Remarks on "Derivation by Phase": Feature Valuation, Agreement, and Intervention

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In "Derivation by Phase" (2000, henceforth DBP), Chomsky revises the feature system and the mechanisms of agreement and deletion developed in Chomsky (2000, "Minimalist Inquiries", henceforth MI). Specifically, uninterpretable features on a head now enter the derivation "unvalued". A head which assigns structural case, for example, will contain unvalued ϕ-features and nominals will contain an unvalued Case-feature. The Agree operation incorporates mechanisms for providing values to unvalued features under appropriate conditions. Later, at the end of a phase, the newly valued features will be recognized as such and deleted from the syntactic representation that is the current state of the continuing derivation. These newly-valued features do persist long enough to be part of the material handed over to the morphological and phonological components at the end of phases.

We look at the new system in detail, uncover some problems with it, and suggest ways in which the Agree operation can be modified in order to overcome these problems.

1. The Problems

Icelandic past participles are inflected for case and number. They are not inflected for person, a fact which the DBP theory exploits, as we shall see. Typical glosses would be:

(1) a. Max(nom) was killed(nom,sg)
b. There was killed(nom,sg) someone(nom)
c. Max expected someone(acc) to be killed(acc,sg)
d. Max expected there to be killed(acc,sg) someone(acc)

The valued/unvalued feature mechanism introduced in DBP was, in part, motivated by difficulties in the MI system in correctly analyzing examples like (1d). We begin with a detailed examination of the derivation of (1d) in the DBP system. It is a good illustration of how the system is intended to work. At an early stage, (2) is built:

(2) [Prt [kill someone]]
Num[ ] Num[sg]
Case[ ] Per[3]
Case[ ]

Only the syntactically relevant features are shown. The nominal *someone* enters the derivation with a full set of ϕ-features (which we represent as a person and number feature), and a (structural) case feature, which is "unvalued", its value to be determined when it agrees with a case-assigning head. After *kill*

selects *someone*, *kill* is selected by a participial functional head Prt, with unvalued number and case features. Note that Prt does not have a full set of ϕ-features, but does (at least in Icelandic) have an unvalued case feature. A feature is unvalued when it enters the derivation if and only if it is uninterpretable (on the head that contains it).

Prt in (2) is in a position to probe for matching features. There are matching features on *someone*, where "matching" is taken to mean "of the same type", not necessarily the same with respect to value. Since both Prt and *someone* are "active", which means they contain unvalued features, agreement takes place between them. The effect of agreement is to value a feature which is unvalued if it matches a valued feature. It assumes the value of the valued feature it matches. Thus, after agreement, (2) becomes:

(3) [Prt [kill someone]]
Num[sg] Num[sg]
Case[ ] Per[3]
Case[ ]

The derivation proceeds, eventually reaching:

(4) [T_r [be [Prt [kill someone]]]]
Per[ ] Num[sg] Num[sg]
EPP[ ] Case[ ] Per[3]
Case[ ]

Here, T_r is raising Tense, which is assumed to be defective in having only a person feature, as opposed to finite Tense, which has full ϕ-features. The ϕ-features of Tense, of any variety, are initially unvalued. Like every Tense, T_r does contain an EPP feature, which can only be satisfied by an extra merge operation—extra above the required semantic merge(s), which in this instance was merger with VP.

Now T_r is the probe, and it matches *someone* and apparently could agree with it. If, however, the numeration contains an expletive *there*, the preference for the simpler Merge operation, as opposed to the more complex operation Move, dictates that *there* be merged. The expletive enters with a single unvalued person feature which matches and agrees with the current probe T_r. The EPP feature of T_r is satisfied by the merger; the person features (both unvalued) remain unvalued. While ϕ-features are valued by matching, EPP-features are valued simply by attracting specifiers. This gives:

(5) [there T_r [be [Prt [kill someone]]]]
Per[ ] Per[ ] Num[sg] Num[sg]
EPP[$\surd$] Case[ ] Per[3]
Case[ ]

We have used $\surd$ above as the value, and only possible value, of the EPP-feature.

