Provocative Syntax

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Chapter 2

Provocation

2.1 Introduction

The central claim I wish to put forward is that most syntactic movement occurs as a result of a complex syntactic operation which I call *provocation*. The internal details and mechanism of this operation will be elucidated shortly, but the effect of provocation must be understood from the outset.

Provocation, like feature valuation, occurs only when a probe-goal relation is established in the phrase marker. The provocation operation produces a pair of phrase markers from the input structure. One of the resulting phrase markers is simply the original input, the head of which was the probe. The other is normally a copy of some projection of the goal. This second phrase marker heads a *chain* which also contains the goal in the other phrase marker. The new copy is then merged automatically with the original phrase marker in order to form a single structure, which can be interpreted at the LF and PF interfaces. And that’s what movement is all about.\(^4\)

Let me expand slightly the terminology I am using here. When an unvalued feature F triggers the formation of the paired phrase marker structure, I will say that F *provokes* the goal. Features which provoke a goal are then *provocative* features, or P-features, for short.\(^5\) Finally, in order to indicate the provocative nature of particular features in an illustrative representation, I will sometimes annotate P-features, or the heads which
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contain them, with a + diacritic. Thus $F^+$ means that some feature of head $F$ is provocative, and $[u\psi]^+$ means that unvalued feature $\psi$ is provocative.

Whether a given feature is provocative or not is subject to parametric variation. Heads may be provocative or not, depending on the language, just as in other models heads may be “strong” or “weak”, or they may bear an EPP-feature or not.

How this all works can be illustrated readily with some of the more familiar cases of movement. Take movement of the subject from inside a verb phrase to the [Spec, T] position, as in (1).

(1) $[\text{TP} \quad \text{Jenny was} \quad [vP \quad t \quad \text{putting up the tent} \, ] ]$

At an earlier point in the derivation of this sentence, the structure was (2).

(2)

The T head of TP bears unvalued $\phi$ features in (2), and these must be valued (and deleted) in order for the derivation to converge. The $\phi$ features in T therefore act as a probe which seeks a matching set of features in the vP complement to T. As Jenny is part of the vP, and bears $\phi$ features, the probe identifies the features of Jenny as a match, hence, as a potential goal. But there is more to be said about the $\phi$ features in T in the derivation of (1). Not only are the $\phi$ features unvalued; they are also provocative. And a provocative feature, or feature set, is not satisfied by finding a value—it also affects the phrase which it matches by requiring that a copy be made of that phrase. Thus the result of the feature matching, valuation, and provocation by T is the new pair of structures: (3).
Despite the two distinct “positions” occupied by the two copies of the Jenny DP, the pair still counts as a single syntactic unit, a chain, with respect to θ-role assignment and other issues of semantic interpretation. Following Frampton and Gutmann (2000), I suppose that the φ features of Jenny are shared by the two copies, and I hypothesize that this suffices to establish shared chain membership, at least for the purposes of θ-role assignment. (This supposition is supported more rigorously below.) Any operation which affects the features of one, such as Case assignment, will therefore necessarily affect the features of the other at the same time. (The semantic impact of feature sharing operations is later minimised by deletion of shared features from positions in which they are not interpretable (Pesetsky and Torrego 2007).)

Since two separate phrase markers cannot be interpreted, a merge operation must next, and immediately, unify the two components of (3) into the single phrase marker (4).
And within this familiar structure, the usual conventions of PF and LF interpretation may apply. Thus the lower copy of Jenny will be stripped of phonetic content, and only the upper one pronounced.

It should be immediately apparent what the significant differences are between the model of movement developed here, and any model based on some form of the EPP. In the provocation model, no reference is made to any need to “fill” a specifier position, or to occupy a phrasal edge. Instead “movement” is a side-effect of the creation of a second copy of a single phrase. The fact that movement will often make use of a specifier position is simply the automatic consequence of how two separate phrase markers are unified by external Merge. If there is another way to unify two separate phrase markers—such as adjunction of one to the other—then we might expect movement to sometimes make use of this second structure-building operation as well. If this occurs—and I will argue at length that it does—then it does so without any alteration in the original triggering mechanism, which will still simply ensure that a pair of phrase markers must be unified.

2.2 The inner workings of provocation

The effect of provocation is a binary structure like (5), in which \((\beta', \beta)\) constitute a chain, and from which a resulting structure will be formed in which \(\beta'\) merges at the root or head
of HP.

(5) \[
\begin{array}{c}
\text{HP} \\
\text{\(\alpha\)} \\
\text{\(\beta\)} \\
\text{\(\beta'\)}
\end{array}
\]

The provocation mechanism is simply a fortuitous combination of simplex operations, each of which have been proposed elsewhere in the literature. The feature valuation operation lies at the heart of provocation. Feature valuation occurs only when a probe identifies a matching goal. And the match for a probe can be found either internally, in the complement domain of the probe, or externally, in a separate phrase marker drawn independently from the numeration.

The clearest case of a match situated external to the probe’s own phrase marker can be found in some languages with the interrogative pronoun why. Rizzi (1996) observes that in Italian questions of this type, the finite verb need not be adjacent to the wh-phrase, in contrast to questions with other wh-phrases:

(6)  
a. Perché Gianni è partito?  
  why Gianni is left

b. *Come Gianni ha parlato?  
  how Gianni has spoken

c. *Dove Gianni è andato?  
  where Gianni is gone

Rizzi (1999) shows that this type of pattern emerges in languages in which the why wh-phrase does not undergo wh-movement from inside the clause, but instead arrives in the left periphery by external merge. But this then raises the further question how the unvalued probe feature which normally triggers wh-movement can be valued in sentences like (6a). If interrogative C must value it's uninterpretable wh-feature, then it must be
able to find a matching goal. But the only wh-phrase available in (6a) never occupies a position in the domain of C at any point in the derivation. It follows that the C probe must be able to match features in a phrase external to the phrase marker, which is then merged at the root to CP. 

(7) CP
    C [uWH]  TP
    Gianni è partito

Adv
  perché [WH]

In many languages, expletive subjects must also be able to serve as goals external to the phrase marker of the probe. A fairly clear example of this involves impersonal passives in French.

(8) Il a été procédé au réexamen de la loi. (Kayne and Pollock 2001)
    it has been proceeded to-the reexamination of the law
In (8), the φ-features of T appear to be valued by il, and presumably T Case-marks il in the process. There is no other nominal available in this structure which T might take as the goal, réexamen being the Case-marked complement of the preposition à. The alternative would be that the finite verb in a structure like this simply bears default 3rd person, singular agreement, because it does not agree with anything at all, but this alternative requires that some extra account be given of the obligatory presence of the expletive in this sentence. What is more, if T does not agree with expletive il when it is present, then it is difficult to account for the fact that T cannot agree with plural post-verbal subjects in unaccusative sentences like (9).

(9) Il a/*ont été élu plusieurs candidats du Parti Vert.
    it has been elected several candidates of-the Party Green
On the other hand, if the φ-features of T find a match in il external to the original TP phrase marker, then both the obligatory presence of the expletive and the absence of
agreement by T with anything else follow immediately.

(Selectional features might also be analysed as probes which require an external match. Chomsky (2000) speculates that selection is equivalent to attraction, inasmuch as both involve a head trying to situate another phrase at its edge. The implementation of this idea in terms of provocation would be slightly different, since the feature valuation is distinct from the subsequent merge operation in this model. If selectional features are probes, then they would be valued by the generation of an external phrase with the appropriate categorial properties. Merge of the goal in this valuation procedure would be necessary in order to create a unique phrase marker before the derivation continues. The consequence would be the presence of a phrase at the edge of its selecting head, but this would be the result of provocation, and not its cause. The empirical effects would be the same as in other theories of selection, it seems.)

