Explanations and "engineering solutions"? Aspects of the relation between Minimalism and HPSG

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Abstract

It is not simple to compare Minimalism and HPSG, but it is possible to identify a variety of differences, some not so important but others of considerable importance. Two of the latter are: (1) the fact that Minimalism is a very lexically-based approach whereas HPSG is more syntactically-based, and (2) the fact that Minimalism uses Internal Merge in the analysis of unbounded dependencies whereas HPSG employs the SLASH feature. In both cases the HPSG approach seems to offer a better account of the facts. Thus, in two important respects it seems preferable to Minimalism.

1. Introduction

More than a quarter of a century after its emergence, Chomsky's Minimalist framework still seems the most influential approach to syntax. For anyone who thinks that Head-driven Phrase Structure Grammar (HPSG) offers a better approach, this is a problem, and one that needs to be addressed. It can only be addressed by comparing and contrasting Minimalism and HPSG and seeking to show that the latter is more satisfactory. The issues are clouded by rhetoric, but, as Levine and Sag (2003) and Müller (2013) have shown, it is possible to make meaningful comparisons. In this paper, I will try to do something similar. I will focus on two major differences between Minimalism and HPSG. I will also say something about the rhetoric surrounding Minimalism and a number of other differences. I will argue that comparisons between the two frameworks favour HPSG.

The paper is organized as follows. In section 2, I comment on the rhetoric of Minimalism, and in section 3, I look briefly at some distinguishing features of the framework which are not so important. Then I turn to distinguishing features which are undoubtedly important. In section 4, I look briefly at the complex structures of Minimalism, then in section 5, I look in more detail at its lexically–based nature, and finally in section 6, I consider the movement or Internal Merge approach to unbounded dependencies. In section 7, I conclude the paper**.**

2. Rhetoric

As noted above, Minimalism is surrounded by a thicket of rather obscure rhetoric which anyone interested in discussing the framework has to hack a

way through. In -the early days of the framework it was said to be guided by the notion of virtual conceptual necessity, but no clear meaning was ever assigned to this concept.[1] A little later it was said that its focus was the 'perfection of language' or 'how closely human language approaches an optimal solution to design conditions that the system must meet to be usable at all' (Chomsky 2002: 58). As Lappin, Levine and Johnson (2000) and others noted, this idea does not fit well with the idea that language is a biological system. Biologists do not ask of physical organs how closely they approach an optimal solution to design conditions that the system must meet to be usable at all.

Minimalism has also been said to offer explanations (unlike other frameworks). Thus, Chomsky (2000) remarks that Minimalism 'encourages us to distinguish genuine explanations from "engineering solutions" – a term I do not mean in any disparaging sense'. An 'engineering solution' is presumably something that works. It is not a bad thing to produce something that works. It is certainly better than producing something that doesn't work. It is no doubt good to provide explanations as well. But there seems to be no basis for the idea that Minimalism is more explanatory than other frameworks. Consider a peculiarity of English non-finite relative clauses, the fact, illustrated by the following, that they only allow a PP and not an NP as a filler:

(1) a. a man [on whom to rely]
    b. *a man [whom to rely on]

This raises the question: why do non-finite relatives only allow a PP as the filler? For HPSG an answer is offered in Sag (1997):

(2) Because the relevant phrase type only allows a PP as a non-head Daughter.

For Minimalism *wh*-relative clauses are CPs of the following form where XP is a *wh*-phrase:

(3)
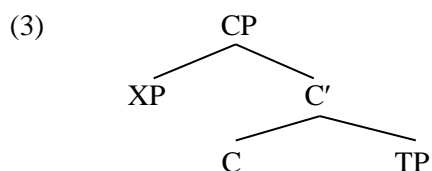
Thus, the Minimalist answer must be the following:

_____

[1] See Postal (2003) and Atkinson and Al-Mutairi (2012) for discussion.

(4) Because the relevant phonologically empty complementizer only allows a PP as its specifier.

The two frameworks offer different answers, but there is no reason at all to think that one is just engineering whereas the other offers an explanation. I will return to this matter in section 5.[2]

What lies behind all this rhetoric? It is hard to escape the feeling that it is an attempt to suggest that Minimalism is quite different from other approaches and that it should not be assessed in the same way, or in the words of Postal (2003: 19), 'an attempt to provide certain views with a sort of privileged status, with the goal of placing them at least rhetorically beyond the demands of serious argument or evidence'. However, like other approaches, Minimalism tries to make sense of syntactic phenomena and provides analyses (or at least sketches of analyses), and the analyses can be compared with those in other frameworks.

