# AGREEMENT, MUTATION AND MISSING NPS IN WELSH[1]

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## 1. Introduction

Most languages have certain missing NPs, NPs which are not audible but appear to be present at some level. Familiar examples are missing subjects in null-subject sentences such as the Polish example in (1) and NP gaps in unbounded dependency constructions, as illustrated in (2).

(1) Czytałem książkę. (Polish)
read-1SGM book
'I read a book.'

(2) What did you see?

An important issue for any syntactic theory is: what is the nature of such NPs? Are they elements of constituent structure just like ordinary overt NPs except that they have no phonological content? Or are they only represented at some abstract level? It is generally accepted within Principles and Parameters theory that they are empty elements of constituent structure, but this position has been widely rejected within other frameworks such as Lexical Functional Grammar (Bresnan 2000), Categorial Grammar (Steedman 2000) and Word Grammar (Hudson 1990). In this paper I will be concerned with this issue as it arises within Head-driven Phrase Structure Grammar (HPSG), where a number of approaches to missing NPs have been explored, and I will consider the implications of Welsh data in this context. Welsh seems to be relevant in two ways. First, like the other Celtic languages, it has a variety of agreement phenomena, all of which allow an NP to be missing. This means that we have agreement phenomena sensitive to missing NPs as well as overt NPs. I will argue that these are quite superficial phenomena and hence that missing NPs must be present at a superficial level. Second, Welsh has a mutation process, a morphophonological process affecting initial consonants, which seems to be sensitive to missing NPs. Again this seems to be a quite superficial process and hence suggests that missing NPs must be present at a superficial level.

Although the main focus of this paper is on HPSG proposals about missing NPs, it is potentially relevant to any theory of syntax. Theories differ in what they understand by a superficial level and a more abstract level. However, in any theory, the data I consider here is likely to suggest that missing NPs must be represented at a superficial level and not just at some more abstract level.[2] On the face of it, then, it is problematic for some HPSG proposals and for Lexical Functional Grammar, Categorial Grammar and Word Grammar.

The paper is organized as follows. In section 2, I outline the approaches which have been taken to missing NPs in HPSG. Then in section 3, I outline the basic facts of agreement in Welsh. In section 4, I discuss the analysis of Welsh agreement in a preliminary way. Then, in section 5, I introduce some further facts and outline a different analysis, which entails that missing NPs must be present in constituent structure. In section 6, I discuss mutation and show that it points to the same conclusion, and in section 7, I look briefly at unbounded dependency gaps. Finally, in section 8, I conclude the paper.

## 2. Missing NPs in HPSG

Three different approaches to missing NPs can be found in the HPSG literature. On one approach they are phonologically empty signs, elements of constituent structure like ordinary NPs except that they have no phonological content. This approach is found in Pollard and Sag (1994: 64, 61). Two more approaches have been proposed, in which they are only present at some abstract level. Since the mid 1990s a distinction has been made in HPSG between the argument structure of a head and its combinatorial potential. A feature ARG-ST encodes argument structure, while combinatorial potential is encoded by the VALENCE features, SUBJ (SUBJECT), SPR (SPECIFIER) and COMPS (COMPLEMENTS). Often the value of ARG-ST is the concatenation of the values of SUBJ, SPR and COMPS, but not always. In Manning and Sag (1999) and Bouma, Malouf and Sag (2001) it is proposed that missing NPs are elements of an ARG-ST list with no counterpart in any VALENCE list, and this approach appears to be widely accepted in HPSG. However, there is an obvious alternative: that missing NPs are elements of a VALENCE list with no counterpart in constituent structure. This approach is in fact proposed for subject unbounded dependency gaps in Bouma, Malouf and Sag (2001, 6.1). Thus, we have three views of missing NPs as follows:

(3)a. Missing NPs are phonologically empty elements of constituent structure.
b. Missing NPs are elements of a VALENCE list with no counterpart in constituent structure.
c. Missing NPs are elements of an ARG-ST list with no counterpart in any VALENCE list.

In the first approach, missing NPs are represented in constituent structure and in VALENCE and ARG-ST lists, in the second, they are represented in VALENCE and in ARG-ST lists, and in the third, they are only represented in ARG-ST lists. The first approach assigns the most superficial status to missing NPs and the third the most abstract status. The second gives them a more abstract status than the first but a less abstract status than the third.

How can we choose between these approaches? Clearly we must ask what sorts of phenomena are sensitive to missing NPs and at what level they should be described. Whatever the relevant level is, missing NPs must be present at that level.

## 3. Agreement in Welsh

As we noted in the introduction, Welsh has a variety of agreement phenomena, all of which license a missing NP. In the terms of McCloskey and Hale (1984), it is a null argument language.[4] The first of these phenomena involves finite verbs.

As is quite well known, Welsh is a VSO language with either a verb (as in (4)) or auxiliary (as in (5)) preceding the subject in finite clauses.

(4) Welodd Rhiannon ddraig.
saw Rhiannon dragon
'Rhiannon saw a dragon.'

(5) Mae Rhiannon wedi gweld draig.
is Rhiannon PERF see dragon
'Rhiannon has seen a dragon.'

Finite verbs and auxiliaries agree with a following pronominal subject. We have paradigms like the following. (Here and subsequently the bracketing indicates that the pronoun is optional.)