Since T_r still has an unvalued person feature, it continues to probe, and agrees with *someone*, which can value the person feature of T_r, assigning it the value 3. The ECM verb *expect* then next selects T_r. Next, the functional head v^*, which

has unvalued ϕ-features, selects *expect* and *Max*. At this point, the representation is:

(6) [Max [v* [expect [there [T_r [be [Prt [kill someone]]]]]]
Per[3] Per[ ] Per[ ] Per[ ] Num[sg] Per[3]
Num[sg] Num[ ] EPP[$\surd$] Case[ ] Num[sg]
Case[ ] Case[ ]

Now v* is the probe, and it agrees with *there*, and then with T_r, the agreement involving unvalued person features, which remain unvalued. A probe continues to probe if it contains unvalued features, so v* next agrees with Prt. Only heads with full sets of ϕ-features can value features on agreeing heads. Thus Prt cannot value features of v*, but v* can value features of Prt. The only feature of Prt that v* can value is Case, which becomes Case[acc]. Like unvalued EPP-features, and unlike ϕ-features, case features are not valued by matching. ϕ-agreement with a case-assigning head can value a case feature as a side effect. Of course, v* is an accusative case assigner. This gives:

(7) [Max [v* [expect [there [T_r [be [Prt [kill someone]]]]]]
Per[3] Per[ ] Per[ ] Per[3] Num[sg] Per[3]
Num[sg] Num[ ] EPP[$\surd$] Case[acc] Num[sg]
Case[ ] Case[ ]

The head v* still has unvalued features, so it continues to probe. It next agrees with *someone*, yielding:

(8) [Max [v* [expect [there [T_r [be [Prt [kill someone]]]]]]
Per[3] Per[3] Per[ ] Per[3] Num[sg] Per[3]
Num[sg] Num[sg] EPP[$\surd$] Case[acc] Num[sg]
Case[ ] Case[acc]

This marks the end of the v* phase. (In this note we use the term "phase" to refer to v* and C phases, which are actually called "strong phases" in DBP.) The derivation concludes with merger of the matrix T, which has a full set of unvalued ϕ-features and selects v*, and then agreement with the subject *Max*. The latter moves to satisfy the EPP of the matrix T. The unvalued ϕ-features of the matrix T are valued via agreement with *Max*, and the latter's case feature receives a nominative value as a side effect of the agreement.

In the DBP theory, the valuation of a feature which entered the derivation without a value plays the role of marking the feature for deletion; but the deletion will actually only take place at the end of a phase. The derivation must "remember" until the end of the phase which features have changed from unvalued to valued. DBP does not specify any mechanism to accomplish this.

The account above is intended to summarize the mechanics of feature checking as given in (the revised version of) DBP. A residual problem is that the person feature of *there* is still unvalued in (8). We return in Section 3 to discuss this in more detail, consider a suggestion of Chomsky, and suggest a possible alternative.

Consider now the derivation of (1c), repeated here as (9). A second problem will appear.

(9) Max expected someone(acc) to be killed(acc,sg)

The derivation is identical to the derivation detailed above up to the point where T_r is the probe. At this point, however, there is no *there* in the numeration and and the EPP feature of T_r must be satisfied by movement. This gives:

(10) [someone$_j$ T_r [be [Prt [kill t_j]]]]
Per[3] Per[3] Num[sg] Case[ ]
Num[sg] EPP[√]
Case[ ]

After *expect* selects T_r, and v* selects *expect*, the relevant structure is:

(11) [v* [expect [someone$_j$ T_r [be [Prt [kill t_j]]]]]]
Per[ ] Per[3] Per[3] Num[sg] Case[ ]
Num[ ] Num[sg] EPP[√]
Case[ ]

Now v* is the probe. We discuss the Minimum Link Condition in detail below, but according to the formulation in DBP (and other published versions that we know of), v* must agree first with *someone*. When v* agrees with *someone*, all features of both heads are valued, exactly as in (8) above. The result is:

(12) [v* [expect [someone$_j$ T_r [be [Prt [kill t_j]]]]]]
Per[3] Per[3] Num[sg] Case[ ]
Num[sg] Num[sg] EPP[√]
Case[acc]

At this point, v* has no unvalued features and hence is "inactive"; it stops probing. The case feature of Prt, which in fact surfaces with morphological accusative case, remains unvalued in this derivation.