From a certain perspective, a match between a probe and an external goal makes more sense as a component of grammar than does matching with internal goals. Consider the effect of external valuation of a \([u \text{WH}]\) feature on C in a why question. If interrogative C lacked such a feature in a language like English or Italian, then there would be no salient signifier at the clause edge to mark that clause as a question. With the \([u \text{WH}]\) probe present, however, some goal must be found which can convey this information. So the presence of an unvalued feature in C provides a means to ensure that a question can be readily identified as such. Internal valuation has no such effect, since the goal does not occupy the (left-)edge, and does not replace the probe at that edge.

External matching operations make better sense in terms of computational efficiency, as well. When internal matching occurs, the probe must conduct a search within its complement for the goal, and the preferred goal is the one found by the minimal search. But with external matching, the goal is already identified. No search is necessary.
Chomsky’s (2001) proposal that external merge is preferable to movement makes sense in these terms. He observes that expletive *there* must be used to fill a subject position if there is an option of either doing so or of moving an internal nominal argument. This accounts for the contrast in (10).

(10) a. *There seems a ship to have landed.
   b. There seems to have landed a ship.

In Chomsky’s analysis, the subject position in the complement clause in (10a) is filled by moving *a ship* even though the presence of *there* in the numeration for the same phase might have been chosen. If *there* is chosen instead, as in (10b), the result is grammatical.

If the T probe must value *φ*-features in raising complements, then this pattern follows directly from efficient search requirements. If *there* is drawn from the numeration to serve as the goal to value T, then no search is necessary. In contrast, in order to displace *a ship*, a search must be conducted to find the closest goal within the complement of T.

Johns (2000) claims that language design exhibits a cross-linguistic balance between morphological expression and expression by displacement. In other words, the same concepts are expressed morphologically in some languages and by movement in others. If this is accurate, then we would want formal theory to provide a reason why this state of affairs should obtain. Again, the idea that unvalued features match external goals suggests what the reason might be. At least some unvalued features might correspond to concepts which are not capable of being fully expressed by the morphology of a certain head in a given language, where other languages might express that concept effectively using their morphological resources. The way to enable expression in languages which lack particular morphological tools then would be by finding an external match for the particular feature to merge locally. In effect, this would provide a means of supplementing weak morphology with extra phrasal structure.
I don’t mean to imply that a functional explanation is all that we require to explain why wh-phrases might appear at the clause edge. Any explanation of this type must obviously take for granted the presence in the grammar of the formal mechanisms which may be used to functional ends. But functional pressures presumably have some role to play in explaining how the resources supplied by universal grammar are deployed in the development of actual (I-)languages.

Of course, most types of wh-phrases cannot be used simply as an external match for unvalued [uWH] features. Most wh-movement is not just external Merge. The use of who or what in this way is clearly impossible: (11)

(11) * Who/what Joan repaired the drill.

Unlike why, which can apparently be interpreted (semantically) by binding some element in the event structure of a lower clause, who and what must belong to a well-formed operator-variable chain structure in order to fulfill their semantic functions. The unacceptability of (11) reflects the absence of any such chain for who/what.

Fortunately, there is a second way for probes to find an external match which allows for the formation of operator-variable chains. It is clear from the phenomenon of Across-the-Board movement that a probe may match more than one goal at a time. Simultaneous matching occurs both with A-movement and with Ā-movement.

(12) a. Jean should [ __ visit the exhibit ] and [ be entertained __ by the guide ].

b. Which article has [ Marcel proofed __ ] and [ Dan reviewed __ ]

Simultaneous matching of this type is possible only when neither goal is closer than the other to the probe. “Closeness” is evidently defined relative to a section of the phrase marker, and not absolutely. In other words, it doesn’t matter if there are more categories separating the probe and goal in one conjoined phrase than there are in the other. Relative distance is not compared further once the bifurcation of conjoined structures takes place.
Since a single probe can match multiple goals in one operation, it is possible in principle for a probe to match an external goal and an internal goal at the same time. Consider the structure (13), where C is interrogative and must find a match for its unvalued $[u \text{WH}]$ feature.

\[(13) \ [C \_]_{u\text{WH}} \_ [TP \ [WH] \ \_ ]_{\text{Beth danced with who }[WH]} \_ ]\]

There are three different ways in which this might occur. C could simply find its match internally, because who carries the appropriate [WH] feature. The result of valuation would then be the same structure as in (13), except that the features of C would now be valued. Alternatively, the C probe could match an external wh-phrase, in which case a structure like (14) could be generated, following valuation and merge of the external wh-phrase.

\[(14) \ [C \_]_{\text{why }[WH]} \_ [TP \ [WH] \ \_ ]_{\text{Beth danced with who }[WH]} \_ ]\]

The third way for valuation of the probe to occur is with a simultaneous matching of the $[u \text{WH}]$ probe with two goals. C can match an external who and the internal who at the same time, and thereby take on the value of both of them simultaneously. The resulting structure will then be (15).

\[(15) \ [C \_]_{\text{who }[WH]} \_ [TP \ [WH] \ \_ ]_{\text{Beth danced with who }[WH]} \_ ]\]

Notice that this procedure does not yet ensure that the structure will be interpretable at LF. In fact, there is no particular difference between the structure (15) and the ungrammatical structure (16) unless something unifies the two instances of who in the former.

\[(16) \ [C \_]_{\text{what }[WH]} \_ [TP \ [WH] \ \_ ]_{\text{Beth danced with who }[WH]} \_ ]\]

I propose that the valuation operation itself is what unifies the internal and external goal. More precisely, I maintain that simultaneous valuation of two goals by a single probe forms a chain structure. The difference between (14) and (16), on the one hand, and (15),
on the other, is that in the latter, the two instances of who are interpreted as a single chain because they act together to provide a value for the [uWH] probe. Neither one serves as the sole goal in the valuation operation.

This effect of valuation can itself be attributed to the nature of feature valuation if valuation is “feature-sharing”, in the sense of Frampton and Gutmann (2000) and Pesetsky and Torrego (2007). Within this framework, the result of a valuation procedure is always a new structure in which a valued feature, or feature complex, occupies multiple distinct heads. For example, of a verb agrees with its object, as in the French (17), the single $\phi$-feature complex valued as [3rd,FEM,PL], will occupy two positions: in the pronoun les and the participle repeintes.

(17) On les a repeint-es.

one them has repainted-FEM.PL

‘We repainted them.’

The purpose of valuation in this model is to replace unvalued features with valued features. The replacement features will typically occupy a second position, as well, in which they are interpretable. The LF interpretation of this structure can then converge because this $\phi$-complex can now be deleted from the participle, where it is uninterpretable, and yet persist in the pronoun.

Consider the effect of valuation on the probe and two goals in (15) in this light. After valuation takes place, the same set of features will occupy three positions: the C probe, and both instances of who. Since the [WH] feature is uninterpretable in the probe, it can then be deleted from C, but it remains intact within the two whos. At this point, we can simply define a chain as any set of units which share an undeleted feature complex. LF interpretation need only notice when a feature occupies multiple positions in order to accomplish its ends.
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We can now adopt, as a notational convenience, the convention of indicating co-chain membership by shared subscripted indices. It should be clear that we are in no danger of “reifying indices” (in Chomsky’s (2000) sense) with this usage.

The interpretation of a chain structure at the PF interface will be the usual. In languages like English, the head of a chain will be interpreted at PF and the foot will not. This provides the illusion of movement, although nothing in this scenario moves around except the valuation features.

