Chapter 4

Comparative syntax: An HPSG perspective

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There has been little explicit discussion of comparative matters in the HPSG literature, but HPSG has a number of properties which make it relevant to comparative syntax. Firstly, it emphasizes detailed formal analyses, often incorporated into a computer implementation. This means that the framework provides firmer foundations than some other approaches for claims about individual languages and about language in general. Secondly, it stresses how little is really known about what is and is not possible in natural language syntax. Thirdly, it seeks to develop concrete analyses closely linked to the observable data, which keep the acquisition task as simple as possible and create as little need as possible for innate apparatus. These properties suggest that HPSG can make an important contribution to the comparative syntax.

1 Introduction

In what ways are languages alike in their syntax? In what ways can they differ? Comparative syntax seeks to answer these questions and perhaps to explain the answers that it arrives at. It has been a major focus of mainstream generative grammar (MGG)[1] since the emergence of the principles and parameters framework in the early 80s, and it has been a central concern of Ian Roberts (see e.g. Roberts 1997; 2007). However, the questions that define the field of comparative

[1]I take this term from Culicover & Jackendoff (2005), who define it as "the line research most closely associated with Noam Chomsky" (fn. 1, p. 3). It refers to a variety of different but related approaches. Like Culicover & Jackendoff I do not regard "mainstream" as a synonym for "correct".

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syntax are of interest not just to MGG but to any serious approach to syntax. In this paper, I will consider what the Head-Driven Phrase Structure Grammar (HPSG) framework can say about them. Although there has been work in HPSG on a variety of languages, there has not been much explicit discussion of comparative matters in the main HPSG literature. Typical papers say "here is a good way to deal with phenomenon P in language L" and not "here's an interesting way in which languages may differ". However, it is not too hard to spell out a view of comparative matters that is implicit in much HPSG work. Moreover, HPSG-based computational work has often been concerned with comparative issues, in particular with developing minimally different grammars for a variety of languages (see e.g. Müller 2015; Bender et al. 2010; Bender 2016), and this work is also of some relevance here. HPSG brings a number of ideas to the discussion of comparative syntax. One is a stress on the importance of firm empirical foundations in the form of detailed formal analyses. Another is an emphasis on how little we really know about what is and is not possible in natural language syntax. A third is an emphasis on the importance of developing concrete analyses which keep the acquisition task as simple as possible. I will discuss all of these in the following pages.

The paper is organized as follows. In §2, I look at the principles and parameters approach to comparative syntax and explain why proponents of HPSG are sceptical about it. Then in §3, I explain the main components of HPSG grammars: types, features, and constraints. In §4, I discuss the ways in which HPSG grammars may differ, and in §5, I pull together the main ideas about comparative syntax that I have introduced in the preceding sections. In §6 I conclude the paper.

2 Principles and parameters

For MGG, the ways in which languages are alike and the ways in which they may differ are a reflection of an innate language faculty. The properties they share are the result of innate principles, while the ways in which they may differ are defined by innate parameters. This position has been hugely influential over the last 25 years. However, it seems fair to say that these ideas, especially the idea of innate parameters, have not been as successful as was hoped when they were first introduced in the early 1980s.[2]

Outsiders have always been sceptical about these ideas. Thus, Pollard & Sag (1994: 31), after considering the possibility of incorporating parameters into HPSG, comment as follows:

[2]See Newmeyer (2005) and Haspelmath (2008) for relevant discussion.

> In the absence of a list, however tentative, of posited parameters and their range of settings, together with a substantial, worked-out fragment for at least one language, a specification of the settings for that language, and a reasonably detailed account of how those settings account for the array of facts covered in the fragment, we are inclined to view parameter-based accounts of cross-linguistic variation as highly speculative.

More recently, linguists who are less obviously outsiders have come to similar conclusions. Thus, Newmeyer (2005: 75) writes as follows:

> […] empirical reality, as I see it, dictates that the hopeful vision of UG as providing a small number of principles each admitting of a small number of parameter settings is simply not workable. The variation that one finds among grammars is far too complex for such a vision to be realized.

At least one Minimalist has come to much the same conclusion. Boeckx (2011) suggests that:

> some of the most deeply-embedded tenets of the Principles-and-Parameters approach, and in particular the idea of Parameter, have outlived their usefulness.

A major reason for scepticism about parameters is that estimates of how many there are seem to have steadily increased. Fodor (2001) considers that there might be just twenty parameters, so that acquiring a grammatical system is a matter of answering twenty questions. Newmeyer (2005: 44) remarks that "I have never seen any estimate of the number of binary-valued parameters needed to capture all of the possibilities of core grammar that exceeded a few dozen". However, Roberts & Holmberg (2005) comment that "[n]early all estimates of the number of parameters in the literature judge the correct figure to be in the region of 50–100". Clearly, a hundred is a lot more than twenty. This is worrying. As Newmeyer (2006: 6) observes,

> it is an ABC of scientific investigation that if a theory is on the right track, then its overall complexity decreases with time as more and more problematic data fall within its scope. Just the opposite has happened with parametric theory. Year after year more new parameters are proposed, with no compensatory decrease in the number of previously proposed ones.

The increasing numbers might not be a cause for concern if parameters were just seen as observations about how languages may vary, but if they are seen as part of an innate language faculty, it is worrying. It is just not clear how there could be so much that is innate. Moreover, a large number of innate parameters seems incompatible with the minimal conception of the language faculty that Chomsky has championed over the last decade or so.[3]

Scepticism about parameters is not a matter of saying that anything goes. It is also not a matter of rejecting any notion of an innate language faculty. After all, Chomsky argued for a language faculty for two decades before he formulated the idea of parameters, and there are more recent advocates of a language faculty who do not assume parameters, for example Culicover & Jackendoff (2005). Thus, one might reject the idea of parameters but still subscribe to the idea of an innate language faculty. However, neither evidence that there are universal properties of language nor evidence that variation is limited is necessarily evidence for an innate language faculty since there may be other explanations. Thus, Sag (1997: 478), echoing much earlier work, suggests that "… perhaps much of the nature of grammars can be explained in terms of general cognitive principles, rather than idiosyncratic assumptions about the nature of the human language faculty". In rather similar vein, Chomsky (2005: 9) advocates "…shifting the burden of explanation from the first factor, the genetic endowment, to the third factor, language-independent principles of data processing, structural architecture, and computational efficiency".

