T and the in-situ associate *ten trains*, (24) must involve Agree across two vP boundaries: (i) T must receive a φ-value from *ten trains*, and (ii) *ten trains* must receive a case value from T. All else equal, if the two vPs in (24) are phases, then both dependencies should be impossible given the PIC (23).

To resolve this locality problem while maintaining the idea that the vPs in (24) are phases, Legate (2005) proposes that the relevant φ- and case dependencies are mediated via the intermediate v head(s).[9] As shown in (24), the v head of the lower clause (v_1) agrees with *ten trains* in φ-features and its unvalued case feature, sharing these features (in her terms, establishing a hyperlink between them). In line with the second condition of (23), the phase head v_1 remains accessible to operations outside of vP, thus keeping the relevant φ- and case features it contains accessible. These features are subsequently shared by the v head of the higher clause (v_2), where they are again located on a phase head and hence remain accessible. Finally, T agrees with v_2, as shown in (25). Because v_2's φ- and case features are also associated with *ten trains* due to the sharing, T and *ten trains* are associated with the same φ- and case features, yielding agreement and nominative case assignment.

(25)

$$\underset{\begin{bmatrix}\varphi{:}\square\\ \text{Case:}\textsc{nom}\end{bmatrix}}{\mathrm{T}}\ [_{\mathrm{vP}} \ldots \mathrm{v}_2\ \overset{\textit{phase domain}}{(}\ [_{\mathrm{VP}} \ldots [_{\mathrm{vP}} \ldots \mathrm{v}_1\ \overset{\textit{phase domain}}{(}\ [_{\mathrm{VP}} \ldots \mathrm{DP}\ ]]]]]$$

$$\begin{bmatrix}\varphi{:}3\textsc{pl}\\ \text{Case:}\square\end{bmatrix}$$

$$\xrightarrow{\textsc{Agree}(\mathrm{T},\mathrm{v}_2)}\ \mathrm{T}\ [_{\mathrm{vP}} \ldots \mathrm{v}_2\ \overset{\textit{phase domain}}{(}\ [_{\mathrm{VP}} \ldots [_{\mathrm{vP}} \ldots \mathrm{v}_1\ \overset{\textit{phase domain}}{(}\ [_{\mathrm{VP}} \ldots \mathrm{DP}\ ]]]]]$$

$$\begin{bmatrix}\varphi{:}3\textsc{pl}\\ \text{Case:}\textsc{nom}\end{bmatrix}$$

As Legate (2005) notes, this analysis requires that Agree can condition the featural content of an element inside a phase complement (namely the case feature of the DP) if this feature is also associated with the phase edge. Legate briefly notes two possible solutions to this question. One is that phase-external Agree can update the featural content of a shared phase-internal feature. The other possible solution mentioned by Legate is that features are inserted pre-valued and need to be checked under identity (though in this case, feature sharing might not be necessary, see section 5.1).

A second interesting issue that arises, not discussed directly by Legate, concerns the interactions of the standard formulation of the PIC in (23) with Agree as feature sharing.[10] The formulation of the PIC in (23) presupposes that any given element is located *either* on the head or specifier or the phase head (in which case it will remain accessible) *or* in the complement (in which case it becomes inaccessible). On a feature-sharing analysis, the φ- and case features of *ten trains* are simultaneously located *both* on the phase head v (and should hence remain accessible) *and* in-

[9] Legate (2014:63–64) proposes a related analysis for case and agreement in Austronesian object-voice constructions.
[10] I am grateful to an anonymous reviewer for helpful comments on this issue.

side the phase complement (and should hence be inaccessible). Legate's (2005) analysis requires that these features remain accessible, hence that being located in the phase head "trumps" being located in the phase complement. Thus, this analysis requires a slight adjustment to the formulation of the PIC, as in (26).

(26) *Phase Impenetrability Condition*
In phase α with head H, only α's edge (i.e., H and its specifier(s)) are accessible to operations outside of α.

The intent of this reformulation is that being located in the phase edge is sufficient for a feature to remain accessible, whereas being located in the phase complement is not, by itself, sufficient to render a feature inaccessible.

It is worth noting that this situation brings out a further parallel between feature sharing and multidominance theories of movement (see section 1). Multidominance as well allows for a single element to be located *both* at the edge of the phase (i.e., the specifier of the phase head) *and* in the phase complement. Thus, here as well being located at the phase edge must take priority so that the element will remain accessible despite also occurring within the phase complement.

4. Φ-Sharing beyond φ-agreement

The various applications of feature sharing we have seen so far involve various aspects of φ-agreement and/or case assignment. Sharing of φ-features has also occasionally been employed to analyze a number of phenomena that, empirically, do not appear to involve φ-agreement. These analyses capitalize on another property that distinguishes feature sharing from feature copying: that sharing creates a static dependency between syntactic elements that persists after Agree has taken place.