The same principles apply in the case of A-movement. Consider the structure of a simple sentence like *We should leave* immediately after merge introduces *should* into the derivation: (18).

\[ [\text{TP} \ should \ [\text{uφ} \ [\text{vP} \ leave \ we \ [φ] \ ] \ ] ] \]

The unvalued $φ$-complex of *should* must probe for matching valued features. In principle, those features may be found internal to the complement of the probe, or external to the phrase marker which it heads. Suppose the derivation supplies both types of goal at once, by drawing a second instance of *we* from the numeration to construct a free-standing DP. Since the $φ$ features of both instances of *we* will be identical, it is then possible for both to share features with *should* at once. The result will be a pair of phrase markers which together contain three locations for the valued $φ$-feature complex: (19).

\[ [\text{TP} \ should \ [φ] \ [\text{vP} \ leave \ we^1 \ [φ] \ ] \ , \ we^2 \ [φ] \ ] \]

These two phrase markers must then be unified into one by merging *we* with TP, thereby generating the structure

\[ [\text{TP} \ we^2 \ [φ] \ should \ [φ] \ [\text{vP} \ leave \ we^1 \ [φ] \ ] \ ] \]

Notice that $we^2$ is merged to a position to which no $θ$-role is assigned. As a non-expletive element, it must bear a $θ$-role or the structure fails Full Interpretation at LF. The implication is that $we^2$ must be licensed at LF by virtue of its membership in a chain with
the \( we^1 \) 1, which does occupy at \( \theta \)-position. This chain is formed by the valuation operation which establishes the shared \( \phi \)-feature complex for both pronouns.

Of course, the same mechanism will include the probe in the chain which contains the \( we^1 \) and \( we^2 \) nominals, but this is a temporary state of affairs which will not imperil the derivation. The valued features of the probe will be deleted for the LF interface (Pesetsky and Torrego 2007), so the interpreted argument chain will no longer contain anything except the pronouns. The final structure is then simply (21).

\[(21) \quad [\text{TP} \ we_i \ [\phi] \ \text{should} \ [\text{vP} \ \text{leave} \ we_i \ [\phi]]] \]

One technical detail remains to be settled. What has been described up to this point is how the primary operations of valuation and merge may produce the effects of movement in a derivation. But I have not yet ensured that movement must occur in any particular circumstance. Simultaneous valuation of a probe by external and internal goals is a derivational option, but not yet a necessity. So the model does not yet ensure the ungrammaticality of sentences like those in (22).

\[(22) \quad \begin{align*}
\text{a.} & \quad *\text{Were celebrated the triumphs of the Greens.} \\
\text{b.} & \quad *\text{I wonder} \ [\text{CP} \ \emptyset \ \text{the electorate will prefer who}] 
\end{align*} \]

The only way to ensure that T in (22a) and C in (22b) must have specifiers is to require that an external match be included in the set of goals used to value their unvalued features. The external match may be something which can be interpreted as an atomic chain (expletives or why-type wh-phrases) or it can be something which must head an n-ary chain. Nothing need be said about whether an internal match is included in the valuation or not.

A provocative feature is then any feature which must match an external goal.

The phenomenon of across-the-board (ATB) movement in extraction from coordinate structure (Williams 1978) is entirely less problematic when examined from the perspective
of provocation-induced “movement”. Consider the derivation of (23), in which who appears to originate both as the object of visited and as the complement of to.

(23) Who did Mark say that Beth visited and Ted talked to?

Extraction from a single half of the coordination is, of course, blocked by the Coordinate Structure Constraint (Ross 1967).

(24) * Who did Mark say that Beth visited and Ted talked to us?

What (24) shows is that a probe located outside two coordinated constituents is not allowed to find a match inside only one of them. The Coordinate Structure Constraint requires that both halves of the coordination be involved in the probe-goal relation. Suppose the structure prior to “movement” to be (25), where C bears the unvalued operator feature, valued versions of which are found in the wh-phrases in each conjunct.

(25) C+ [TP Mark said that [TP Beth visited who ]

and

[TP Ted talked to who ] ]

The operator feature in C probes both conjuncts simultaneously and identifies who in each one as matches. Because the probe is also provocative, it must also match an external goal, which must therefore be identical to the internal who goals: (26).

(26) C [TP Mark said that [TP Beth visited who ]

and

[TP Ted talked to who ] ]

who

And when this single external copy merges as the specifier for C, the ATB movement is complete.
2.3 Virtues of provocation

One of the persistent complications in movement theory involves the numerous cases in which movement does not actually produce a gap in the position from which a phrase has moved. Partial wh-movement is widely attested in both adult and child languages (McDaniel 1989, Müller 1997, Cole and Hermon 1998, Dayal 1994, Fanselow 2006), as in the German (27) examples.

(27)  a. Was glaubst du wen Irina liebt?

what believe you who Irina loves
‘Who do you believe that Irina loves?’

b. Was glaubst du was er sagt wen Irina liebt?

what believe you what he says who Irina loves
‘Who do you believe that he says that Irina loves?’

The usual issue with such data is that the relationship between the upper wh-phrase and the lower one appears to be the same as a movement operation creates between a wh-phrase and its trace, but the lower phrase cannot have moved in the corresponding fashion, since it is situated in the lower clause.

Such data has a different character in the current model, because the chain formation procedure works differently. Consider the structure of the German question (27a) at the point at which the matrix C is merged into the phrase marker. (For simplicity’s sake, I ignore the presence of the vP phase boundary in the root clause.)

(28) \[
\text{[CP} \ C_{\text{[uwh]}} \ TP \ du \ glaubst \ [CP \ wen_i \ C \ [TP \ Irina \ wen_i \ liebt] \ ]] \]

Interrogative C is provocative, so the matrix probe must find a match external to its own phrase marker in (28). And in order to give root scope to the wen in the complement clause, the external match must form a chain with wen. Root C must match an external goal and wen simultaneously. In languages which lack partial wh-movement, two
matching goal phrase must be identical, as they are in English, for example. But in
German, evidently, the constraints on chain formation are less restrictive, and a complete
wh-phrase can form a chain with a bare was. So the structure (29) is permitted, in which
was and wen value the \([uWH]\) feature of C together.

\[
(29) \quad \left[\text{CP} \ C \ [\text{TP} \ du \ glaubst \ [\text{CP} \ wen_{i}^{[uWH]} \ C \ [\text{TP} \ Irina \ wen_{i} \ liest ]] ] \right] \]
\[
\text{was}_{i}^{[uWH]}
\]

Subsequent merger of the external wh-phrase with CP then produces the sentence (27a).
Since the external was is not identical to the original internal one, the phonetic content of
the latter cannot be deleted, and so both wh-phrases are pronounced.

For (27b), of course, a similar derivation will occur. The only important difference is
that there are two points in the derivation for was to be introduced above wen.

In short, the existence of partial wh-movement appears quite unproblematic in the
approach advocated here, and simply reflects a degree of parametric variation in chain
formation.

Other marked options in wh-movement appear to be more amenable to analysis in
this framework, too. For example, wh-movement of clitics presents a challenge to
EPP-based analyses, but is easy to accommodate into a provocation account. Since phrasal
movement displaces (copies of) relatively large constituents, the normal effect is creation
of a specifier at the root. Occasionally, however, phrasal movement produces an adjunction
structure instead. This plausibly occurs when wh-movement affects French que, the clitic
allomorph of quoi (Bouchard and Hirschbühler 1986).

\[
(30) \quad \text{Qu’a vu Jean?}
\]
\[
\text{what-has seen Jean}
\]
\[
\text{‘What did Jean see?’}
\]
b. * Que, d’après toi, a vu Jean? (French; Poletto and Pollock 2004)
   what according to you has seen Jean
   ‘What, according to you, has John seen?’

c. Qui, d’après toi, a vu Jean?
   who according to you has seen Jean
   ‘Who, according to you, has Jean seen?’

(31) a. * Que et qui a-t-elle vu?
   what and who has she seen
   ‘What and who has she seen?’

b. À quoi et à qui a-t-elle pensé?
   to what and to who has she thought
   ‘What and to who has she thought of?’

As Bouchard and Hirschbühler show, *que* must be adjacent to verbal support to its
immediate right, just as are the pronominal clitics in French. Other wh-words in the
language are not constrained in this way.