Probably most proponents of HPSG would remain agnostic about these matters. No doubt there are language universals and languages do not vary without limit, as Joos suggested. But most HPSG linguists would think that we do not have enough detailed formal analyses of enough phenomena in enough languages to have any firm conclusions about these matters. In the absence of such conclusions, it is not possible to say much about contributions of general cognitive principles and purely linguistic principles to grammatical phenomena.

3 The HPSG framework

HPSG emerged in the mid 1980s, building in various ways on earlier work, and it has since been employed in theoretical and computational work on a variety of languages.[4] It is a monostratal, constraint-based approach to syntax. As a monostratal approach, it assumes that linguistic expressions have a single constituent

[3] For further discussion of parameters and the problems they face, see Newmeyer (2017).

[4] As a referee has pointed out to me, many of the properties of HPSG that I highlight here are also features of Lexical Functional Grammar.

structure. This means that no constituent ever appears anywhere other than its superficial position and hence that it has nothing like the movement processes that are a feature of all versions of transformational grammar. The relations that are attributed to movement in transformational work are captured by constraints that require certain features to have the same value. For example, a raising sentence is one with a verb which has the same value for the feature SUBJ(ECT) as its complement. As a constraint-based approach, it assumes that grammars involve sets of constraints, and a linguistic expression is well-formed if and only if it conforms to all relevant constraints. There are no procedures modifying representations such as the Merge and Agree operations of Minimalism. For arguments in favour of such a declarative view of grammar, see e.g. Pullum & Scholz (2001), Postal (2003) and Sag & Wasow (2011; 2015).

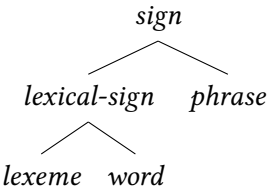
HPSG is also a framework which places considerable emphasis on detailed formal analyses of phenomena. Thus, it is not uncommon to find lengthy appendices setting out formal analyses. See, for example, Sag's (1997) paper on English relative clauses and especially Ginzburg & Sag (2000), which has a 50 page appendix. One consequence of this, alluded to above, is that HPSG has had considerable influence in computational linguistics.

A further important feature of HPSG is that it avoids abstract analyses with tenuous links to the observable data. Phonologically empty elements are only assumed if there is compelling evidence for them.[5] Thus, the fact that some English subordinate clauses contain a complementizer is not seen as evidence that there is a phonologically empty complementizer in subordinate clauses in which no complementizer is visible. Similarly, overt elements are only assumed to have properties for which there is clear evidence. The fact that many languages have a case system of some kind or some form of subject-verb agreement does not mean that they all do. This feature of HPSG stems largely from considerations about acquisition. Every element or property which is postulated for which there is no clear evidence in the data increases the complexity of the acquisition task and hence necessitates more complex innate machinery. This suggests that such elements and properties should be avoided as much as possible. It has important implications both for the analysis of individual languages and for how we see differences between languages.

[5]There may be compelling evidence for some empty elements in some languages. Thus, Borsley (2009: Sec. 8) argues that Welsh has phonologically empty pronouns. For general discussion of empty elements, see Müller (2016: Sec. 19.2).

For HPSG, a linguistic analysis is a system of types, features, and constraints.[6] Types provide a complex classification of linguistic objects, features identify their basic properties, and constraints impose further restrictions. The central focus of HPSG is signs. For Ginzburg & Sag (2000), the type *sign* has the subtypes *lexical-sign* and *phrase*, and *lexical-sign* has the subtypes *lexeme* and *word*. Thus, we have the following type hierarchy:

(1)



Both *lexeme* and *phrase* have a complex system of subtypes. In both cases, complex hierarchies mean that the framework is able to deal with broad, general facts, very idiosyncratic facts, and everything in between. I will say more about this below.

There are many other kinds of type. For example, there are types that are the value of fairly traditional features like PERSON, NUMBER, GENDER, and CASE. A simple treatment of person might have the types *first*, *second*, and *third*, and a simple treatment of number the types *sing*(*ular*) and *plur*(*al*).[7] Unlike the types mentioned above, these are atomic types with no features. There are also types that provide the value of various less familiar features. For example, HPSG has a feature HEAD, whose value is a *part-of-speech*, a type which indicates the part of speech of a sign and provides appropriate information, e.g. information about person, number, gender, and case in the case of nominal signs or finiteness in the case of verbal signs. Two other important features are SUBJ(ECT) and COMP(LEMENT)S, whose value is a list of *synsem* objects, combinations of syntactic and semantic information. The former, mentioned earlier, indicates what kind of subject a sign requires and the latter indicates what complements it takes. Obviously, there are plenty of opportunities here for languages to do things differently.

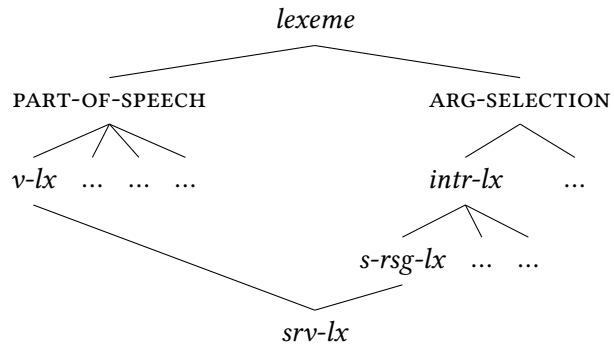
The type *lexeme* and its subtypes and the associated constraints are the core of the lexicon. In much HPSG work *lexeme* has two distinct sets of subtypes, one

[6]The related but slightly different framework, Sign-Based Construction Grammar, has a further major element, namely constructions. For SBCG signs are defined in terms of constraints on constructions, whereas standard HPSG has constraints applying directly to signs. SBCG is more complex in some respects but simpler in others. In particular, it has a simpler notion of sign and is able to dispense with a number of features and types which are assumed in HPSG. See Sag (2010; 2012) for discussion.