3. Differences between Minimalism and HPSG which are not so important

There are a number of notable features of Minimalism which are not essential in the sense that it would still be Minimalism without them. I will comment briefly on these features and then turn in section 4 to features which seem essential in the sense that without them it would be a different framework.

One feature of Minimalism that has often been commented on is that it generally lacks the kind of detailed and precise analyses that one would expect within generative grammar. In this it contrasts with HPSG. It is not uncommon in HPSG to find substantial appendices setting out formal analyses. See, for example, Sag (1997), and especially Ginzburg and Sag (2000), which has a 50 page appendix. There are no such appendices in Minimalism. This is a notable contrast. However, Minimalism would still be Minimalism if its practitioners developed a taste for detailed formal analyses.

It has also often been noted that Minimalist work tends to be less careful about data than work in HPSG. Thus, in a review of a collection of Minimalist papers, Bender (2002: 434) comments that: 'In these papers, the data appears to be collected in an off-hand, unsystematic way, with unconfirmed questionable judgments often used at crucial points in the argumentation'. She goes on to suggest that the framework encourages 'lack of concern for the data, above and beyond what is unfortunately already the norm in formal syntax, because the connection between analysis and data is

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[2] There is, of course, a field of grammar engineering and HPSG has interacted with it in productive ways (see e.g. Bender 2008, Müller 2015), but this is a separate matter.

allowed to be remote.' Similar things could be said about a variety of Minimalist work. Consider, for example, Aoun and Li (2003), who argue for quite different analyses of *that*-relatives and *wh*-relatives on the basis of the following (supposed) contrasts, which appear to represent nothing more than their own judgements:

(5) a. The headway that Mel made was impressive.
    b. ??The headway which Mel made was impressive.

(6) a. We admired the picture of himself that John painted in art class
    b. *We admired the picture of himself which John painted in art class

(7) a. The picture of himself that John painted in art class is impressive.
    b. *?The picture of himself which John painted in art class is impressive.

None of the native speakers I have consulted find significant contrasts here which could support different analyses. However, in the present context, the important point is that Minimalism would not be a new framework if the practitioners were to become less cavalier about data.

Another notable contrast between the frameworks is that Minimalism is a procedural approach, in which the grammar is a set of operations or procedures. Thus, (Chomsky 1995: 219) remarks that: 'We take L [a particular language] to be a generative procedure that constructs pairs (π, λ) that are interpreted at the articulatory–perceptual (A–P) and conceptual-intentional (C–I) interfaces, respectively, as "instructions" to the performance systems'. HPSG, in contrast, is a declarative approach, in which the grammar is a system of types and constraints. No argument seems to be offered for the procedural view, whereas various arguments have been presented for a declarative view.[3] However, as noted by Jackendoff (2011) and Müller (2013), Minimalism could be reformulated as a declarative approach. Consider, for example, the operation Merge, which produces structures of the following forms:

(8)
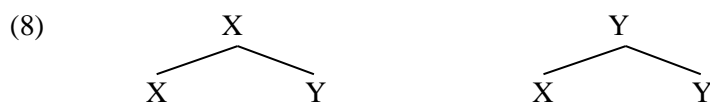
This could be reformulated as a constraint on complex signs of the following form:

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[3] See e.g. Postal (2003), Sag and Wasow (2011).

$$(9) \; \textit{complex-sign} \; \rightarrow \; \begin{bmatrix} \text{LABEL X} \vee \text{Y} \\ \text{DTRS} < [\text{LABEL X}], [\text{LABEL Y}] > \end{bmatrix}$$

The other Minimalist operations (Agree and Move/Internal Merge) could also be reformulated in declarative terms. I will consider Move/Internal Merge in section 6. So this difference too is probably of limited importance.

In the following sections I turn to differences between the frameworks which are clearly important.