It is possible to approach such data from a different angle, and treat it as a purely
prosodic effect. In such a view, the special property of *que* would simply be that it must be
left-adjacent to a verb to form a legitimate prosodic bond, regardless of the syntactic
position which *que* occupies. In that case, though, we would expect the status of conjoined
*que* to improve if it appears on the right, as in (32), which is not the case.

(32) * Qui et que a-t-elle vu?

If it is right to take *que* to be a clitic syntactically, then it requires a position other
than the specifier position which other wh-phrases typically occupy. And in that case,
wh-movement of *que* cannot be driven by the need to create a specifier, as the usual story
has it. In the model which I am proposing, a provocative feature of C provokes *que* so that
a new copy of *que* is situated alongside the original CP phrase marker:
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(34) Qu’a dit Louise que tu as fait?

‘What did Louise say that you did?’

In fact, given the overall preference for merging phrases as specifiers, clitic *que* must merge into [Spec, C] in the complement clause, since it will not actually have its PF realisation in that position. Later provocation by root C will again produce a simple copy of *que*, but the following Merge operation will have a different effect, because *que* is pronounced in the root clause, so it must occupy a clitic position at that point. But the provocation operation itself does exactly the same thing at each point.

The grammars of various South German dialects also include wh-elements which appear to raise to a clitic position instead of a specifier. Bayer and Brandner (2008) show that certain small interrogative pronouns in these dialects are incompatible with overt *dass*
complementisers in embedded questions, although larger wh-phrases can cooccur with
dass. Bavarian examples of this pattern appear in (35).

(35)  

a. I frog-me, fia wos dass-ma an zwoatn Fernseher braucht.  
   I ask-REFL for what that-one a second TV needs  
   ‘I wonder what one needs a second TV for.’

b. I hob koa Ahnung, mid was fia-ra Farb dass-a zfrien waar.  
   I have no idea with what for-a color that-he content would-be  
   ‘I have no idea with what color he would be happy.’

c. * I woass aa ned, wer dass alas am Sunndoch in da Kiach gwen is.  
   I know too not who that all at Sunday in the church been is  
   ‘I don’t know either who all has been to church on Sunday.’

Bayer and Brandner analyse this pattern in (35c), where the wh-word cannot cooccur with
dass, as movement of an atomic wh-phrase to a position external to TP to a position where
it can rebrand itself as C and merge with T as the head of CP. Since the wh-word is itself
the complementiser, there cannot be a second complementiser in the same clause. In
the (35a)-(35b) examples, however, normal wh-movement displaces full wh-phrases to
[Spec, C], and an overt complementiser is then possible.

Bayer and Brandner support this analysis by showing that the small wh-words behave
like heads rather than phrases with respect to “n-intrusion”, an Allemanic morphological
process which inserts an /n/ between a vowel-final head and a clitic pronoun adjoined to its
immediate right. This is possible in embedded clauses in Allemanic when a pronoun
appears to the right of a small wh-word, but not when it follows a larger vowel-final
wh-phrase.\textsuperscript{13}

(36)  

a. . . . wa -n -er tuet.  
   what he does  
   ‘. . . what he does’
b. ... wo \text{-n-er ani} isch
   \begin{align*}
   & \text{where he towards is} \\
   & \text{‘...where he has gone to’}
   \end{align*}

c. *... von wo \text{-n-er herkommt}
   \begin{align*}
   & \text{from where he comes} \\
   & \text{‘where he comes from’}
   \end{align*}

Such data supports the conclusion that small wh-words do not raise to a specifier position under wh-movement. In a provocation model, this conclusion is unproblematic. Suppose that words like \text{wa, wo, wer} are simply proclitic elements in South German dialects. Provocation of the small wh-words by C then will produce a structure in which an external clitic interrogative pronoun must find a place to attach within the CP of the probe. They therefore adjoin to C instead of merging as specifiers with CP. The other differences then follow from the structure of the head position, which now includes a clitic element on the left. The contrast in (35) shows that overt \text{dass} is impossible when there is a clitic adjoined to C. And the possibility of \text{n}-intrusion in (36a)-(36b) reflects the fact that the proclitic wh-word is actually a part of the C to which the pronominal clitic is itself attached.

Multiple wh-movement is better suited to a provocation analysis, too. As is now well documented, some languages allow a single head to acquire multiple specifiers in the course of a derivation (Ura 2000, Richards 1997, Hiraiwa 2005). The legitimacy of such derivations must reflect, in part, parametric variation in the probe features which trigger movement. In models in which movement is driven by the EPP, the probe must then require multiple specifiers. In the P-feature model, the nature of this parametric variation will be quite different.

Consider the case of multiple wh-movement in Bulgarian, as described by Rudin (1988) and Richards (1997). Movement of a single wh-phrase, as in (37a), will take place
when the provocative C probe induces simultaneous matching with the internal wh-phrase and with an external copy, which then merges at the root to become a specifier in CP.

(37) a. Koj e vidjal Pjotr.
   who [AUX] seen Peter
   ‘Who saw Peter?’

b. Koj kogo e vidjal. (Bulgarian; Richards 1998)
   who whom [AUX] seen
   ‘Who saw whom?’

In (37b), the same type of probe induces movement of both wh-phrases. This means that the ability of the probe to produce a binary chain in Bulgarian is not exhausted by a single provocation event. I will use the term “agitator” to characterise provocative probes of this type. As a matter of parametric choice, then, Bulgarian C is an agitator, with a provocative [WH] feature.

Agitation is subject to the same reliance on a prior matching operation as is a single provocation event. So only wh-phrases may be provoked by the second (and subsequent) provocations in a Bulgarian multiple-wh question.

The technical details of agitation are far from clear, but we may hypothesize a scenario like the following. An agitator must originate as a provocative probe with normal unvalued features. For example, Bulgarian C in both of the (37) examples must enter the derivation with a provocative [uWH] feature. The probe matches its unvalued feature with both an external and an internal goal, which then value the probe and form a chain structure in the process. In (37a), the [WH] feature of C is then dispensable, and it can be deleted. However, in (37b) the same probe feature has more work to do with respect to the remaining wh-phrase in its domain. It must therefore be allowed to loose the value which it acquired in the earlier valuation process, so that it may provoke the next wh-phrase kogo in its domain.
An agitator is then a provocative feature which is permitted to forget a value which has been assigned by an earlier valuation operation. Notice, though, that the feature valuation which renders C interpretable for PF always takes place with the first such match, and is not affected by subsequent matching operations. Therefore, it must be the case that “Spell-Out” of the features of the probe takes place immediately after valuation, so that these features may be reused in subsequent provocations of the same type.

Agitation involves the reuse of a single probe in multiple valuations; the effect of multiple provocations on the structure of the phrases involved is a separate issue. What is necessary for a derivation involving agitation to succeed is simply that some way must be found to incorporate each of the new external goal phrases into the original phrase marker. This may involve creation of multiple specifiers, but there are other possible outputs, as well. As Richards (1997) observes, the second (and any subsequent) wh-phrase in the Bulgarian multiple-wh questions is “tucked in” to a specifier position to the right of the first. This reflects a structure-building principle which is evidently independent of the provocation operations.

Agitation may also produce structures in which the goals are displaced to non-specifier positions. One example of an agitator which does not generate multiple specifiers may be the T which hosts non-subject clitics in the Romance languages. Consider the French examples: (38).