[7]In practice a more complex system of values may well be appropriate.

dealing with part-of-speech information and one dealing with argument selection information. Here is a simple illustration based on Ginzburg & Sag (2000: 20):

(2)



Small capitals are used for the two dimensions of classification, and *v-lx*, *intr-lx*, *s-rsg-lx*, and *srv-lx* abbreviate *verb-lexeme*, *intransitive-lexeme*, *subject-raising-lexeme*, and *subject-raising-verb-lexeme*, respectively. All these types will be subject to specific constraints. For example, *v-lx* will be subject to something like the following constraint:

(3) $$\textit{v-lx} \rightarrow \begin{bmatrix} \textsc{head} & \textit{verb} \\ \textsc{subj} & \langle \textsc{xp} \rangle \end{bmatrix}$$

This says that a verb lexeme has a verbal part of speech and requires a phrase of some kind as its subject. Similarly, we will have something like the following constraint for *s-rsg-lx*:

(4) $$\textit{s-rsg-lx} \rightarrow \begin{bmatrix} \textsc{subj} & \langle \boxed{1} \rangle \\ \textsc{comps} & \langle \textsc{subj} \langle \boxed{1} \rangle \rangle \end{bmatrix}$$

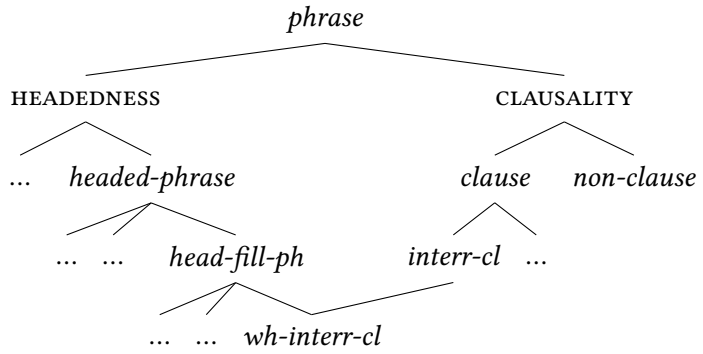
This says that a subject-raising-lexeme has a subject and a complement, and the subject is whatever the complement requires as a subject. Most of the properties of any lexeme will be inherited from its supertypes. Thus, very little information needs to be associated with specific lexemes in a system like this.

The lexicon is important for HPSG, and it has been the focus of much research. However, it is not as important as it is for Minimalism. In Minimalism, the syntax is just a few very general mechanisms – Merge, Agree, Copy – and how they operate is determined by the properties of lexical items. Hence, the lexicon is absolutely central. In HPSG, as explained below, the syntax is a complex system

of types and constraints. Hence the lexicon is rather less central than it is in Minimalism.

The type *phrase* and its subtypes and the associated constraints are central to the syntax of the language. It is widely assumed that type *phrase* has two distinct sets of subtypes, one dealing with headedness information and one dealing with clausality information. Here is a simple illustration:

(5)



Head-fill-ph, *interr-cl*, and *wh-interr-cl* are abbreviations for *head-filler-phrase*, *interrogative-clause*, and *wh-interrogative-clause*, respectively. Other subtypes of *headed-phrase* are *head-complement-phrase* (for combinations of a word and its complements) and *head-subject-phrase* (for combinations of a phrase and its subject), and other subtypes of *head-filler-phrase* include *wh-relative-clause*. Again, all the types will be subject to appropriate constraints. For example, *headed-phrase* will be subject to a constraint requiring it to have a head daughter with which it shares certain properties. This system allows all sorts of generalizations to be captured. Properties that are shared by all phrases can be captured by a constraint on *phrase*, properties that are shared by all headed-phrases by a constraint on *headed-phrase*, properties that are shared by all head-filler-phrases by a constraint on *head-fill-ph*, and so on.

Among other things, constraints on the various phrasal types provide information about what daughters they have. However, they don't say anything about the order of the daughters. This is the province of a separate set of constraints. Obviously, this is an area in which languages may differ.

An HPSG syntactic analysis is quite complex, especially compared with Minimalism, for which, as we have noted, syntax is just a few very general mechanisms. However, it is not as complex as the base component of an *Aspects*-style grammar (Chomsky 1965) nor as the kind of grammar proposed within the earlier Generalized Phrase Structure Grammar (GPSG) framework (Gazdar et al. 1985)

Both approaches involve many different rules for combinations of a head and its complement, a set of rules for VPs, a set for PPs, and so on. Most HPSG work has a single *head-complement-phrase* type with no subtypes. This raises the question: when do we need to postulate a phrasal type? There are, of course, various different kinds of head-complement-phrase, but there is no need for any subtypes. A verb-phrase is just a head-complement-phrase headed by a verb with certain properties stemming from its head, while a prepositional phrase is just a head-complement-phrase headed by a preposition, again with certain properties stemming from its head. We can say the following:

> A phrasal type is necessary whenever some set of phrases have properties which do not follow either from the more general types which they instantiate or from the lexical items that they contain.

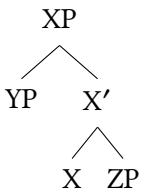
This might lead one to wonder whether a *wh-interrogative-clause* type is necessary. One point to emphasize here is that a *wh*-interrogative-clause is not just a head-filler-phrase with a *wh*-phrase as the filler. The *wh*-phrase must have the immediately containing clause as its scope. This is unlike the situation in languages with so-called partial *wh*-movement. Consider, for example, the following German example from McDaniel (1989).

(6) German
Was glaubt Hans [[mit wem] Jakob jetzt spricht]?
what believes Hans with whom Jakob now speaks
'What does Hans think Jacob is speaking to now?'

Here the *wh*-phrase is in the subordinate clause, but, as the translation makes clear, the scope of the *wh*-word *wem* is the whole sentence. It is also necessary to ensure that English *wh*-interrogatives have a pre-subject auxiliary if and only if it is main clause. It may be possible to capture these facts without postulating a *wh-interrogative-clause* type, but it is not easy.

At least this is not easy if phonologically empty elements are not freely available. If such elements are freely available, it may well be possible to attribute the facts to the properties of a phonologically empty head. This is essentially the approach which is taken in Minimalism, in which head-filler-phrases involve structures of the following form, where X is C(omplementizer) or one of the elements that replaces it in work stemming from Rizzi (1997), e.g. Force, Top(ic), Foc(us).