On an Agree-as-copying account, if a feature (value) [F : δ] is copied from one element X to another element Y, then X and Y both bear [F : δ] as the result, but, in the absence of additional stipulations and diacritics, there is no subsequent record that the appearance of [F : δ] on Y was the result of Agree with X. In (27), X and Y have undergone Agree in [F : δ], and as a result both X and Y bear [F : δ] after Agree. But the information that the feature was transmitted from X to Y (as opposed to X and Y being generated with coincidentally identical features or having received those features through Agree with some other element) is not part of this representation.

(27) $[\ \underset{[\varphi:\delta]}{\text{Y}}\quad \ldots\quad \underset{[\varphi:\delta]}{\text{X}}\ ]$

By contrast, a feature-sharing relation persists for the remainder of the derivation. If a feature [F : δ] is shared between X and Y, this feature is subsequently associated with both X and Y, as in (28). This double association effectively provides a representational record that X and Y have undergone Agree with each other in [F:δ].

(28) [Y ... X]
[φ:δ]

Some of the literature on feature sharing has used this property of feature sharing to analyze case assignment and binding or reference-tracking effects in terms of sharing of φ-features. The overarching idea is that the φ-sharing relationship between two elements is part of the representation transmitted to the interfaces, where it may then be interpreted as case (at PF) or binding/coreference (LF).

4.1. *Case*

Frampton and Gutmann (2000, 2006) propose that structural case features can be eliminated from narrow syntax if a feature-sharing account of φ-Agree is adopted (also see Pesetsky and Torrego 2007). Their account is based on Chomsky's (2000, 2001) theory of structural case, which treats such cases as being assigned as a byproduct of φ-Agree between a DP and a functional head. Chomsky's original account involves case features on a DP receiving a value as a byproduct of this DP undergoing φ-Agree with a functional head. Which case is assigned is determined by what functional head the DP agrees with (Agree with finite T leads to nominative, Agree with v leads to accusative, and so on). Frampton and Gutmann (2000, 2006) suggest that if φ-Agree gives rise to feature sharing, case does not need to be represented as a syntactic feature at all. While they do not spell out the precise mechanisms by which this is achieved, their guiding idea is that case is assigned postsyntactically, in the mapping from narrow syntax to morphology, based on the existence of φ-sharing dependencies. As an example, nominative case is determined postsyntactically by the existence of a φ-sharing relationship between a DP and T (29); accusative case by φ-sharing between a DP and v, and so on.

(29) T ... DP
[φ:δ]

What enables such an analysis is that feature sharing provides a representational record of which elements have agreed with each other over the course of the derivation. This record, Frampton and Gutmann (2000, 2006) propose, can then be utilized by post-syntactic processes such as assignment of case.

4.2. *Binding and coreference*

A second example of a dependency that is empirically distinct from φ-agreement but that has been analyzed in terms of sharing of φ-features through Agree is certain cases of coreference and binding. Reuland (2005, 2011) develops a feature-sharing accounts of anaphor binding; Kratzer (2009) develops a sharing account of binding and fake indexicals; Landau (2015) develops a sharing-based account of control; and Camacho (2010) and Baker and Souza (2020) develops sharing-based accounts of switch-reference.

I will illustrate first with Reuland's (2005, 2011) feature-sharing approach to anaphor binding. Traditional binding theory (Chomsky 1981) is stated in terms of referential indices. However, such indices violate the *Inclusiveness Condition* of Chomsky (1995:228). Reuland (2001, 2005, 2011) therefore develops a binding theory that does not make use of indices. I will illustrate his approach with so-called SE-anaphors (such as Dutch *zich*, Norwegian *seg*, or Icelandic *sig*), which Reuland (2011:47) treats as pronominal elements that are underspecified for φ-features. The Dutch SE-anaphor *zich* is illustrated in (30).

(30) *Dutch*
Willem$_1$ wast zich$_1$
William washes SE
'William washes himself.' [Reuland 2011:83, ex. (5b)]

Instead of using indices to represent binding and coreference, Reuland (2005, 2011) employs sharing of case and φ-features. Simplifying somewhat, Reuland (2005, 2011) proposes that Agree and feature sharing can replace the use of indices in the following way. Extending Pesetsky and Torrego's (2007) tense-sharing system to φ-features, Reuland (2005, 2011:176–178) proposes that the SE-anaphor enters the derivation with unvalued φ-features and that T's φ-probe agrees with both the anaphor and the subject. This Agree step creates a φ-feature link between the anaphor and the subject, which is then interpreted at LF as binding without the use of designated index features.[11]

The feature-sharing relation is crucial for Reuland's account. Reuland (2011:175) notes that simply having identical φ-features does not entail binding or coreference, as in (31).