We now turn to possible solutions to the two problems which have been uncovered: the unvalued person feature of *there* in (1d) and (8), and the unvalued case feature of Prt in (1c), (9), and (12).

2. Transitivity

Above, we identified two apparent difficulties in the DBP checking system. We repeat them here.

(13) a. There was killed(nom,sg) someone(nom)
b. Max expected someone(acc) to be killed(acc,sg)

First, in (13a), the person feature on *there* remains unvalued. Although *there* agrees with the matrix T, which has full ϕ-features and is therefore capable of valuing other ϕ-features under ϕ-agreement, provided that its own ϕ-features are valued, the agreement with *there* takes place before those ϕ-features are indeed valued. In fact, the person feature of *there* never gets valued in any DBP derivation.

Second, in (13b), the case feature of Prt remains unvalued. The problem, on the face of it, appears to be of a different sort, an intervention problem. The raised nominal *someone* intervenes between Prt and v*, which could otherwise ϕ-agree with Prt and value its case feature.

In spite of their different appearances, both problems would be overcome if there was some principle of transitivity of ϕ-agreement in force; informally, if α ϕ-agrees with β, and β ϕ-agrees with γ, then α ϕ-agrees with γ. If we suppose that the ϕ-agreement induced by transitivity automatically induces feature valuation which aligns the values of case and ϕ-features of elements which ϕ-agree, then the valued person feature of *someone* in (13a) induces valuation of the person feature of the expletive as a side effect of T/*someone* agreement since T and the expletive have previously agreed. In (13b), Prt first ϕ-agrees with *someone*, then the latter ϕ-agrees with v*. Under transitivity, the second agreement operation induces indirect ϕ-agreement between v* and Prt, which values the case feature of Prt.

Incorporating a principle along these lines into the derivational framework requires inventing new mechanisms. One must specify how the derivation remembers or records the list of pairs of heads that have entered into the Agree relation. And one must specify how this record is used at each stage of the derivation to induce the valuation of features that is implied by transitivity. Exactly how is the person feature of *there* in (13a), for example, indirectly valued when the person feature of T (which previously agreed with *there*) is valued? Frampton and Gutmann (2000) propose that the mechanism which both records agreement and performs indirect valuation is "feature coalescence": features that have agreed, whether valued or not, become *the same* entity.

Below we examine two alternate solutions to the problem of valuing the case feature of Prt in (13b). One capitalizes on Chomsky's notion of "occurrences". The second explores different formulations of the Minimal Link Condition. In spite of the suggestion above that the two problems have a unitary solution, there is some justification for independent solutions to the two problems we have identified. It is not entirely clear that the person feature of the expletive must be syntactically valued. The person feature of the expletive must be valued only for theory-internal reasons: uninterpretable features must be deleted before they reach the interfaces. In DBP terms, this means unvalued features must be valued before they reach the interfaces. But now that the mechanism for deletion is valuation, it seems natural to explore the possibility that unvalued features cause a derivation to crash if they reach the morphological interface, as opposed to the LF interface, since unvalued features presumably cannot be spelled out by the morphology. Since *there* type expletives are devoid of overt morphology, apparently as a cross-linguistic universal, it may be that morphology does not even look at the person feature of the expletive. Alternatively, morphology could universally default the value to 3rd person.