(7)



The idea seems to be that the properties of X ensure that the specifier YP and the complement ZP have the right properties. However, this idea never seems to be developed in any detail. A detailed development would involve precise lexical descriptions for the various empty heads. The sort of thing that is necessary was developed in some early HPSG work. Pollard & Sag (1994: Ch. 5) outlined an approach to English relative clauses involving a number of empty heads (an approach which was abandoned in Sag 1997). One of these heads has the following description:

(8)
$$\left[\begin{array}{l}\textsc{local}\left[\begin{array}{ll}\textsc{cat} & \left[\begin{array}{ll}\textsc{head} & \left[\textsc{mod}\ \textsc{n}'\ \left[\textsc{to-bind}|\textsc{rel}\ \{\boxed{1}\}\right]:\left[\begin{array}{l}\textsc{index}\ \boxed{1}\\ \textsc{restr}\ \boxed{3}\end{array}\right]\right]\\ \textsc{subcat} & \left\langle\left[\textsc{loc}\ \boxed{4},\ \textsc{inher}\mid\textsc{rel}\ \{\boxed{1}\}\right],\right.\\ & \left.\textsc{s}\left[\textit{fin, unmarked,}\ \textsc{inher}\mid\textsc{slash}\ \{\boxed{4}\}\right]:\boxed{5}\right\rangle\end{array}\right]\\ \textsc{content} & \left[\begin{array}{l}\textsc{index}\ \boxed{1}\\ \textsc{restr}\ \{\boxed{5}\cup\boxed{3}\}\end{array}\right]\end{array}\right]\\ \textsc{nonlocal}|\textsc{to-bind}|\textsc{slash}\ \{\boxed{4}\}\end{array}\right]$$

This interacts with certain phrase types to give a structure like (7). It is complex, but each component of it has a purpose. The MOD feature indicates that the maximal projection of this element modifies an N′. The SUBCAT feature indicates that it combines with a specifier containing a relative pronoun and a complement which is a finite clause with no complementizer but a non-empty SLASH feature ensuring that it contains a gap.[8] This feature also ensures that the specifier has the properties in the value of SLASH. The CONTENT feature ensures that the content of this element brings together the content of the modified N′ and the relative clause. Various principles of HPSG ensure that the combination of N′ and relative clause has the content of the empty head.[9] As noted above, this approach has been abandoned, but it gives some idea of what is involved in giving an explicit analysis of the kind of empty head that is central to the Minimalist approach to head-filler-phrases. It may be that Minimalist empty heads will have

[8]The SUBCAT feature does work that is done by separate SUBJ and COMPS features in later work. SLASH does the work that is done in MGG by A′-movement. For arguments that the SLASH mechanism provides a better account of the phenomena, see Borsley (2012).

[9]The TO-BIND features ensure that the REL and SLASH features do not appear any higher in the tree than they should.

simpler descriptions, but until such descriptions have been developed, we cannot really know.

Within Minimalism it is not just head-filler-phrases whose properties have to be derived in some way from a typically empty head. English clauses without an auxiliary have an empty T head, and English nominal constituents without a visible determiner have an empty D head. Thus, empty heads of various kinds are central to Minimalism. This is a reflection of the fact noted earlier that the syntax for Minimalism is just a few very general mechanisms. Minimalism is a bit like a version of HPSG with just two phrase types, an External Merge type and an Internal Merge type.[10] It follows that the real work must be done by lexical elements and often by empty lexical elements. Oddly, however, very little attention has been paid to the properties of these elements.[11]

If empty elements are only postulated when there is compelling evidence for them, there is no possibility of deriving the properties of different phrase types from various invisible heads. Hence, a fairly complex syntax is more or less inevitable. However, this need not be a problem for acquisition if the analysis is a fairly direct reflection of the observable data, as it is in HPSG.

As we have noted, a typical HPSG analysis will have a number of other subtypes of *head-filler-phrase*. Consider the following examples:

(9) the book [which I am writing]

(10) What an interesting book this is!

(11) The more I read, the more I understand.

The bracketed material in (9) is a *wh*-relative, (10) is a *wh*-exclamative, and (11) is what has often been called a comparative correlative, a construction whose component clauses have been called *the*-clauses, e.g. in Borsley (2011). We have three types of head-filler phrases each with various distinctive properties. *Wh*-relatives may contain *who* and *which* but not *what*. *Wh*-exclamatives may only contain *what a*(*n*) or *how*. Neither allows an auxiliary before the subject. Finally, *the*-clauses must contain *the* and a comparative word. The second clause but not the first may contain a pre-subject auxiliary:

(12) a. The more I read, the more do I understand.

b. * The more do I read, the more I understand.

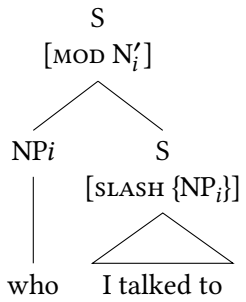
[10] For further discussion of the relation between the two approaches, see Müller (2013).

[11] Newmeyer (2005: 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."

For HPSG, these facts can be handled by constraints on three additional subtypes: *wh-relative-clause*, *wh-exclamative-clause*, and *the-clause*. See Ginzburg & Sag (2000) and Sag (2010).

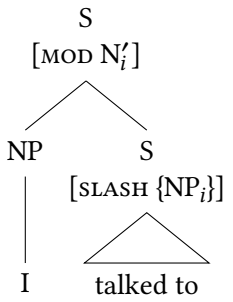
English also has relative clauses with no visible relative pronoun. One might propose that such relative clauses have a phonologically empty relative pronoun. But, as we have noted, HPSG only assumes such elements if there is compelling evidence for them. In the absence of clear evidence for such an element, this is just an ad hoc way of minimizing differences between constructions. It is not difficult to provide an analysis which does not involve an empty element. For HPSG, as indicated earlier, relative clauses have a feature MOD, whose value indicates what type of nominal phrase they modify. In a *wh*-relative clause, the value of MOD is coindexed with the relative pronoun, as in (13):

(13)



The value of SLASH matches the filler and hence has the same index.[12] In a non-*wh*-relative clause, the value of MOD is coindexed directly with the value of SLASH, as in (14):

(14)



This just requires a type *non-wh-relative-clause* with an appropriate constraint. See Sag (1997) for discussion.

[12] In a more complex example such as the following, where the relative pronoun is just part of the filler, the value of SLASH and the relative pronoun will have different indices:

(i) whose brother I talked to

4 HPSG and language variety

An HPSG linguistic description involves types, features, and constraints, and languages may differ in any of these areas. Some types, features, and constraints will no doubt be universal, but others will be language-specific. The more general types such as *sign*, *lexical-sign*, *word*, *lexeme*, and *phrase* will probably occur in all languages with the same features, but many others are likely to be language-specific or to have language-specific features.