(38) a. Marc a emprunté ces skis de Joanne.
   Marc has borrowed these skis from Joanne

   b. Il a emprunté ces skis de Joanne.
   she has borrowed these skis from Joanne

   c. Marc les a empruntés de Joanne.
   Marc them has borrowed from Joanne
   ‘Marc borrowed them from Joanne’
d. Il les en a empruntés
   he them of-her has borrowed
   ‘He borrowed them from her’

French T is provocative, so the subject nominal which values the $\phi$-features of T is provoked, and remerges as [Spec, T] in (38a).

\[(39)\]
\[
\begin{tikzpicture}
  \node {TP} child {node {DP} child {node {Marc} edge from parent node [left] {T}} child {node {vP} edge from parent node [left] {a} child {node {$t$ emprunté ces skis…}}}};
\end{tikzpicture}
\]

When vP contains pronouns (other than the subject), they also adjoin to T, as in (38c)–(38d). T is moreover an agitator, so after it provokes the subject (and obtains a valuation of its own $\phi$ features), it may provoke another, more distant phrase which it matches. Pronouns bear $\phi$ features, so they may be provoked by a T agitator. Non-pronominal nominals are immune to such provocation, since they must not be realized adjoined to another head.

One implication here is that $en$ and $y$ bear $\phi$ features. An anonymous reviewer points out that past participles may agree with $en$ in Italian, so this is a plausible approach for French $en$, as well. As for $y$, we have already accepted that English $there$ must sometimes have $\phi$ features, since it serves as a goal for T both internally and externally, so there is no reason not to suppose that the same is true of its French counterpart $y$.

In (38d), the participle agrees with the clitic direct object, which seems to reflect prior attraction of the object by the participle (Kayne 1989a). In this case, the clitic will be provoked by agitator T in a position at the edge of vP, rather than in its original $\theta$ position. The mechanics of provocation remain the same, however.
As Richards (1997) demonstrates, the order of movement of wh-phrases other than the first is free in Bulgarian multiple-wh questions. The second highest specifier need not originate in the second highest base position in the clause.16

(40)  a. Koj kogo kak e tselunal? (Bulgarian; Krapova and Cinque 2008)
     who whom how is kissed
     ‘Who kissed whom how?’

     b. Koj kak kogo e tselunal?
     who how whom is kissed

Parallels to this pattern are found in the ordering of non-subject clitics in French. The subject, which will always be the first nominal provoked, is always the left-most element within TP, whether it is a clitic pronoun or not. But the next clitic down need not originate as the next highest pronoun. Consider the contrast in (41).

(41)  a. Paul me l’a prêté.
     Paul me-DAT it-has loaned
     ‘Paul loaned it to me.’

     b. Paul le lui a prêté.
     Paul it her-DAT has loaned
     ‘Paul loaned it to her.’

In (41a), the dative me precedes accusative le. The opposite ordering is found in (41b), where accusative le precedes dative lui. It is not important for our purposes which ordering reflects the initial order of arguments within the verb phrase more accurately, since one of the two must in any case represent a reversal of relative height when the clitics are displaced.

The permissable final order of French clitics is governed by rules enforced at PF interpretation, i.e. morphological rules. But the syntax must at least make it possible for both the orders found in (41) to be generated. It does so in this case, because the same
freedom of provocation ordering obtains when multiple clitics are provoked as when multiple wh-phrases are provoked in Bulgarian. After the T agitator provokes the subject, it is free to provoke either the next closest pronoun or a more distant one at the next point in the derivation.\textsuperscript{17}

### 2.4 Clausal provocation

Stowell (1981) showed that the pervasive general tendency for clauses to appear at the right edge of a clause could be explained if clauses are required to undergo extraposition from a less peripheral argument position.\textsuperscript{18} This approach, which has considerable explanatory value, has proved difficult to integrate into a Minimalist framework, simply because extraposition itself is a problematic concept in this model. If movement is driven by the EPP (feature), then extraposition is somehow not normal movement.

In a provocation model, extraposition is easier to accommodate, although the forces which compel extraposition must still be elucidated. Consider example (42), in which the clause presumably originates to the left of the PP.

(42) Peter explained to us that the paint was wet.

At the relevant point in the derivation, the structure of vP must be (43).

Suppose that a P-feature can be added to the head at this point to enable extraposition. (I
take no position on what the specific P-features consist of.) The immediate effect of
provocation on (43) will be (44).

\[ (44) \]
\[ \begin{array}{c}
  \text{vP} \\
  \text{v} \\
  \text{V} \\
  \text{explain} \\
  \text{CP} \\
  \text{that} \\
  \text{V'} \\
  \text{PP} \\
  \text{e} \\
  \text{to us} \\
  \text{C} \\
  \text{TP} \\
  \text{that the paint was wet} \\
  \text{the paint was wet} \\
\end{array} \]

The next stage in the derivation must be an operation which unifies the two separate phrase
markers in (44). With provocation of other types of categories, the attachment site of the
copy phrase depends on whether it is a clitic or head or a simple phrase. With full finite
clauses, it seems that there is an additional possibility. Rather than merging as a specifier,
the external CP in (40) may apparently adjoin to the right at the root: (45).

\[ (45) \]
\[ \begin{array}{c}
  \text{vP} \\
  \text{vP} \\
  \text{v} \\
  \text{V} \\
  \text{explain} \\
  \text{CP} \\
  \text{that} \\
  \text{V'} \\
  \text{PP} \\
  \text{e} \\
  \text{to us} \\
  \text{C} \\
  \text{TP} \\
  \text{that the paint was wet} \\
  \text{the paint was wet} \\
\end{array} \]

So even though the provocation operation which compels “movement” to take place is the
same one which triggers leftward movement, the resulting linear order will be completely
Obviously, this is not a complete theory of extraposition, but only a sketch of what a part of such a theory might look like. The conditions under which anything is adjoined to the right of anything else are unclear, for one thing. But if extraposition is real, then there must be some "landing site" to the right of the verb phrase where extraposed phrases may move to. And whatever this landing site might be, the provocation operation will have the capacity to trigger movement to it, simply because provocation itself is neutral to what the correct merge position should be for any external copy.

2.5 Chain formation

Chains formed by wh-movement are typically interpreted as operator-variable structures at the LF interface (Chomsky 1986b). For this to occur, the content of the head and the foot of an $\bar{A}$-chain must be modified, so that the head and foot are semantically distinct. At the LF interface, a wh-chain must comprise two elements: an operator, possibly restricted, and a restricted variable. The LF structure for the abstract form (46a) should be approximately (46b).

\begin{equation}
\text{(46) a. who should they say \([CP \text{ who that we wanted CP \text{ who to invite CP \text{ who to supper}}]\])}
\end{equation}

\begin{equation}
\text{b. wh } x, \text{ they said that we wanted to invite } x: \text{ person}(x) \text{ to supper}
\end{equation}

Any theory of chain formation should include some specification of how this change in content is accomplished.

Two distinct approaches are conceivable. In one, the formation of operator-variable structures is a semantic phenomenon, which occurs at the mapping from syntactic structures to conceptual representation. In other words, it takes place at the LF interface. In the other, the syntactic derivation itself provides operator-variable chains, and the LF mapping procedure simply deals with the chain structure which is presented to it.
Chomsky (1995, p. 206ff) provides compelling argumentation in support of the syntactic approach. His data includes the following: (47).

(47) a. The students asked what attitudes about each other the teachers had noticed.
   b. The students asked what attitudes about each other the teachers had.

Example (47a) is ambiguous. The reciprocal phrase *each other* may be bound either by *the students* or by *the teachers*. This ambiguity is expected, as the wh-phrase will occupy two positions: its base position in VP and the [Spec, C] position.

(48) the students asked [CP what attitudes about each other C [TP the teachers had noticed what attitudes about each other ] ]

In either position, the phrase has an appropriate c-commanding antecedent. And if the phrase is identical in both positions, then the reciprocal being bound by virtue of one position is good enough.

But (47b) is not ambiguous; the reciprocal can only take *the teachers* as its antecedent in this case.