4. Important differences 1: Complex vs. relatively simple structures

One difference between the two frameworks which is undoubtedly of considerable importance is the contrast between the exceedingly complex structures of Minimalism and the relatively simple structures of HPSG. For Minimalism the simplest of sentences have complex structures. All subjects are moved to their superficial position, Spec TP, from some lower position. Sentences with no auxiliary have a phonologically empty T element. Sentences also contain the light verb v as well as an ordinary verb. Some proposals add much more complexity. To account for various properties of adverbs, Cinque (1999) proposes that sentences have not T but 32 different functional heads. Kayne (1999) proposes that an innocent looking phrase such as *tried to sing* is the product of a complex sequence of movements, as follows:

(10)   to [$_{VP}$ tried [$_{IP}$ sing]] $\Rightarrow$
       [$_{IP}$ sing]$_i$ to [$_{VP}$ tried t$_i$] $\Rightarrow$
       to$_j$ [$_{IP}$ sing]$_i$ t$_j$ [$_{VP}$ tried t$_i$] $\Rightarrow$
       [$_{VP}$ tried t$_i$]$_k$ to$_j$ [$_{IP}$ sing]$_i$ t$_j$ t$_k$

To originates outside VP, and the IP complement of V is moved to the specifier position of *to*. To then moves to a higher position, and finally the VP, which only contains a verb moves to specifier of this higher position.[4] Specific proposals may or may not survive, but complex structures are an integral feature of Minimalism. Without them, it would be a very different framework.

Why does Minimalism have such complex structures? It sometimes seems as if complexity of a certain kind is seen as explanatory, as if treating some structure as the endpoint of a complex sequence of derivational steps explains it in a way that a set of constraints on superficial structures cannot. There is no obvious basis for such a view.

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[4] See Borsley (2001) for discussion.

There are clearly other, more sophisticated considerations at work here. Culicover and Jackendoff (2005) see a commitment to various notions of uniformity as major factors. In particular they highlight the role of Structural Uniformity, Interface Uniformity, and Derivational Uniformity, which they characterize as follows:

> Structural Uniformity. '[a]n apparently defective or disordered structure is actually a distorted regular form' (p. 46)

> Interface Uniformity. '[t]he syntax semantics interface is maximally simple, in that meaning maps transparently onto syntactic structure; and it is maximally uniform so that the same meaning always maps onto the same syntactic structure' (p. 47)

> Derivational Uniformity. '[w]here possible, the derivations of sentences are maximally uniform' (p. 47).

These all lead to considerable complexity.

A further factor that is surely important is the Minimalist commitment to a simple grammatical system involving just a few general mechanisms. This entails that the properties of constructions must derive from the lexical elements that they contain. Sometimes it is difficult to derive them from the properties of visible lexical elements. But there is a simple solution: postulate an invisible element. The result is a large set of invisible functional heads. Essentially Minimalism embodies an extreme version of the approach to relative clauses developed in Pollard and Sag (1994: chapter 5), which employed three empty relativizers. This will be the focus of the next section.

5. Important differences 2: A very lexically-based approach vs. a more syntactically-based approach

Properties of lexical elements are absolutely central to Minimalism. In other words, it is a very lexically-based approach.[5] The lexicon is also important within HPSG and has been a major focus of research, but the framework's complex hierarchies of phrase types or constructions mean that it is a much more syntactically-based approach.

A useful domain for exploring the relation between the two approaches is unbounded dependency constructions, such as *wh*-interrogatives and relative

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[5] Oddly, the obvious implication – that the lexicon should be a major focus of research – seems to be ignored. As Newmeyer (2005: p.95, fn. 9) comments that '... in no framework ever proposed by Chomsky has the lexicon been as important as it is in the MP [Minimalist Program]. Yet in no framework proposed by Chomsky have the properties of the lexicon been as poorly investigated.'

clauses. Detailed HPSG analyses have been developed within HPSG in Sag (1997, 2010) and Ginzburg and Sag (2000). There seems to be no equally detailed Minimalist work. Therefore it is necessary to consider what might be proposed within Minimalism, not what has been proposed.

It has been clear since Ross (1967) and Chomsky (1977) that there are many different unbounded dependency constructions. Here, however, I will confine my attention to *wh*-interrogatives and relative clauses. An adequate account of the former needs to accommodate main and subordinate finite *wh*-interrogatives, and non-finite *wh*-interrogatives, as in (11).

(11) a. Who did Kim talk to?
      b. I wonder [who Kim talked to].
      c. I wondered [who to talk to].

An adequate account of the latter needs to deal with finite *wh*-relatives, finite non-*wh*-relatives, non-finite *wh*-relatives, and non-finite non-*wh*-relatives with and without a subject, as in (12).

(12) a. the man [who Kim talked to]
      b. the man [(that) Kim talked to]
      c. a man [to whom to talk]
      d. a man [for you to talk to]
      e. a man [to talk to]

A Minimalist analysis will have to attribute the properties of these constructions to a set of mainly phonologically empty complementizers. It will need to ensure: (a) that the complementizers take the right kind of complement, (b) that they have the right kind of specifier, (c) that they either attract or do not attract an auxiliary, i.e. require it to precede the subject, and (d) that their maximal projection either does or does not modify a nominal constituent of a certain kind. It might postulate eight complementizers with the properties specified in Table 1.