The types that are the value of various traditional features will differ from language to language for obvious reasons. Languages differ in how many genders and cases they have. Therefore, the features GENDER and CASE will differ in what types they have as possible values. Languages may also differ in whether or not they have these features. Only some languages have grammatical gender and only some languages show morphological case. Of course, it is possible to assume an abstract notion of CASE present in languages whether or not they have morphological case, but this complicates the acquisition task and necessitates more complex innate machinery than would otherwise be needed. It is probably not a position that would find favour outside MGG.[13]

A question that arises here is whether languages have the same GENDER and CASE feature if they have very different systems of values. Does a language with two genders have the same GENDER feature as one with ten? Probably most researchers would think that they do, but there is room for debate here. Of course, questions like this are not peculiar to HPSG but arise in any theoretical framework.

Within HPSG, whether or not a language has case is first and foremost a question of whether the type *noun* has CASE among its features. But there is another question here: does the type *adj* have CASE among its features? In some languages that have morphological case it is clearly a property of adjectives as well as nouns. Consider e.g. German or Arabic. But in other languages with morphological case, it does not extend to adjectives. The North-East Caucasian language Archi is a relevant example (see Bond et al. 2016 for discussion). Similar issues arise with gender. If a language has gender, then the type *noun* has GENDER among its features, but it may or not be a feature of other types such as *adj* or *verb*.

What about other features, e.g. the HEAD feature? This will probably have a large number of values (but not so many as it would have within Minimalism, where numerous "functional" parts of speech have been postulated, e.g. Force,

[13] An abstract notion of case (or Case) played an important role in the government and binding framework, but it seems to be of little importance within Minimalism and it has not been adopted outside MGG.

Top(ic), and Foc(us) mentioned earlier). It is likely, however, that there will be some variation from language to language. Of course, just as there are questions about whether different languages can have the same GENDER and CASE features, so there are questions about whether they can have the same *noun*, *verb* and *adjective* types. Haspelmath (2010) thinks not. However, most HPSG linguists seem to assume they can, and this view is defended in Müller (2015: Sec. 2.2).

The questions that we have just highlighted arise in any theoretical framework. However, it is possible to sidestep them in a framework that does not emphasize formal analyses. HPSG with its emphasis on detailed formal analysis makes this more or less impossible.

The lexicon is obviously a major area in which languages differ. For Minimalism it is the only area in which differences may reside (a position often referred to as the Borer–Chomsky conjecture). This is an automatic consequence of the fact, highlighted earlier, that all the real work is done by lexical entries within Minimalism. This is not the case within HPSG given the important role of the system of phrasal types and associated constraints. However, for HPSG, many differences between languages are a lexical matter.

Most obviously, the same meaning will generally be associated with different phonological properties in different languages. English has *dog* where Welsh has *ci* and Polish has *pies*. Clearly, however, there can be other differences. A meaning may be associated with different HEAD values in different languages. Thus, for example, the Welsh counterpart of the modal verb *must* is the noun *rhaid* "necessity", as in (15).

(15) Welsh
Rhaid i mi adael.
necessity to me leave.INF
'I must leave.'

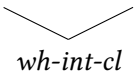
Clearly, such contrasts are common. The same meaning may also have different selectional properties in different languages. It is clear that the selectional properties of a word are predictable to a considerable extent from its semantics. However, there is quite a lot of room for variation. Where one language has an NP with one case, another language may have an NP with a different case, or a PP. Similarly, where one language has a finite clause, another may have a non-finite clause, or some kind of nominalized clause. Within HPSG, what case subjects have is also commonly seen as a matter of selection. In some languages, all subjects or all subjects of finite verbs may have nominative case, but in other languages there are other possibilities.

Turning to syntax, we emphasized above that HPSG only postulates empty elements when there is compelling evidence for them. This has obvious implications for comparisons between languages. If empty elements are not freely available, there is no possibility of saying that languages are much the same but look different because elements that are overt in one are empty in others. It follows that we should expect substantial differences between languages in this area.

The central question here is: how far can languages vary in the phrasal types that they employ and the constraints to which they are subject? Probably all languages will have the type *headed-phrase* and *head-complement-phrase* as one of its subtypes. Perhaps they will also have the types *head-subject-phrase* and *head-filler-phrase*. But this may not be the case. Moreover, if two languages have the same type, it may well have different subtypes from language to language.

As noted above, it may be that all languages will have the type *head-filler-phrase*. But it is clear that languages will differ in what subtypes of *head-filler-phrase* they have. A *wh*-in-situ language will not have *wh-interrogative-clause* among the subtypes of *head-filler-phrase*. Since *wh*-interrogatives have the same structure as ordinary clauses in such languages, they will probably have a type *wh-interrogative-clause* which is a subtype of *head-subject-phrase*, giving the following situation:

(16)



One might wonder here whether phrasal types that have different supertypes (and are subject to different constraints) can really be viewed as the same type. I will not try to decide this question.

As we noted above, another subtype of *head-filler-phrase* in English is *wh-relative-clause*. It seems, however, that most languages have relative clauses with no sign of a fronted relative pronoun. One might propose that relative clauses in such languages have a phonologically empty relative pronoun. But, as emphasized above, this is not a move that would find favour in HPSG. In the absence of any concrete evidence for such an element, it is just an ad hoc way of minimizing differences between languages. Thus, whereas English has both a *wh-relative-clause* type and a *non-wh-relative-clause* type, many languages seem to just have the latter.

As also noted earlier, another subtype of *head-filler-phrase* is required to accommodate the two clauses in comparative correlatives such as the following:

(17) The more I read, the more I understand.

Other languages have broadly similar constructions.[14] Consider e.g. French and Spanish:

(18) French
Plus je lis, plus je comprend.
more I read more I understand
'The more I read, the more I understand.'

(19) Spanish
Cuanto más leo, (tanto) más entiendo.
how.much more I.read that.much more I.understand
'The more I read, the more I understand.'

In the French construction, there is no counterpart of *the*, while the Spanish construction has two different elements, *cuanto* 'how-much' and *tanto* 'that-much', the latter being optional. Maybe both languages will have the same subtype of *head-filler-phrase* (though a different name might be appropriate) but the subtype will be subject to somewhat different constraints. In some languages, the second clause need not be a head-filler-phrase. One such language is Dutch, with examples like the following:

(20) Dutch
Des te meer je leest, je begrijpt des te minder.
the.GEN TE more you read you understand the.GEN TE less
'The more you read the more you understand.'