Chomsky’s (1995) explanation for this contrast goes like this. Chains formed by wh-movement must be mapped to operator-variable chains, in which the restrictive content of a nominal can appear with either the operator or the variable. Thus, there are two legitimate LF structures for the wh-chain in (47a):

(49) a. the students asked [ wh x, x attitudes about each other ] the teachers had noticed x
   b. the students asked [ wh x ] the teachers had noticed x attitudes about each other

The mapping procedure thus provides different structures for the different interpretations available for this sentence.
However sentence (47b) makes use of the idiom chunk *have ___ attitudes*, and this idiom must be preserved in the LF structure to allow the proper meaning to be found. As such, the structure (50a) is impossible, and only (50b) is allowed.

(50)  

a. the students asked [ wh *x, x* attitudes about each other ] the teachers had *x*  

b. the students asked [ wh *x* ] the teachers had *x* attitudes about each other  

Since the only permissible structure is (50b), the only good interpretation is one in which the reciprocal takes *the teachers* as its antecedent.

This elegant account of the data only works if the head and tail of the \( \bar{A} \)-chain are factored into two different content units before the LF interface. If operator-variable chains are formed only by a mapping procedure at the interface, then the LF structure of (48) would be

(51)  

the students asked [ what attitudes about each other ] the teachers had [ what attitudes about each other ]  

The idiom would be fully present within the verb phrase, but the reciprocal phrase would still be able to find its antecedent in the higher clause, with this structure. Since this is the wrong result, (51) must represent an impossible structure. So operator-variable chains must be formed in the syntactic derivation.

Chains are formed in the provocation model when a probe is simultaneously valued by two goals. This point in the derivation appears to be the only time in the derivation when a chain is particularly salient to the computational machinery. It is natural to suppose that the chain factoring which is necessary for interpretation of \( \bar{A} \)-chains also takes place at this point.

What should this entail? Let us begin with the simplest of such situations: object wh-movement in an embedded question. (For present purposes, I ignore TP-internal movement to the edge of a vP phase. Successive cyclic movement will be examined in
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detail in chapter 5.) For a sentence like (52), the embedded question will originate as
in (53a), when provocative C is merged with TP. Provocation then produces the
structure (53b), in which the probe features are valued, and shared with the two copies of
the wh-phrase. But this structure cannot be interpreted at the LF interface without
modification. Let us call this the Refine operation on chains. The [WH] feature on C has no
semantic function, so it must be deleted and the corresponding phonetic features sent
along to PF. And the chain which contains the content for the operator and variable must
be factored into complementary parts. So each component of the chain structure looses
some content at this point: C loses its [WH] feature; the internal copy of which book gives
up its operator content; and the external copy loses its predicational material. The result of
this complementary deletion procedure will then be (53c). (The deletion of semantic
content has no effect on the phonological content of the wh-phrases, of course.)

(52) I wonder which book Shelby was reading.

(53) a. $C_{[uWH]} C_{[TP]}$ Shelby was reading which book_{[WH]}

     b. $C_{[WH]} C_{[TP]}$ Shelby was reading which book_{i[WH]}

     which book_{i[WH]}

     c. $C_{[TP]}$ Shelby was reading $x$: book($x$)

Finally, merge of the external wh-phrase at the root will produce a the semantically
coherent phrase marker: (54).

(54) $[CP$ wh $x$ C_{[TP]} Shelby was reading $x$: book($x$) $]$

My intention, in giving a name to the Refine operation, is to make explicit an idea
which is already implied in other approaches to agreement or feature valuation: the idea
that something in the LF content of a probe is altered after an agreement operation takes
place. Actually, it is made equally explicit by Pesetsky and Torrego (2007), who simply do
not identify it by name. In Chomsky’s approach, the newly valued probe features are normally stripped away entirely by the Transfer operation, which applies once valuation has taken place; Refine is therefore a component of a more complex Transfer operation. In some form or another, the Refine operation seems inescapable. The only thing that I am adding to this is the idea that it is not only the probe which is affected by deleting uninterpretable content. Everything in a chain is subject to the same process.

In a language like German, where partial wh-movement may occur, the lexicon seems to provide a wh-phrase which need not be affected by the Refine operation. Consider again example (27a).

(27a) Was glaubst du wen Irina liebt?

what believe you who Irina loves
‘Who do you believe that Irina loves?’

The use of was in this sentence does not imply non-animacy in the answer to the question being asked. The meaning of was in this type of question is somehow less rich than it would normally be. This follows if partial wh-movement involves the use of wh-words which come from the lexicon in a “pre-Refined” form. In other words, the meaning of was when it is introduced into the derivation is already that of a pure operator—[ wh x ] —which carries no extra information about the restrictions on the range of the variable. When valuation forms a chain with this type of element, the Refine operation is able to leave it in the same state as it was in beforehand.

With pure A-movement, the formation of an n-ary chain is slightly different.

Consider the movement of the subject in a simple intransitive sentence:

(55) a. $T_{\phi} \left[ vP, Jennifer_{\phi} \right. \text{ laughed } \left. \right]$

b. $T_{\phi} \left[ vP \left[ DP, Jennifer_{\phi} \right. \right. \text{ laughed } \left. \right] \left[ DP, Jennifer_{\phi} \right. \right]$
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c. \[ [\text{TP } \text{Jennifer},_i^{[\phi]} T [\text{vP } \text{Jennifer},_i^{[\phi]} \text{laughed} ] ] \]

Formation of A-chains leaves full semantic content in the head and tail positions. This is why ‘quantifier lowering’ effects arise in A-chains but not in $\overline{A}$-chains (May 1977).

We may attribute the different semantic effects of the Refine operation to differences in the probes which trigger the complex provocation operation. When an A head contains the P-feature, the result is a pure copying operation, in which a chain is formed with identical (semantic) content in the head and foot. When an $\overline{A}$ head like C provokes, the result is a chain with complementary, quantificational content in the head and foot.

2.6 Provoking head movement

It should already be clear that the provocation model provides an account of movement to specifier positions which has coverage at least equivalent to the standard EPP model for standard cases of A and $\overline{A}$ movement. What will be of interest in what follows is how the P-feature model differs from the standard model in the analysis of head movement. In the simplest cases, as we have seen, P-features will always trigger movement to specifier or clitic positions. But sometimes, P-features can trigger head movement instead. And sometimes, the derivation can induce a flip from a specifier movement context to a head movement context.

A number of conditions must be satisfied before this situation will arise. First, because the computational component prefers phrasal movement to head movement, a goal feature must be located somewhere where full phrasal movement is not possible.21 As already discussed, this appears to involve cases where the goal is found in the head of the complement to a P-head.
(56) \[
\begin{array}{c}
\text{FP} \\
\text{F}^+ \\
\text{HP} \\
\text{H} \\
\text{[GOAL]} \\
\end{array}
\]

Second, there must be an equidistant phrase which also contains feature which match the probe.

An important feature of this model is that the size of the phrase to be copied may vary depending on the syntactic context, even though the same basic provocation operation is responsible for making sure there is an external match of some size. When a provocative probe matches features in the head of its complement, the size of the copy shrinks dramatically. This effect follows from bare phase structure premises (Chomsky 1995), which ensure that the same phrase cannot be merged twice with the same head. Therefore, a complement to a particular head cannot become a specifier for the same head (Pesetsky and Torrego 2007).

A copy made containing the features in the head of a probe’s complement must not then reprise the entire complement; instead, it can only be made from the head of the complement. This situation arises, for example, when V-to-v movement occurs. Returning to an earlier point in the derivation of (1), consider what must occur next given the structure in (57).

(1) \[
\text{[TP Jenny was [VP t putting up the tent ] ]}
\]
(Lacking better imagination, I will refer to the provocative feature in \( v \) as the \([\text{ROOT}]\) feature.) The \( v \) head bears an unvalued \([\text{ROOT}]\) feature, which it must value against a matching feature set in its complement. It finds a match in the verbal root \( \text{put} \), and thereby forces a copy to be formed which contains these features. The copy cannot comprise the entire complement \( \text{VP} \), because that would lead to a re-merge of the complement as the specifier of \( v \). Therefore a copy is made of just the head \( V \), which produces the structures in (58).