Clearly, we would have a much larger table if we considered the full range of unbounded dependency constructions.

There are obviously questions about how one might ensure that the complementizers have the necessary properties. Essentially, they need to be assigned appropriate features, but what these might be is not a simple matter. However, given appropriate features, they will have the necessary properties and do the necessary work. But a long list of complementizers makes no distinction between properties shared by some or all elements and properties restricted to a single element. There are a variety of shared properties. Four of the complementizers take a finite TP complement and the other four take a non-finite CP complement. The three interrogative complementizers allow the same specifier categories. The five relative complementizers all take a relative specifier. Only one of the C-elements here attracts an auxiliary, but

there will clearly be others with this property given examples like those in (13), where the auxiliary is in bold:

(13) a. Only in Colchester **could** such a thing happen.
    b. Kim is in Colchester, and so **is** Lee.
    c. Such **is** life.
    d. The more Bill smokes, the more **does** Susan hate him.
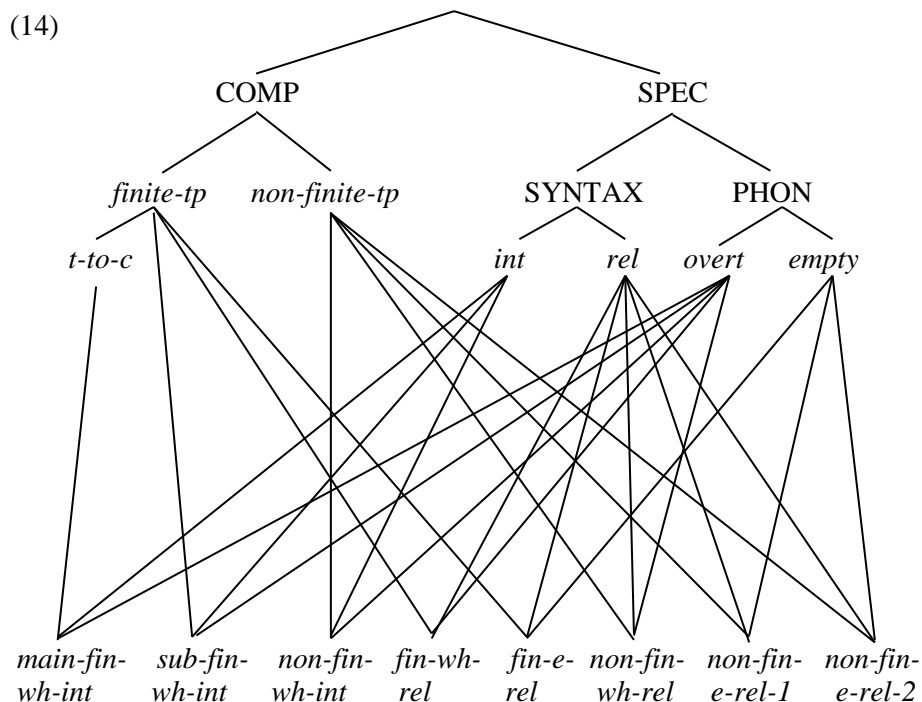   c. **Had** I been there, I would have seen him.

Thus, there are generalizations to be captured here.

Complement-izer	Form	Complement	Specifier	Aux-attraction	N′-modif-ication
main-finite-*wh*-interrogative	∅	finite TP	int-*wh*-DP/PP/AP/AdvP	yes	no
subordinate-finite-*wh*-interrogative	∅	finite TP	int-*wh*-DP/PP/AP/AdvP	no	no
non-finite-*wh*-interrogative	∅	non-finite null-subject TP	int-*wh*-DP/PP/AP/AdvP	no	no
finite-*wh*-relative	∅	finite TP	rel-*wh*-DP/PP	no	yes
finite-empty-spec-relative	*that* or ∅	finite TP	empty-rel-DP	no	yes
non-finite --*wh*-relative	∅	non-finite null subject TP	rel-*wh*-PP	no	yes
non-finite-empty-spec-relative-2	*for*	non-finite overt subject TP	empty-rel-DP	no	yes
non-finite-empty-spec-relative-1	∅	non-finite null subject TP	empty-rel-DP	no	yes

Table 1: Complementizers

How could the various generalizations be captured? The obvious approach is that developed in the 1980s in HPSG work on the hierarchical lexicon, i.e. a detailed classification of complementizers which allows

properties to be associated not just with individual complementizers but also with classes of complementizers. We might propose the following classification:

(14)

COMP   SPEC

finite-tp   *non-finite-tp*   SYNTAX   PHON

t-to-c   *int*   *rel*   *overt*   *empty*

main-fin- wh-int   *sub-fin- wh-int*   *non-fin- wh-int*   *fin-wh- rel*   *fin-e- rel*   *non-fin- wh-rel*   *non-fin- e-rel-1*   *non-fin- e-rel-2*

Following standard HPSG practice, I use upper case letters for independent dimensions of classification and lower case italics for lexical types. The complementizers are classified on the basis of their complement selection properties and their specifier selection properties, and in the latter case they are classified both syntactically (is the specifier interrogative or relative?) and phonologically (is it overt or empty?). We have seven non-maximal types: *finite-tp*, *non-finite-tp*, *t-to-c*, *int*, *rel*, *overt*, *empty*. These will be associated with various features as in Table 2.

    I am assuming here that a complementizer will not attract an auxiliary if it lacks certain features and hence that there is no need for a type for complementizers that do not attract an auxiliary. The maximal types that correspond to the eight complementizers will have some features of their own. *Fin-e-rel* will have features indicating that it optionally takes the form *that*, and *inf-e-rel-2* will have features indicating that it takes the form *for*. All the others will be associated with the information that they are phonologically empty. In addition, *inf-e-rel-2* must be specified as licensing an overt subject, *fin-wh-rel* as taking a DP or PP specifier, and *inf-wh-rel* as taking a PP specifier. However, most features of the eight complementizers will be inherited from some supertype.

Type	Features
finite-tp	features ensuring that a head takes a finite TP complement
non-finite-tp	features ensuring that a head takes a non-finite TP complement
t-to-c	features ensuring that an auxiliary is moved to C
int	features ensuring that a head requires an interrogative specifier
rel	features ensuring that a head requires a relative specifier and modifies an N′ agreeing with the rel value of the specifier
overt	features ensuring that the specifier has some phonology
empty	features ensuring that the specifier has no phonology and that it is a DP

Table 2: Non-maximal types and their features

This is only a sketch of an analysis, but it looks as if it may be possible to provide a broadly satisfactory lexical approach to unbounded dependency constructions given hierarchies of lexical types of the kind proposed within HPSG. Thus, it seems that we have a choice between hierarchies of phrasal types and hierarchies of lexical types. What can we say about this choice? The first point to make is that there is no reason to think that the lexical approach is any less stipulative than the syntactic approach. It involves different sorts of stipulations, but there is no reason to think that it requires any fewer stipulations. Probably the main difference is that the syntactic approach has a classification of overt constituents while the lexical approach has a classification of mainly phonologically empty elements. There is obviously no doubt about the existence of the elements that the syntactic approach classifies, but there is doubt about the existence of the elements that the lexical approach classifies. They are in fact rejected by most theoretical frameworks. The case for these elements is not very compelling. In absence of strong arguments for them, a syntactic approach of the kind developed in HPSG seems preferable to the kind of lexical approach that might be developed within Minimalism.[6]

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[6] See Borsley (2006) for further discussion of the issues, and see Borsley (2011) for a comparison of HPSG and Minimalist approaches to another unbounded dependency construction, the comparative correlatative.

6. Important differences 3: Movement/Internal Merge vs. SLASH

The preceding section compared Minimalist and HPSG approaches to the properties that distinguish various unbounded dependency constructions. In this section, I will compare their approaches to the property that these constructions share: the unbounded dependency.

For HPSG, unbounded dependencies involve the SLASH mechanism, originally developed by Gerald Gazdar (see e.g. Gazdar 1981). For Minimalism, they are a product of movement or more precisely Internal Merge. This is an operation which takes a complex expression and merges it with a copy of one of its constituents, giving structures of the following form:

(15)
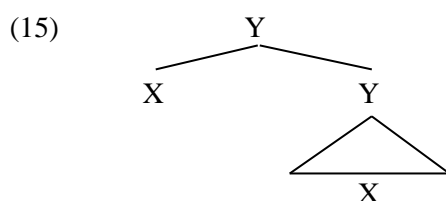
The lower X is deleted in PF. As an operation, this is unlike anything in HPSG. However, a declarative version of Minimalism could simply allow the kind of structures that are the output of Internal Merge. There are various ways in a declarative version of Internal Merge might be developed, some of which would make it quite similar to the SLASH mechanism. However, if it is not simply replaced by SLASH, it will differ from SLASH in two ways: (a) it is broader in scope and (b) it is less flexible.