Thus, broadly similar constructions may differ in important ways and pose various analytic challenges.[15]

As noted above, the type *headed-phrase* has a number of subtypes. In addition to those mentioned, there is a *head-adjunct-phrase* type required for adjective and nominal combinations such as *old men* and verb-phrase and adverb combinations such as *walk slowly*. It may be that another subtype is necessary for verb-initial clauses such as (21).

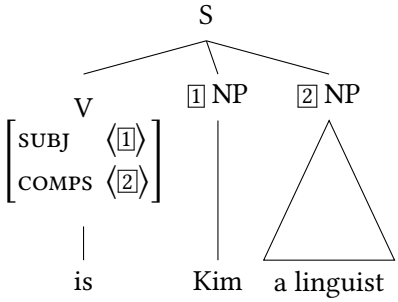
[14] This is noted by den Dikken (2005: 498), who claims that the construction is "analyzable in keeping with the principles and parameters of UG". However, he does not provide an analysis. See Abeillé & Borsley (2008) for critical discussion.

[15] For further discussion and analyses of the French and Spanish constructions, see Abeillé et al. (2006); Abeillé & Borsley (2008).

(21) Is Kim a linguist?

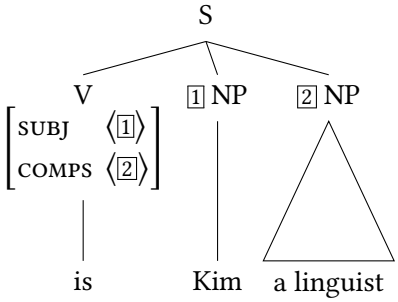
HPSG rejects the view that all branching is binary and generally assumes a ternary branching analysis for such clauses.[16] An obvious approach is one in which both the subject and the complement are sisters of the verb, as in the following structure:

(22)



This approach requires an additional subtype of *headed-phrase*, which can be called *head-subject-complement-phrase*, with an appropriate constraint. But there is an alternative approach to verb-initial clauses, in which the verb takes two complements and no subject, giving a structure like the following:

(23)



This is an ordinary head–complement structure, but it requires special lexical descriptions for auxiliary verbs. These can be derived from the standard lexical descriptions by a lexical rule. The first of these approaches is adopted in Ginzburg & Sag (2000: 36), while the second approach is assumed in Sag et al. (2003: 410). One possibility is that the two approaches are relevant to different languages. Thus, Borsley (1995) argues that the first approach is right for verb-initial clauses in Syrian Arabic, while the second is appropriate for verb-initial clauses in Welsh.

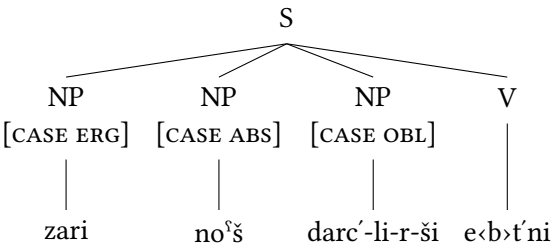
[16] The arguments for the binary branching restriction have never been very persuasive, see e.g. Culicover & Jackendoff (2005: 112–116).

One further point to note here is that a structure in which both the subject and the complement (or complements) are sisters of the verb is potentially relevant not just to clauses in which verb and complement(s) are separated by the subject but also to clauses in which they are adjacent. That is, there may be SVO or SOV clauses in which there is a flat structure and no VP. Thus, Borsley (2016) argues that such an analysis is appropriate for SOV clauses in Archi. On this analysis, (24) has the schematic analysis in (25).

(24) Archi

zari no$^{\text{ʕ}}$š darc′-li-r-ši e‹b›t′ni.
1SG.ERG horse.III[SG.ABS] post-OBL.SG-CONT-ALL ‹III.SG›.tie.PFV
'I tied the horse to the post.'

(25)



Thus, the fact that V and O are normally adjacent in some language does not necessarily mean that they form a VP constituent.

A more general point that we should make here is that it is important not to assume too quickly that something that looks rather like an English realization of a specific phrase type is just another realization of that type. For HPSG, English subject-initial clauses are realizations of a *head-subject-phrase* type. Arabic also has subject-initial clauses, e.g. the following:

(26) Arabic

T-tullaab-u qaabaluu /*qaabala Aħmad-a.
the-students-NOM met.3PL.M met.3SG.M Ahmad-ACC
'The students met Ahmad.'

One might assume that these are head-subject-phrases. However, another possibility is that they are verb-initial clauses with an initial NP topic and hence head-filler-phrases. This might seem dubious initially. The verb in a subject-initial clause shows full agreement for person, gender, and number. The situation is different in verb-initial clauses, as the following shows:

(27) Arabic
qaabala / *qaabaluu T-tullaab-u Aħmad-a.
met.3SG.M met.3PL.M the-students-NOM Ahmad-ACC
'The students met Ahmad.'

Here, we have partial agreement, agreement for person and gender but not number. This might be seen as evidence against the idea that subject-initial clauses are clauses with an initial topic. Consider, however, an example with an initial topic interpreted as subject of a subordinate clause:

(28) Arabic
T-tullaab-u ʔiqtaraħtu [ʔan yušaarikuu /
the-students-NOM suggested.1SG.M that participate.3PL.M
*yušaarika fii l-musaabaqat-i].
participate.3SG.M in the-competition-GEN
'The students I suggested participate in the competition.'

The complementizer *ʔan* only introduces verb-initial clauses. Hence the subordinate clause here is a verb-initial clause, but it shows full agreement. This seems surprising. However, the problem disappears if we assume that the clause has a null pronominal subject coindexed with a preceding topic. Null subject sentences, which I assume have a null pronominal subject, show full agreement. Thus, the following can only have the meaning indicated and cannot mean that they met Ahmad:

(29) Arabic
laqad qaabala Aħmad-a.
indeed met.3SG.M Ahmad-ACC
'He met Ahmad.'

Essentially the same analysis can be applied to (26). That is, it too can be analysed as involving an initial topic coindexed with a null pronominal subject. If this is right, (26) is not a head-subject-phrase but a head-filler-phrase.[17] Maybe Arabic has some other kinds of head-subject-phrase or maybe it has no head-subject-phrases at all.