Once again, the two phrase markers must be unified immediately to form a single structure. But a head cannot be merged as a specifier, so \( \text{put} \) does not merge in the same
way as Jenny did. Instead, put finds a place in its sister phrase marker by adjoining to the head of vP, producing the structure we require: (59).

(59)

A corollary to this view of when head movement is possible is that head movement will be strictly local, because a copy of a full phrase is preferred to a copy of just the head. In a structure like (60), T cannot then attract $v$ via head movement, even if $v$ is the closest element with features which match those of T. (I will use the familiar term “attraction” intermittently to refer to the end result of a provocation operation.) If T were able to provoke $v$ in (60), the immediate result would be that a copy be made of some category which contains $v$, which would then need to merge in [Spec, T] for the derivation to proceed successfully.

(60)

The central cases of the Head Movement Constraint (Travis 1984) thus follow
automatically in this model.

Incorporation phenomena will follow the same pattern. Baker’s (1988) demonstration that noun incorporation is syntactic is compelling, but it leaves unanswered some important questions about how incorporation is driven within the derivation. Working in a Government-and-Binding framework, Baker was able to assume that movement may occur whenever the result is a suitable representation. In that model, it was sufficient to suppose that the verbs which incorporate are morphologically suitable hosts for incorporation, so that the process might take place freely when necessary. And then principles like the Case filter do the rest.

If movement must be driven by some force, as I assume, then this must be as true for incorporation as it is for A-movement or wh-movement. So Baker’s model requires an update.

Consider the well-studied noun incorporation structures of Southern Tiwa (Allen et al. 1984). In this language, nouns originating in the domain of the verb can be incorporated. All such inanimate nouns must be incorporated, as in (61a), and non-proper animate nouns may be (61b)-(61c), and must be when they are otherwise not Case-marked, as in (61d) and (61e) (Baker 1988).

(61)  a. Te-shut-pe-ban.  
    1s:C-shirt-make-past  
    ‘I made the shirts.’

    b. Yedi seuanin bi-mū-ban.  
    those man:pl 1s:B-see-past  
    ‘I saw those men.’

    c. Yedi bi-seuan-mū-ban.  
    those 1s:B-man-see-past  
    ‘I saw those men.’
d. Ka-’u’u-wia-ban.
   1s:2sL-baby-give-past
   ‘I gave you the baby.’

e. I-’u’u-kur-’am-ban.
   1s:2s-baby-hold-cause-past
   ‘I made you hold the baby.’

It is clear that the verb itself does not require incorporation to be well-formed, as the non-incorporating (61b) shows. And it would be entirely ad hoc to invent two forms for every verbal root: one affixal, requiring incorporation, and the other non-affixal.

Let us narrow in on the optional incorporation in (61c). At the VP level, this sentence and its non-incorporating alternate should presumably share the same structure, something like (62).

(62) VP
    /\      /\  
   V     NP
   / \  / \  
mù Dem N
  /  \ /  
yedi seuan

The derivation should evidently be able to produce two outputs from this structure, which suggests that Southern Tiwa has access to an optional rule. Suppose that incorporation takes place when a provocative [uROOT] feature is added to V in the course of the derivation. The [uROOT] feature is valued by a lexical goal, such as the nominal root seuan. And since [uROOT] is provocative, there must be an external copy of the nominal root which serves as an extra goal when feature Match takes place. And since the internal goal is the head of the complement to V, it is only the head which is accessible under provocation.
Adjunction of seuan to mū then gives rise to the complete incorporation structure of (61c).

But since the addition of the provocative [uROOT] feature to V is optional, the unincorporated form in (61b) may be generated, too.

The “optional” addition of [uROOT] becomes effectively obligatory when other factors intervene. Southern Tiwa verbs are able to check Case on only one nominal argument, as Baker (1988) shows. In the double object VP in (61d), and in the causative structure (61e), the verb will Case-mark only the upper of two arguments. The lower argument must therefore be incorporated, by supplying the [uROOT] feature to the appropriate verbal root. But the process itself is the same in all cases.

Since head movement and phrasal movement are both reflexes of the same underlying operations, it is not surprising that we find other parallels between these two “types” of movement. For example, head movement sometimes appears to involve “partial” movement, in which the phrase-internal copy is pronounced fully and an external copy which matches it only in part is produced, and then merged. This occurs fairly frequently in noun incorporation language, where what is incorporated can be something less than a full noun.

Noun incorporation in Plains Cree exhibits this pattern. Full nouns can be incorporated, as “medials”, most often when they refer to affected body parts (Wolfart 1971, 1973).

(64) wanih-astimw-ê-w, sak-inisk-ê-n, nôcih-iskwêw-ê-w
lose-horse-PROC-3T, take/connect-arm-PROC-3, chase-woman-PROC-3T
‘he loses his horse, he seizes him by the arm, he chases women’
The same medial position in the verb can host “classificatory” morphemes, which must characterise the grammatical object by matching it in semantic features which delimit its physical composition. Thus in (65), the incorporated medial morphemes -âskw and -âpisk signify that the object is composed of wood and metal respectively.

(65) pakam-âskw-êw, paw-âpisk-ahwê-w
     strike-wood/CLASS–PROC-3, brush-metal/CLASS-by.tool-3
     ‘he strikes wood, he brushes it (a metal thing)’

When the context encourages it, both incorporated nouns and incorporated classifiers can be accompanied by lexical objects which contain either another copy of the incorporated noun, or a noun which matches its semantic features.

(66) awa okimâw o-tânisah ntawih-nôt-iskwêw-âtamiht (Wolfart 2008)
     this chief 3-daughter AUX-pursue-woman-PROC
     ‘Go court this chief’s daughter.’

Such copy-incorporation represents a head-movement counterpart to wh-movement of a partial copy. Consider the structure of the verb phrase prior to incorporation in (66), for the form pakam-âskw-êw with the provocative verb stem pakam introduced to the structure.

(67) [VP nôt [uROOT] [DP okimâw o-tânisah [ROOT]]]

The probe must match an external goal with a valued [ROOT] feature, but this external goal will be interpretable only by forming a chain with the object nominal in (67). It must therefore match the object in the valuing root feature, and it must be semantically compatible with the object in its own semantic features. Evidently, the match is close enough in Cree as long as the external goal has the right features of physical composition or personal identity. Therefore the external goal iskwêw can value the probe together with the direct object, to form the paired structure (68).
Subsequent adjunction of the external goal then produces the attested morphological structure.

Multiple incorporation structures are also possible, apparently. Collins (2002) shows that †Hoan “compound verbs” are actually underlying serial verb structures in which \( v \) attracts both lexical verbs from their original position inside the verb phrase. Example (69) is derived from the underlying structure (70) by movement of \( V_1 \) and \( V_2 \) to \( v \).

Example (69)

\[
\text{Ma a- qllhu l’o djo ki kx’u na.}
\]

\( 1SG \text{ PROG pour put.in water PART pot in} \)

‘I am pouring water into the pot.’