Unlike SLASH, Internal Merge is assumed to be involved not just in unbounded dependency constructions but also in passives, unaccusatives, and raising sentences, such as the examples in (16).

(16) a. Kim [has been hit ~~Kim~~].
      b. Kim [has disappeared ~~Kim~~].
      c. Kim [seems [~~Kim~~ to be clever]].

Thus, Minimalism is committed to the claim that passives and unaccusatives like (16a) and (16b) have a gap in object position in the same way that unbounded dependencies with an object gap such as (17) have a gap in object position.

(17) Who did you think [Lee saw ___]?

Similarly, Minimalism is committed to the claim that subject raising sentences like (16c) have a gap in subject position in the same way that

unbounded dependencies with a subject gap such as (18) have a gap in subject position.

(18) Who do you think [___ saw Lee]?

There is no obvious evidence for these claims in English. If there is any evidence in other languages, this may just mean that they have rather different passive, unaccusative, or raising sentences.

We turn now to the inflexibility of Internal Merge. One aspect of this inflexibility is the following :

(19) With Internal Merge one expects to see a filler constituent in the tree matching a gap somewhere inside its sister.

Obviously, many unbounded dependency constructions conform to this expectation. But there are also many unbounded dependency constructions in which there is no visible filler. Consider e.g. the following :

(20) a. the book [Kim bought ___]
      b. Lee is too important [for you to talk to ___].
      c. Lee is important enough [for you to talk to ___].
      d. Kim is easy [for anyone to talk to ___].

Within Minimalist assumptions, it is more or less necessary to assume that such examples contain an invisible filler (a so-called empty operator). Unless there is some independent evidence for such invisible fillers, they are little more than an ad hoc device to maintain the Internal Merge approach.

Within the SLASH approach, there is no reason to think that there will always be a filler in an unbounded dependency construction. The top of a SLASH dependency takes the following form:

(21)   [SLASH { }]

                   / | \
              …   [SLASH {X}]   …
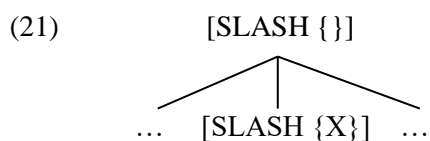
There is no reason why there should always be a filler as a sister of the [SLASH {X}] constituent. As is shown especially by Sag (1997, 2010), it is not difficult to accommodate unbounded dependencies in which there is no filler. I conclude, then, that unbounded dependencies with no filler cast doubt on Internal Merge but are no problem for SLASH.

Another aspect of the inflexibility of Internal Merge is the following:

(22) With Internal Merge one expects the gap to have all the properties of the filler.

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Most unbounded dependency constructions conform to this expectation, but there are cases where the filler and the gap don't match. An interesting example is what Arnold and Borsley (2010) call auxiliary-stranding relative clauses (ASRCs), which are exemplified by the following:

(23) a. Kim will sing, which Lee won't ___.
      b. Kim has sung, which Lee hasn't ___.
      c. Kim is singing, which Lee isn't ___.
      d. Kim is clever, which Lee isn't ___.
      e. Kim is in Spain, which Lee isn't ___.
      f. Kim wants to go home, which Lee doesn't want to ___.

Which in these examples appears to be the ordinary nominal *which*, but the gap is a VP in (a), (b), (c) and (f), an AP in (d), and a PP in (e). One response to these data might be to propose that *which* in such examples is not the normal nominal *which* but a pronominal counterpart of the categories which appear as complements of an auxiliary, mainly various kinds of VP. It is clear, however, that ordinary VP complements of an auxiliary cannot appear as fillers in a relative clause, as shown by the (b) examples in the following:

(24) a. This is the book, which Kim will read ___.
      b. *This is the book, [read which] Kim will ___.
(25) a. This is the book, which Kim has read ___.
      b. *This is the book, [read which] Kim has ___.
(26) a. This is the book, which Kim is reading ___.
      b. *This is the book, [reading which] Kim is ___.
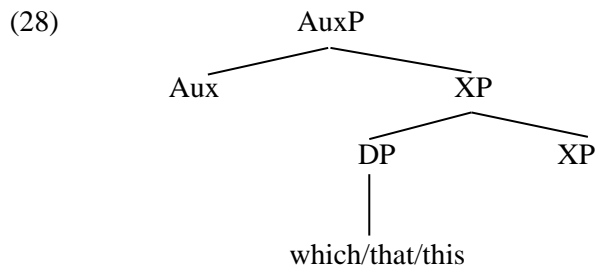
Thus, this doesn't seem a viable approach.