We should now say something about word order. For HPSG, as for some other frameworks, some word order differences between languages are not very important. We noted earlier that constraints on the various phrasal types provide information about what daughters they have, but say nothing about the order of the

[17] This argument is taken from Alotaibi & Borsley (2013).

daughters, which is the province of a separate set of constraints. It follows that head-initial and head-final languages may have head-complement-phrases that are identical apart from word order. This contrasts with the situation in Kayne's (1994) antisymmetry version of MGG in which complement-head order is the product of a movement process and hence more complex than head-complement order. The HPSG position is more like that of versions of MGG that assume a directionality parameter. However, unlike such approaches, HPSG does not assume that a language will linearize all head-complement structures in the same way. Hence, there is no problem with a language like Finnish, which has verb-object order but postpositions, or a language like Persian, which has object-verb order but prepositions. Such languages will have two different linear precedence constraints, while languages which order all head-complement structures in the same way will have just one. Hence the latter are simpler in this area, and this makes it unsurprising that they are more common.[18]

The fact just highlighted means that SVO and SOV languages may have VPs licensed by the same *head-complement-phrase* type. VSO languages are different if they have either of the analyses in (22) and (23). (On the analysis in (23) the clause is a head-complement-phrase but it is not an ordinary VP.) However, there is an alternative approach which might be taken to VSO clauses. Much work in HPSG has proposed that linear order is a reflection not of the constituent structure of an expression but of a separate system of order domains (see Reape 1992; Müller 1996; Kathol 2000). Within this approach, the constituent structure of an expression is encoded as the value of a DTRS (DAUGHTERS) feature and the order domain as the value of a DOM(AIN) feature. Adopting it, one might propose that the Welsh VSO sentence in (30) has the schematic analysis in (31).

(30) Welsh
Gwelodd Emrys y ddraig.
see.PST.3SG Emrys the dragon
'Emrys saw the dragon.'

(31)
$$\begin{bmatrix} \textsc{synsem} & S \\ \textsc{dtrs} & \langle [\textit{Emrys}], [\textit{gwelodd y ddraig}] \rangle \\ \textsc{dom} & \langle [\textit{gwelodd}], [\textit{Emrys}], [\textit{y ddraig}] \rangle \end{bmatrix}$$

On this analysis Welsh has finite VPs just like English. One could propose essentially the same analysis for verb-initial clauses in a language in which the

[18] Essentially this point was made by Fodor & Crain (1990) in a discussion focusing on the earlier GPSG framework.

existence of finite VPs is uncontroversial, e.g. English. In Borsley (2006), I argue against an analysis of this kind for Welsh and in favour of an analysis of the kind in (23). It could be, however, that the approach in (31) is appropriate for other VSO languages or for verb-initial clauses in some language of other types.

Even if order domains are not appropriate for Welsh VSO clauses, they provide a plausible approach to various other phenomena. For example, they might be used to provide an account of extraposed relative clauses, such as (32), which might have the analysis in (33).

(32) A man came in who looked like Chomsky.

(33)
$$\begin{bmatrix} \textsc{synsem} & S \\ \textsc{dtrs} & \langle [\textit{a man who looked like Chomsky}], [\textit{came in}] \rangle \\ \textsc{dom} & \langle [\textit{a man}], [\textit{came in}], [\textit{who looked like Chomsky}] \rangle \end{bmatrix}$$

Alternatively, however, one might assume that such examples are rather like head-filler-phrases but with the filler constituent on the right.

Order domains seem most plausible as an approach to the sorts of discontinuity that are found in so-called nonconfigurational languages such as Warlpiri.[19] However, they may well have a role to play in more familiar languages. Exactly how much of a role they play in syntax is an unresolved matter.

The preceding remarks illustrate the fact that there are often a number of plausible approaches to some syntactic phenomenon. This means that it is not easy to know what the right analysis is and that it is hard to be confident that one has the right analysis for any phenomenon. Deciding on an analysis is somewhat easier if you subscribe to a theoretical framework which limits the range of possible analyses, e.g. by excluding more than binary branching or by insisting with Kayne (1994) that there is a universal specifier-head-complement order. The first restriction is generally accepted within Minimalism, and the second quite widely accepted. Outside Minimalism, however, the view is that there is little motivation for them. Whatever framework one subscribes to, there are many unresolved issues, even in a language like English, which has been studied by numerous syntacticians over many decades. Naturally, there are many more such issues in languages which have a lot less attention. All this means that there is little basis for strong claims about language universals or the extent to which languages may vary.

[19] See e.g. Donohue & Sag (1999).

5 Further discussion

The previous section ended on what might be seen as a negative note. It seems to me that this is a realistic assessment, but some researchers have painted a much rosier picture. Not so long ago, Baker (2001) commented that: "We are approaching the stage where we can imagine producing the complete list of linguistic parameters, just as Mendeleyev produced the (virtually) complete list of natural chemical elements" (Baker 2001: 50). It is not clear that many would share this optimism now. In any event, I do not see how this could be justified. We could only be confident about any set of proposals about parameters if we had detailed formal analyses for a wide range of languages employing them. There are of course proposals about many phenomena in many languages, but the detail and precision is generally lacking. Thus, Culicover & Jackendoff (2005: 535) comment that "much of the fine detail of traditional constructions has ceased to garner attention".

The limited nature of our knowledge is sometimes recognized within MGG. Thus, Chomsky (1995: 382, fn. 22) remarks that: "… we still have no good phrase structure theory for such simple matters as attributive adjectives, relative clauses, and adjuncts of different types". No doubt there has been some progress since 1995, but there are clearly still many unresolved issues about these phenomena both in English and in other languages. Obviously, other languages are very important here. The vast majority of languages have had a fraction of the attention that has been lavished on English. If other languages were broadly similar to English, this might not matter, but it is hard to deny that there are major differences. I highlighted a number of differences in the previous section, but it may be that languages can differ even more fundamentally from English. Koenig & Michelson (2014) argue that Oneida has no standard syntactic features. In similar vein, Gil (2005; 2009) argues that Riau Indonesian has no parts of speech, almost no function words, and virtually no morphology.[20] It is possible that someone will be able to show that these languages are less different from familiar languages than they appear, but at present they suggest that language variety is rather greater than is often suggested. We may eventually have a firm basis for claims about language universals and the extent to which languages may vary, but currently this seems a long way off. So at least it seems to most people within HPSG.