Again, this process falls quickly into place in the current model. In this case, the provocative feature resides in \( v \), which is moreover an agitator. So provocation of the closest verb values the [ROOT] feature of \( v \), but this probe can then reuse the same feature to match a second external goal. The effect is the formation of two distinct \( V \)-chains, each
of which originally contains an external verb and an internal one. The external verbs must be incorporated, successively, into the original phrase marker by adjoining to the head. And, as Collins observes, the second adjoined head attaches more closely to the attracting v, by “tucking in” to the existing \([vP \ V \ v]\) head structure.\(^{22}\)

2.7 Conclusion

More than other movement transformations, head movement has seemed problematic in Minimalist approaches (Chomsky 1995, 2000, 2001) in terms of its functional motivation.\(^{23}\) While \(\overline{\alpha}\)-movement clearly contributes to the expressive power of the derivation, and A-movement at least alters scopal relations, head movement appears to be semantically vacuous. As such, one would not expect it to occur at all, at least in the “narrow syntax”. If the primary purpose of the derivation is to construct structure for interpretation at the “conceptual-intentional” interface (Chomsky 2007), then the vacuous operations like head movement should be excluded in principal. And yet they occur.\(^{24}\)

The movement-as-provocation model resolves this apparent dilemma. Head movement does play a part in the narrow syntax, because head movement exists as an inescapable corollary to the existence of phrasal movement. Phrasal movement occurs because probe triggers creation of a copy of its goal, but if the goal is too close, then head movement is the result instead. Phrasal movement cannot be a part of the derivation without head movement becoming possible as well.
Notes

1Epstein and Seely (2006) provide an exhaustive critique of the empirical justifications for the EPP. Their central concern is the status of the [Spec, T] position, however, rather than the role of the EPP or EPP features in driving movement. For the most part, the issues which concern them are orthogonal to those discussed here.

2The literature on the EPP also includes various proposals to associate the subject position with a particular semantic role having something to do with clausal “aboutness”. Such theories are not vulnerable to the charge of circularity. Notable contributions in this area include Rothstein (1983) and Rizzi (2003). To my mind, approaches of this type have not surmounted the general problem that the subject position sometimes seems to be entirely lacking in special semantics, as when expletive subjects are used. Rizzi (2003) disagrees.

3Chomsky (2008, p. 8) observes: ‘It has sometimes been supposed that a new “copy” is created, then inserted in the position of the moved element—all unnecessary—and an alternative has been proposed in terms of “remerge,” which is simply the copy theory as originally formulated.’

4The provocation theory developed here is informed by earlier proposals on “sideward movement” by Nunes (2004). In Nunes’ work, as in mine, movement creates sets of independent phrase markers which are subsequently unified by a Merge operation. The primary goal of the two models is quite different, however, as is the implementation of this shared conception. For Nunes, movement is still driven by the EPP, even if the components of the complex movement operation do not satisfy the EPP immediately. And he maintains that “copies” are derived from the original phrase marker, while I derive the notion of a copied element indirectly, from the feature valuation process, as described in section 2.2. It remains
an open question to what extent these two approaches might benefit from unification.

5By hijacking Chomsky’s (2000) terminology, I do mean to imply that provocative features will do the work of Chomsky’s P-features, or Chomsky’s (2008) “edge features”.

6One might imagine that a copy of the goal feature (set) alone would satisfy the demands of a provocative probe, and this might be allowed in principle. But subsequent introduction of the bare features into the original phrase marker will not produce a valid, interpretable output, so such a derivation must fail on other grounds.

7The question does not arise in Rizzi’s own model, which starts from slightly different assumptions about the forces which drive wh-movement.

8An anonymous reviewer points out that the same argument might be made for regular polar questions, which presumably are formed with a null interrogative operator merged (externally) at the root. The claim would again be that interrogative C matches its unvalued feature against this type of external goal. On the other hand, Larson (1985) has argued that polar questions are formed by movement of a disjunction operator from a TP-internal position. If Larson is correct, then the text analysis of perché cannot be extended in this way.

9The implication here, as in Chomsky’s analysis, is that there must bear some φ feature or feature set. This is necessary in any theory in which agreement and movement are connected, since there can certainly undergo raising, in sentences like (i).

i. There seemed to be believed to be several ships in the harbour.

10The agreement in finite clauses between T and the “associate” of there can be accommodated even if no T never conducts a second search after there is merged. Since φ-feature complexes are shared after agreement takes place, the features of there are shared with T
whenever *there* fills the subject position. But the features of *there* may be themselves mutable. Suppose that *there* must find a value for some portion of its own $\phi$-features by a valuation operation. Then *there* must act as a probe and conduct a search within the clause for the closest element which has a match for the unvalued features. The match will be the indefinite nominal within the verb phrase, the features of which are thereafter shared with *there*. And since *there* already shares its $\phi$-features with T, the features of the associate will automatically be shared with T, too.


i. Hún er vinsæl.
   she(Nom) is popular

ii. Þeir segja hana vera vinsæla.
    They(Nom) say her(Acc) to-be popular

iii. Hún er sögð vera vinsæl.
     she(Nom) is said(Nom) to-be popular

iv. Þeir telja hana vera sagða vera vinsæla.
    they(Nom) believe her(Acc) to-be said(Acc) to-be popular

v. Hún er talin vera sögð vera vinsæl.
    she(Nom) is believed(Nom) to-be said(Nom) to-be popular

The passive participles in each example agree in Case with the *hún/hana* pronoun. But the Case of that pronoun is not determined until it has raised past the participle to a higher position in the sentence, or even several clauses up. In (v), for example, the pronoun is assigned nominative Case by T in the root clause after it has raised from its original clause through an intermediate clause. And there is no reason to suppose that root T has any direct
checking/valuation relationship with the participle two clauses down.

If valuation is feature sharing, then this pattern follows directly. Each participle may agree locally with the pronoun hún/hana before it raises out of the relevant clause, and the result of each agreement operation is that the shared \( \phi \)-feature complex appears in one extra position. When Case is eventually assigned to the pronoun, it is automatically realized in each position where the shared features appear, which includes the pronoun itself and all head which it has agreed with earlier in the derivation.

12Poletto and Pollock (2004) describe the small interrogative pronouns in several Italian dialects in similar terms, as clitic elements, and the analysis of wh-clitics presented here seems appropriate for these languages, as well.

13I attribute the fact that \( n \)-intrusion does not occur in root clauses to the different positions occupied by wh-phrases in embedded and root clauses in Germanic generally, as discussed in chapter 4. Small wh-words in south German are clitics only when they are attracted by the Force head, which triggers wh-movement in embedded clauses only.

14In fact, bare subject pronouns are also clitic elements (Kayne 1975), but they cliticise to Fin, rather than to T, as discussed in section 3.3.

15The question remains open why T does not permit multiple specifiers in French. One possibility is that T actually does allow multiple (non-clitic) specifiers, but that only the outermost specifier is subject to PF interpretation. The true structure of a sentence like(38c) would then be (1).

1. \[ TP \text{ Marc de Joanne les a emprunté } . . . \]

All other specifiers would instead be spelled-out at the foot of the chain. Pesetsky (2000) develops a model of English multiple-wh questions along these lines. But as I see no way
at present to test the validity of this hypothesis, I do not pursue this line of analysis.

16Krapova and Cinque (2008, p. 173:fn. 2) suggest that this freedom is limited, but do not offer a thorough description or analysis of what the limitations are. At least some of the examples of free variation in the ordering of second and subsequent wh-phrases seem uncontroversially to be acceptable.

17The Person-Case Constraint observed by Bonet (1991) is evidently relevant only to provocation of non-subject clitics. It is plausible that this will be a consequence of the fact that T is valued by, and assigns Case to, only the first nominal that it provokes.

18Stowell ensured this result with a Case Resistance Principle, which forced clauses to avoid occupying Case-marked position.

19Chomsky (2008) locates the moment of valuation of unvalued features at the phase level, so that valuation and feature deletion will always be essentially simultaneous. In multiple wh-movement derivations, where a single probe must reuse the same features to drive further movement, it is difficult to maintain that valuation and feature deletion will always coincide. A more natural interpretation of the order of events in this scenario is suggested by the theory of Distributed Morphology (Halle and Marantz 1993), in which feature valuation can be said to provide the information necessary to calculate the morphological form of a feature complex. For a sentences like (37b), for example, the initial valuation of the \([uWH]\) feature of C would establish that the correct form must be a zero morpheme; subsequent operations involving the same probe would leave this morphological form intact. Full Spell-Out—which presumably occurs when the phase is complete—can then deal with the morphological content of C in the same way as it deals with any other morphemes in the phase.

20Chomsky (2007, 2008) maintains, in addition, that both valuation and Transfer must
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