(31) a. John$_1$ expects him$_{2/*1}$ to be on time.
b. Sue$_1$ said that Mary$_2$ likes herself$_{2/*1}$.

Because feature sharing effectively provides a record of which elements have undergone φ-Agree, it can be used to distinguish configurations in which two elements have the same φ-features as the result of Agree (resulting in binding) from configurations in which they do not. Another consequence of this account noted by Reuland (2005, 2011) is that it can be used to derive the locality restrictions on the binding of anaphora (e.g., *zich* is clausebounded, Broekhuis 2022) from the locality of φ-Agree and other independently-motivated purely syntactic mechanisms.

Another empirical reference-tracking domain is switch-reference. Broadly speaking, switch-reference systems make use of a verbal marker that indicates whether the subjects of two clauses are coreferent (same-subject marking) or disjoint (different-subject marking). Camacho (2010) proposes a φ-sharing account of switch-reference in Shipibo. In a nutshell, one subject DP φ-agrees with the switch-reference marker (analyzed as the realization of a C head), establishing a φ-feature sharing relationship. The switch-reference marker then agrees with the subject of the other clause. The resulting representation is then interpreted as coreference between the two subjects.

A related sharing account of switch-reference is proposed by Baker and Souza (2020), with the difference that sharing is for the feature [D] rather than [φ]. They propose that the two subjects create an *Agree-Link* relationship with functional heads. Agree-Link shares with feature sharing

[11] Reuland (2005, 2011) does not develop the specific semantic rules by which this link between φ-feature sharing and binding/coreference is achieved. He simply notes that φ-features form the "instructions for interpretation" (Reuland 2005:511, 2011:178), and due to φ-sharing, these instructions are now the same for both DPs in the sharing relation, leading to binding/coreference.

the property that it is a static dependency that persists throughout the derivation and at LF. It differs from feature sharing in that it does not involve valuation, which is a separate process (so-called *Agree-Copy*).[12]

5. Outlook

Feature sharing results in representations that are more complex than those that result from Agree-as-copying. Whether this additional complexity is justified is in no small part an empirical question, and we have seen various examples of empirical motivations for feature sharing, including parasitic φ-agreement and case assignment, overcopying effects, obviation of locality domains, and handling case assignment and coreference/binding post-syntactically.

Of course, none of the discussions in the preceding sections are exhaustive, either empirically or analytically, and I would like to emphasize that the status of feature sharing is far from settled. For most of the cases discussed here, alternative analyses that do not make use of feature sharing have been proposed, which I briefly discuss in section 5.1. In section 5.2, I then pick up a recurring issue of the preceding discussion, namely the question of the levels at which sharing takes place, and the relationship between feature sharing and multidominance.

5.1. Some alternatives to feature-sharing analyses

First, while the parasitic-agreement effects discussed in sections 2.1–2.3 are one of the most common empirical rationales for feature sharing, at least in some cases they may also be analyzed in terms of feature checking (Chomsky 1995). Suppose that all features enter the derivation valued on all elements that participate in agreement relations, and Agree involves neither copying nor sharing, but instead checking of features under identity. A checking account can in principle derive parasitic-agreement effects without the need for two unvalued feature to enter into a sharing relation. Applied to configurations like (32), the basic line of approach would be that rather than assuming that two elements Z and Y share an unvalued feature that is then valued by a third element X (as in (8)), a checking account would assume that X, Y, and Z are all born with a valued feature which must be checked. Checking takes place if the two features are identical (i.e., if they have the same value). Z's feature must be checked under identity with Y's feature, and then Y's feature must in turn be checked under identity with X's feature. By transitivity, X's feature must then be identical to Z's feature.

(32) [X ... Y ... Z]

While such an account is not equally straightforward for all cases discussed in section 2, the Icelandic case agreement discussed in section 2.2 can be used to illustrate: the adjective, the participle, the DP, and matrix T/v head are all generated with their own case feature. By assumption, the ad-

[12] Also see Deal (2010:228–229, 397–399), Arregi and Nevins (2012), Bhatt and Walkow (2013), Marušič et al. (2015), and Atlamaz and Baker (2018) for discussion of Agree-Link and Agree-Copy, and Preminger (2017) for remarks on the relationship between Agree-Link/Agree-Copy and feature sharing.

jective and participle must check their case features with the DP under identity, and then the DP must check its case feature with the matrix T/v head. As a result, the case of the adjective/participle must match the case assigned by T/v without there being a direct checking relationship between the two. For a detailed checking analysis of the Icelandic pattern, see Frampton and Gutmann (1999). In at least some cases, a checking account might therefore constitute a viable alternative to feature sharing, though the notion of feature checking is itself controversial. See Frampton and Gutmann (2006:126–127) for an objection to a checking account of Icelandic, and Preminger (2014) for an argument against checking theories of agreement in general.