Another feature of HPSG, alluded to above, which is very relevant in the present context is the emphasis on the importance of firm empirical foundations in the form of detailed formal analyses of the kind advocated by Chomsky in *Syntactic structures*. Whereas MGG typically offers sketches of analyses which might

[20] But see Yoder (2010) some critical discussion.

be fleshed out one day, HPSG commonly provides detailed analyses which can be set out in an appendix. As noted above, Ginzburg & Sag (2000), which sets out its analysis of English interrogatives in a 50 page appendix, is a notable example. Arguably one can only be fully confident that a complex analysis works if it is incorporated into a computer implementation. Hence, computer implementations of HPSG analyses are quite common. Particularly important here is the CoreGram project reported in Müller (2015), which seeks to develop computational grammars for a diverse range of languages. Among other things, this permits a fairly precise measure of how similar or how different grammars are, in terms of shared constraints or shared lines of code. Analyses that are not implemented or are only partly implemented can be very valuable, but it seems likely that implemented analyses will be increasingly important in syntax, and that includes comparative syntax.

A further important feature of HPSG, highlighted above, is its avoidance of abstract analyses with elements or properties for which there is no clear evidence in the data. There may be real evidence for such elements and properties, but research in HPSG suggests that they are generally unnecessary. For example Ginzburg & Sag (2000) can be seen among other things as a demonstration that English interrogatives do not require either movement processes or abstract structures, and much the same can be said of Sag (1997) and English relative clauses. As was emphasized above, grammars that are quite closely related to the observable data pose less of a problem for acquisition than grammars that are more abstract and hence create less need for some innate apparatus. This is surely something that anyone should view as a good thing.[21]

As noted above, this outlook on grammar construction entails that the fact that many languages have some element or property should not be seen as evidence that they all do. Many languages have case and many languages have agreement, but it does not follow that they all do. In much the same way, many birds fly, but it does not follow that they all do, even those such as ostriches and penguins which never seem to get off the ground. As Müller (2015: 25) puts it, "grammars should be motivated on a language-specific basis." Does this mean that other

[21]One might think that the acquisition task is fairly simple if languages have essentially the same structures differing only in what is and what is not visible. But this seems doubtful. As Fodor (2001: 765) puts it, "It is clear now that even if the structural scaffolding of sentences is everywhere fixed and the same, any particular sentence may be highly ambiguous with respect to how its words are attached to that scaffolding." Essentially, the more complex the structure of sentences is and the more invisible material it may contain, the harder it is for the learner to determine where anything is. As Fodor (2001: 763) comments, on this view, "natural language design is extremely cruel to children".

languages are irrelevant when one is investigating a specific language? Clearly not. As Müller also puts it,

> In situations where more than one analysis would be compatible with a given dataset for language X, the evidence from language Y with similar constructs is most welcome and can be used as evidence in favor of one of the two analyses for language X. (Müller 2015: 43)

In practice, any linguist working on a new language will use apparently similar phenomena in other languages as a starting point. It is important, however, to recognize that apparently similar phenomena may turn out on careful investigation to be significantly different. I made this point in the last section in connection with subject-initial clauses in Modern Standard Arabic. Arabic comparatives provide a rather different illustration.

Like many languages, Modern Standard Arabic has simple comparatives with a comparative form of an adjective and complex comparatives with two separate elements:

(34) Arabic

a. heya ʔaTwal-u min xalid-in
she taller.F.SG.NOM from Khalid-GEN
'She is taller than Khalid.'

b. ʔanaa ʔakthar-u thakaʔ-an min ali-in
1SG.M more-NOM intelligence-ACC from Ali-GEN
'I am more intelligent than Ali.'

Superficially, these examples are much like their English translations and like simple and complex comparatives in many other languages. However, as the gloss of (34b) makes clear, *thakaʔ-an* is not an adjective like *intelligent*, but what can be called an adjectival noun (with accusative case). This might seem like a minor, unimportant difference. However, there is evidence that it is an important matter, reflecting the fact that Arabic complex comparatives are a quite different construction from the complex comparatives of many other languages. The most important evidence comes from the fact that the construction can contain not just adjectival nouns but also ordinary nouns:

(35) Arabic
ʔanaa ʔakthar-u maal-an min ali-in
1SG.M more-NOM money.ACC from Ali-GEN
'I have more money than Ali.'

It is fairly clear that (34b) involves the same comparative construction as (35). To reflect this, it could be translated as "I have more intelligence than Ali". The comparative construction in (34b) and (35) is quite like what is called the adjectival construct construction, illustrated in (36).

(36) Arabic
'anta azīm-u l-hazz-I
you great-NOM the-fortune-GEN
'You have great luck.', 'You are very lucky.'

The nominal in the adjectival construct is genitive and definite whereas that in the comparative construction is accusative and indefinite. However, in both cases, we have an adjective with an extra nominal complement, and in both, we have what can be called a possessive interpretation. Thus, the construction in (34b) is very different from its counterpart in English and other languages.[22]

Thus, phenomena that look familiar may turn out to be rather exotic. Of course it may also turn out that what look like unfamiliar phenomena are not so very different from phenomena one is familiar with. All this just means that syntax is complex and that it is not easy to get a clear picture of the syntax of any language.

6 Concluding remarks

I have argued in the preceding pages that HPSG is a framework that can make a major contribution to the comparative syntax. It has a number of features that are important here. The first is its emphasis on detailed formal analyses of the kind envisaged in *Syntactic structures*, often incorporated into a computer implementation. This means that the framework provides firmer foundations than some other approaches for claims about individual languages and ultimately about language in general. Secondly, it is cautious about advancing strong claims about the universal properties of language and the extent of linguistic variation. Some may feel that bold conjectures act as a stimulus for research, but it is not clear that they are any more effective in this regard than sober and cautious assessments of what is and is not known. Finally, there is the avoidance of abstract analyses with tenuous links to the observable data. As I have emphasized, this makes the acquisition problem less difficult than it would be if grammars were more abstract and hence creates less need for innate apparatus. For these reasons, HPSG has a lot to offer for anyone interested in comparative syntax and looking for a suitable theoretical framework.

[22] See Alsulami et al. (2017) for detailed discussion of the facts.

Abbreviations

1	first person
3	third person
III	III gender
ABS	absolutive
ACC	accusative
ALL	allative
CONT	continuous
ERG	ergative
GEN	genitive
GPSG	Generalized Phrase Structure Grammar
HPSG	Head-Driven Phrase Structure Grammar
INF	infinitive
M	masculine
MGG	mainstream generative grammar
MP	Minimalist program
NOM	nominative
OBL	oblique
PFV	perfective
PL	plural
PST	past
SBCG	Sign-Based Construction Grammar
SG	singular
UG	Universal Grammar

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