3. Occurrences

Chomsky (p.c.) suggested that the problem of valuing Prt in (13b) could be handled by adopting the suggestion at the end of DBP that syntactic movement might be replaced by the recording of "occurrences". Consider a typical case of agreement, between T and a nominal:

(14)

T	be	Prt	kill	someone
Per[ ]		Num[sg]		Per[3]
Num[ ]		Case[ ]		Num[sg]
EPP[ ]				Case[ ]

T, as always, contains an EPP feature. In the occurrences alternative to movement, after T agrees with *someone*, the presence of the EPP feature causes T to be marked as an "occurrence" of *someone*. Some mechanism is required for recording this. The simplest is to assume that the EPP feature is valued by a pointer to the head which it is the occurrence of. But no movement of *someone* to the specifier of T takes place until the end of a phase, when material is sent to the phonological component. In the case of successive cyclic nominal raising, then, agreement will always be with the *tail* of the chain, rather than with the head of the chain.

In the occurrences version of the DBP theory, the stage of the derivation of (13b) that was previously represented as (11) is instead:

(15)

[v*	[expect	[T_r	[be	[Prt	[kill	someone$_j$]]]]]]
Per[ ]		Per[3]		Num[sg]		Per[3]
Num[ ]		EPP[j]		Case[ ]		Num[sg]
						Case[ ]

Here, T_r is an occurrence of *someone*. Now v* agrees sequentially with T_r and then Prt, valuing the case feature of Prt as accusative, though no valuation of the ϕ-features of v* takes place, since neither T_r nor Prt has full ϕ-features. v* continues to probe, and agrees with *someone*, which values the ϕ-features of v* and the case feature of *someone*. Occurrences are described at the end of DBP; for the interaction of occurrences and the order of feature checking, as indicated here, see Chomsky (forthcoming).

4. Locality Conditions on Probing

The Minimal Link Condition is in essence a locality condition on probing. It limits the "space" in which a probe is permitted to search for a goal. In this section, we want to explore the possibility that the locality condition can be formulated in such a way as to allow v*/Prt ϕ-agreement in (16), while at the same time blocking ϕ-agreement in the contexts in which agreement must be prevented:

(16)

[Max	v*	[expect	[someone$_j$	T_r	[be	[Prt	[kill	t_j]]]]]]
Per[3]	Per[ ]		Per[3]	Per[3]		Num[sg]		
Num[sg]	Num[ ]		Num[sg]	EPP[$\surd$]		Case[ ]		
Case[ ]			Case[ ]					

The relevant configuration for a discussion of intervention effects is (17), where Probe c-commands Goal_1, which c-commands Goal_2.

(17) Probe ... Goal_1 ... Goal_2 ...

The question is: Under what circumstances does the presence of Goal_1 prevent Probe from agreeing with Goal_2? As far as we can see, the intervention condition (18) is sufficient to rule out agreement in those instances in which the DBP analysis requires it to be ruled out, but does allow agreement in (17).

(18) Goal_1 blocks Probe/Goal_2 ϕ-agreement if (and only if):

a. Goal_1 has full ϕ-features; and

b. Goal_2 is in a lower phase than Goal_1.

Under (18), v*/Prt agreement in (16) can take place prior to v*/*someone* agreement because the two goals are in the same phase.

The key examples in which intervention is required involve dative experiencers in Icelandic. Consider (19), for example.

(19) a. *Max expected Jon(dat,sg) to like horses(acc,pl)

b. $\underset{\substack{\text{Per[ ]}\\ \text{Num[ ]}}}{[\ \text{v}^*}\ [\text{expect}\ [\ \underset{\substack{\text{Per[3]}\\ \text{Num[sg]}\\ \text{Case[dat]}}}{\text{Jon}_j}\ \underset{\substack{\text{Per[3]}\\ \text{EPP[}\surd\text{]}}}{\text{T}_\text{r}}\ [t_j\ \text{v}_\text{exp}\ [\text{like}\ \underset{\substack{\text{Per[3]}\\ \text{Num[pl]}\\ \text{Case[ ]}}}{\text{horses}}\ ]]]]]$