Second, as already noted in section 2.4, overcopying effects are typically handled without feature sharing by means of a stipulation on the copying of segments.

Third, the apparent obviation of phase locality under sharing discussed in section 3 may, as Legate (2005) notes, also be treated in terms of checking.

Fourth, while case and coreference/binding might be analyzable as feature sharing along the lines discussed in section 4, alternative accounts of these dependencies do not involve feature sharing, using syntactically-represented case and index features instead (see, e.g., Chomsky 1981 for binding and Arregi and Hanink 2022 for switch-reference).

As a result, while feature sharing makes available new lines of accounts to these various empirical patterns (and ties them to the same φ-sharing property of Agree), to what extent they provide empirical support for feature sharing remains an open question. Thus, more work is necessary to determine whether the analytical uses of feature sharing justify the representational enrichment it entails.

5.2. Levels of sharing

If Agree is represented as feature sharing, it raises intriguing questions about the relationship between Agree and displacement. As noted in section 1, feature sharing is in many respects the feature-level analogue of multidominance. Both have in common that a single entity is associated with two positions, and if an element is associated with both a position inside a phase domain and a phase edge, it remains accessible (see section 3). On a view where Agree involves sharing and displacement involves multidominance, it is therefore perhaps tempting to unify the two as different degrees of granularity of the type of element that undergoes sharing. Moreover, while it is difficult to pinpoint what exactly is shared in many instances of feature sharing (the feature as a whole, its value, or the segments that make up the value), we saw that some cases of feature sharing impose restrictions on what is shared (such as sharing of a feature that lacks a value or sharing of an individual segment). Some analyses—such as Kalin's (2014, 2018), discussed in section 2.3—potentially require even more fine-grained distinctions. We can therefore distinguish between (at least) the levels in (33). The distinction between (33a–c) occurs at the sub-head level; (33d) corresponds to head movement; (33e) corresponds to phrasal movement.

(33) a. segment sharing
b. value sharing
c. feature sharing

d. head sharing
e. phrase sharing

As was the case with sharing at the (sub-)featural level, it is not always easy to distinguish between these levels in practice. For examples, cartographic and nano-syntactic approaches in which every head contains only a single feature blur the distinction between (33c) and (33d).[13] And there are several significant differences between at least head movement and Agree, which might militate against a unification in terms of sharing. First, head movement is typically subject to much stricter locality constraints than Agree (i.e., Travis's 1984 *Head Movement Constraint*). Second, in movement dependencies, typically only one end of the chain is overtly realized, in striking contrast to φ-agreement. We do not, for instance, find cases where a noun's φ-features are overtly realized on a noun if and only if that noun does not control verb agreement. Third, agreeing features most often show a strong degree of contextual allomorphy. That is, the morphological realization of φ-features on a noun is usually entirely distinct from the realization of the same φ-features as verb agreement. In this respect, agreement differs from cliticization (often analyzed as head movement, see Anagnostopoulou 2003, Preminger 2014, 2019, and the references cited there), which typically exhibits a much lower degree of allomorphy.[14]

It is also worth noting that segment sharing (as used in section 2.4) is in some sense analogous to phrase sharing in that both involve sharing of material that potentially dominates other elements (other segments in the case of segment sharing, and heads and other phrases in the case of phrase sharing).[15] This is an immediate consequence of the feature-geometric view that feature values may be hierarchically complex in conjunction with the assumption that sharing may apply at different levels.

It is not clear at present how to best interpret these various similarities and differences between agreement and movement. One the one hand, these differences might be taken as evidence that agreement and movement should not be unified as sharing, with one of both of them involving copying rather than sharing. Alternatively, one might hope that it is possible to derive the differences from some general principle based on the level at which sharing takes place.

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[13] See also Roberts (2010) for a theory of head movement that assimilates it to Agree (also see Arregi and Pietraszko 2021), and Chomsky (1995) and Pesetsky (2000) for the concept of feature movement, a precursor to Agree.

[14] For example, Preminger (2014:58) uses the fact that verbal person markers in Kichean bear a strong resemblance to strong pronouns (hence, the absence of contextual allomorphy) as an argument that these markers are clitics, not agreement.

[15] I thank a reviewer for pointing this out.

Abbreviations used in glosses

ABS – absolutive	F – feminine	PST – past
ACC – accusative	FOC – focus	PERF – perfective
AF – agent focus	IMPERF – imperfective	PL – plural
COM – completive aspect	INF – infinitive	PRES – present
DFLT – default agreement	M – masculine	SG – singular
ERG – ergative	NOM – nominative	

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