A further point to note is that there are also sentences rather like ASRCs with a topicalized demonstrative pronoun. Consider the following naturally occurring examples:

(27) a. They can only do their best and that they certainly will ___.
          (http://www.britishcycling.org.uk/web/site/BC/gbr/News200 8/ 200807018_Jamie_Staff.asp)

      b. Now if the former may be bound by the acts of the legislature, and this they certainly may ___, ...
          (Thomas Christie, *The Analytical Review, or History of Literature, Domestic and Foreign, on an Enlarged Plan*, Princeton University, 1792, p. 503)

      c. It was thought that he would produce a thought provoking chapter, and this he certainly has ___.

(J. B. Cullingworth (ed.), *British Planning: 50 years of Urban and Regional Policy*, Continuum International, 1999, p. 13)

It seems, then, that there is a serious challenge here.

In an Internal Merge approach one might try to accommodate the data by allowing the complement of an auxiliary to have a DP realized as *which* or *that* adjoined to it, as in (28).

(28)

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                   AuxP
              ┌─────┴─────┐
             Aux          XP
                     ┌─────┴─────┐
                    DP           XP
                    │
              which/that/this
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The complement would have to be deleted in this situation. However, it is not clear how one could ensure that deletion applies. Hence, it is not clear how one could exclude the following:

(29)   *Kim will sing, which Lee won't sing.

It is also not clear how one could ensure that a demonstrative introduced in such a structure is fronted. In other words, it is not clear how an example like the following, with or without *sing*, could be excluded:

(30)   *Kim will that/this (sing).

Thus, this doesn't look like a promising approach.

As Arnold and Borsley (2010) show, the type of mismatch between filler and gap that we see in ASRCs is no problem for the SLASH approach. It simply requires a special kind of gap. Gaps normally have the following feature-makeup.

(31)
$$\begin{bmatrix} \text{LOCAL}\,[1] \\ \text{SLASH}\,\{[1]\} \end{bmatrix}$$

However, as Webelhuth (2008) noted, there is no reason why we should not under some circumstances have what he calls a 'dishonest gap', one whose LOCAL value and SLASH value do not match. Developing this approach, Arnold and Borsley (2010) propose that when an auxiliary has an unrealized complement, the complement optionally has a certain kind nominal as the

value of SLASH, which is realized as relative *which* or a demonstrative. When SLASH has the empty set as its value, the result is an auxiliary complement ellipsis sentence. When SLASH has the nominal value, we have a dishonest gap because the value of LOCAL is whatever the auxiliary requires, normally a VP of some kind, and the result is an ASRC. Thus, filler–gap mismatches are problematic for Internal Merge but no problem for SLASH.

A further aspect of the inflexibility of Internal Merge is the following:

(32) With Internal Merge one expects there to be a gap in an unbounded dependency construction.

Perhaps this is normally the case, but in some circumstances in some languages there is not a gap but a resumptive pronoun (RP). Among many languages that are relevant here is Welsh, which has RPs in both *wh*-interrogatives and relative clauses, as the following illustrate:

(33) a. Pa   ddyn werthodd   Ieuan y ceffyl iddo   **fo**?
          which man   sell.PAST.3SG Ieuan the horse   to.3SGM he
          'Which man did Ieuan sell the horse to?'
      b. y dyn werthodd   Ieuan y ceffyl iddo   **fo**
          the man sell.PAST.3SG Ieuan the horse   to.3SGM he
          'the man that Ieuan sold the horse to'

Willis (2011) and Borsley (2010, 2013) present evidence that Welsh RPs involve the same mechanism as gaps. For example, Borsley (2010, 2013) notes that while it is not generally possible to have a gap in just one conjunct of a coordinate structure, it is possible to have a gap in both or a gap in one and an RP in the other. The following illustrate:

(34) *y   dyn [welais   i ___ a   gwelaist   tithau Megan]
        the man see.PAST.1SG I   and see.PAST.2SG you   Megan
      *'the man that I saw and you saw Megan'
(35) y   dyn [welais   i ___ a   gwelaist   tithau ___
        the man see.PAST.1SG I   and see.PAST.2SG you
      hefyd]
      too
      'the man that I saw and you saw too'
(36) y   dyn [welais   i ___ a   soniais   amdano
        the man see.PAST.1SG I   and talk.PAST.1SG about.3SGM
      fo]
      he
   'the man that I saw and talked about'

Within Minimalism this means that they must involve Internal Merge.