If we assume that v_exp establishes a phase, as Chomsky does, ϕ-agreement with the object is blocked in (19), as desired.[2] The subject experiencer has full ϕ-features and is in a higher phase than *horses*. Replacing the DBP formulation of the MLC by Condition (18) simplifies the DBP account of:

(20) there were believed to have been caught several fish

At the point in the derivation that the matrix T becomes the probe, and putting aside the question of whether or not the person feature of the expletive is valued or not, the relevant heads (with c-command from left to right) are:

(21)

T	...	Prt_1	...	there	...	Prt_2	...	fish
Per[ ]		Num[pl]		Per		Num[pl]		Per[3]
Num[ ]		Case[ ]				Case[ ]		Num[pl]
EPP[ ]								

Under Condition (18), neither Prt_1 nor Prt_2 is an obstacle to T/*fish* agreement.

Finally, note that replacing DBP version of the MLC by Condition (18) also simplifies the account of subject raising after object shift. In (22), following the account of object shift in DBP, the object is assumed to have raised to a second specifier of v*. There is no Condition (18) intervention since the object and subject are in the same phase.

(22) a. Max expected Jon(acc,sg) to us(acc,pl) see (with object shift)

b. $\underset{\substack{\text{Per[ ]}\\ \text{EPP[ ]}}}{[\ \text{T}_\text{r}}\ [\ \underset{\substack{\text{Per[1]}\\ \text{Num[pl]}\\ \text{Case[acc]}}}{\text{us}_j}\ \underset{\substack{\text{Per[3]}\\ \text{Num[sg]}\\ \text{Case[ ]}}}{\text{Jon}}\ \underset{\substack{\text{Per[1]}\\ \text{Num[pl]}\\ \text{EPP[}\surd\text{]}}}{\text{v}^*}\ [\text{saw}\ t_j\ ]]]$

The considerations in this section are tentative, but sufficient to make the point that the problem of valuing the case feature of Prt in (16) can perhaps be dealt with by a reconsideration of the locality conditions on probing.

5. Conclusion

One innovation introduced in DBP is that the deletion of features should be precisely understood as the consequence of the valuation of features that entered the derivation unvalued. This proposal has clear conceptual strengths. For one, it means that case features on nominals start out unvalued, and become valued (i.e. are assigned case) via ϕ-agreement with a case-assigning head. This desideratum had seemed hard to achieve, because it was not clear how past participles could be case marked under this assumption. But the MI/DBP system succeeds.

In this note we have exhibited some related apparent flaws in the DBP system, and discussed some possible solutions, which themselves seem to open the way to further fruitful work on the precise nature of agreement and movement.

Notes

1. Shortly after the first version of Chomsky's "Derivation by Phase" (DBP) was circulated, the four authors formed a study group to help us understand the new proposals. This paper tries to summarize some of our discussion, with the intention of helping others who may also be wrestling with some of the same questions. We intend it as a (partial) "reading guide" to DBP, not to be read independently of that work.

We thank Noam Chomsky for his consideration of the questions we raised and his discussion of possible solutions.

2. The point here is only to show that Condition (18) does all the work done by the formulation of the MLC given in DBP. We do not explore the question of whether the account given in DBP of (19) is adequate. This would require a discussion of whether the traces of movement trigger ϕ-intervention. Chomsky assumes that they do, in order to draw the contrast between Icelandic:

(i) *there T(pl) me(dat) v_{exp} seem people(nom,pl) to be in the room

(ii) me_j(dat) T(pl) t_j v_{exp} seem people(nom,pl) to be in the room

The account relies on movement in (ii) obviating intervention in (i). But if movement can obviate intervention, an account is needed of why object shift in (19), which apparently is possible, cannot obviate intervention.

See Frampton and Gutmann (2000) for a different approach to the (i)/(ii) contrast.

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