How could such examples involve Internal Merge? One suggestion, outlined in McCloskey (2006), is that rather than being deleted, the lower X is (somehow) turned into a pronoun.[7] One problem, as McCloskey (2002: 192) pointed out, is that this would make the fact that RPs look just like ordinary pronouns surprising.

Another approach takes advantage of the complexity of Minimalist structures and claims that there is a gap in the structure somewhere near the RP. A version of this approach is proposed for Welsh by Willis (2011). Willis suggests that a PP whose head has an RP as its object may have a coindexed operator in its specifier position, which undergoes movement.

(34)
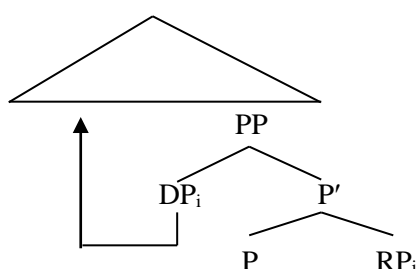
On this analysis RPs are ordinary pronouns. Hence, it is immune to the objection just advanced against an analysis in which RPs are the realization of copies left by Internal Merge. However, a question arises about the specifier position which it requires. In English, what Culicover (1999) calls sluice-stranding, exemplified by the following, seems to provide some support for a Spec PP position.

(35) a. Who with?
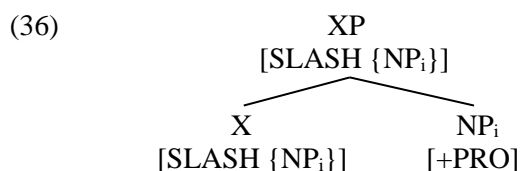   b. What about?
      c. Who for?

Welsh does not have examples like this. Hence, this approach seems rather dubious. There have been other attempts to combine a gap with an RP, but they also face problems (see Borsley 2013 for discussion). Thus, RPs seem problematic for Internal Merge.

Examples with an RP instead of a gap are no problem for the SLASH approach. Just as there is no reason why a non-empty SLASH should always be associated with a filler, so there is no reason why it should always be associated with a gap. We can assume that some languages allow certain heads that are [SLASH {NP}] to be associated not with a gap but with a pronominal sister coindexed with the value of SLASH (which must be

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[7] McCloskey (pc) emphasizes that this is not an approach he favours.

nominal for coindexing to be possible). In other words we can assume that they have structures of the following form:

(36)
$$
\begin{array}{c}
\text{XP} \\
[\text{SLASH } \{NP_i\}] \\
\diagup\diagdown \\
\text{X} \qquad\qquad \text{NP}_i \\
[\text{SLASH } \{NP_i\}] \qquad [+\text{PRO}]
\end{array}
$$

Borsley (2010, 2013) develops an analysis of Welsh RPs along these lines, in which prepositions and nouns, but not verbs and adjectives appear in structures of this kind. A verb or adjective with a non-empty SLASH value has an argument which is a gap or one which contains a gap or an RP, while a preposition or noun with a non-empty SLASH value has an argument which is a coindexed pronoun or one which contains a gap or an RP. This is a straightforward extension of standard HPSG analyses. Thus, examples with an RP instead of gap pose no problems for the SLASH approach.[8]

It seems, then, that all three of the example types that cast doubt on movement/Internal Merge are unproblematic for the SLASH approach. Hence the latter seems preferable.[9]

7. Conclusions

I have sought in this paper to compare and contrast Minimalism and HPSG and to show that the latter is more satisfactory. I have noted that the issues are clouded by rhetoric and that some of the distinguishing features of Minimalism seem inessential in that it would still be Minimalism without them. Others, however, are essential in that without them it would be a different framework. I have concentrated on two distinguishing features of the framework: (1) the fact that it is very lexically-based approach whereas HPSG is more syntactically-based, and (2) its use of Internal Merge in the analysis of unbounded dependencies where HPSG has the SLASH feature. I have argued that there is no reason to think that a system of generally invisible functional heads is preferable to a system of phrase types/constructions and that Internal Merge is less able than SLASH to accommodate the full range of unbounded dependency phenomena. I conclude that the comparisons favour HPSG.

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[8] For a slightly different HPSG approach to RPs, see Crysmann (2012, 2016).

[9] Levine and Sag (2003) show that multiple gap structure also pose problems for movement/Internal Merge but not for SLASH. For more discussion of the issues, see Borsley (2012).

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