(6)a. weles (i) — saw-1SG I
b. welest (ti) — saw-2SG you(SG)
c. welodd (o)/(hi) — saw-3SG he she
d. welson (ni) — saw-1PL we
e. welsoch (chi) — saw-2PL you(PL)
f. welsan (nhw) — saw-3PL they

With a non-pronominal subject, we have the third person singular form of the verb, which can be seen as default form. Thus, we have the following data:

(7) Welodd y bachgen/bechgyn
saw the boy boys
'The boy/boys saw.'

(8) * Welsan y bechgyn.
saw the boys
'The boys saw.'

Thus, we have agreement with pronouns but not with a non-pronominal NP.

We have a similar situation with prepositions. Most prepositions agree with a following pronominal object, giving paradigms like the following:[5]

(9)a. arnaf (i) — on-1SG I
b. arnat (ti) — on-2SG you(SG)
c. arno (fo) — on-3SGM he
d. arni (hi) — on-3SGF she
e. arnon (ni) — on-1PL we
f. arnoch (chi) — on-2PL you(PL)
g. arnyn (nhw) — on-3PL they

Notice that unlike with finite verbs we have separate masculine and feminine third person singular forms. The basic uninflected form of the preposition appears with a non-pronominal object. Thus, we have (10) and not (11).

(10) ar y bachgen/yr eneth y bechgyn
on the boy the girl the boys
'on the boy/the girl/the boys'

(11)a. * arno 'r bachgen
on-3SGM the boy
b. * arni 'r eneth
on-3SGF the girl
c. * arnyn y bechgyn
on-3PL the boys

Again, then, we have agreement with pronouns but not with a non-pronominal NP.

We have a similar pattern of agreement in a very common type of subordinate clause which resembles an English *for-to* clause. This is introduced by what looks like the preposition *i* 'to', 'for', which following Borsley (1986), I will call a prepositional complementizer. This element agrees with a following pronominal subject. We have data like the following:

(12)a. Disgwyliodd Emrys i mi fynd i Fangor.
expected Emrys to me go to Bangor
'Emrys expected me to go to Bangor.'
b. i ti fynd i Fangor
to you(SG) go to Bangor
c. iddo (fo) fynd i Fangor
to-3SGM he go to Bangor
d. iddi (hi) fynd i Fangor
to-3PL she go to Bangor
e. i ni fynd i Fangor
to we go to Bangor
f. i chi fynd i Fangor
to you(PL) go to Bangor
g. iddyn (nhw) fynd i Fangor
to-3PL they go to Bangor

Notice that there appears to be no agreement with first and second person pronouns. We have the same situation with the homophonous preposition. I assume that these elements are morphologically defective and that agreement although present is not realized in the case of first and second person forms. There is no agreement with a following non-pronominal subject, as the following show:

(13) Disgwyliodd Emrys i 'r bachgen/eneth/bechgyn fynd i Fangor.
expected Emrys to the boy girl boys go to Bangor
'Emrys expected the boy/girl/boys to go to Bangor.'

(14)a. * iddo 'r bachgen fynd i Fangor
to-3SGM the boy go to Bangor
b. * iddi 'r eneth fynd i Fangor
to-3PL the girl go to Bangor
c. * iddyn y bechgyn fynd i Fangor
to-3PL the boys go to Bangor

Once more, then, we have agreement with pronouns but not with a non-pronominal NP.

We have a rather similar situation with nouns. When a noun is followed by a pronominal possessor, it is preceded by an agreeing proclitic. The following illustrate:[6]

(15)a. fy nhad (i)
1SG father I
'my father'
b. dy dad (di)
2SG father you(SG)
c. ei dad (o)
3SGM father he
d. ei thad (hi)
3SGF picture she
e. ein tad (ni)
1PL father we
f. eich tad (chi)
2PL father you(PL)

g. eu tad (nhw)
3PL father they

It is important to emphasize that these elements are clitics. McCloskey and Hale (1984: 512) and Pollard and Sag (1994: 357) assume that they are prefixes. It is clear, however, that this is not right because they can be separated from the noun by a numeral or by one of a small number of adjectives which appear prenominally. We have examples like the following:

(16) ei dri llyfr o
3SGM three book he
'his three books'

(17) ei hen lyfr o
3SGM old book he
'his old book'

I assume that what we have here is agreement between a noun and a possessor but that the agreement is realized by a proclitic. It is not that unusual for a noun to agree with a possessor. This occurs, for example, in Turkish, which has NPs like the following:

(18) Hasan-ın kitab-ın
Hasan-GEN book-3SG
'Hasan's book'

(19) biz-im kitab-ımız
we-GEN book-1PL
'our book'

There is no proclitic with a non-pronominal possessor, as the following show:

(20) tad y bachgen/bechgyn
father the boy boys
'the boy's/boys' father'

(21)a. * ei dad y bachgen
3SGM father the boy

b. * eu tad y bechgyn
3PL father the boys

Again, then, we have agreement with pronouns but not with non-pronominal NPs.

Non-finite verbs behave in much the same way as nouns. They show agreement in the form of a proclitic with a following pronominal object.[7]

(22)a. Naeth Emrys fy ngweld (i)
did-3SGEmrys 1SG see I
'Emrys saw me.'

b. Naeth Emrys dy weld (di).
did-3SG Emrys 2SG see you(SG)
'Emrys saw you(SG).'

c. Naeth Emrys ei weld (o).
did-3SG Emrys 3SGM see he
'Emrys saw him.'

d. Naeth Emrys ei gweld (hi).
did-3SG Emrys 3SGF see she
'Emrys saw her.'

e. Naeth Emrys ein gweld (ni).
did-3SGEmrys 1PL see we
'Emrys saw us.'
f. Naeth Emrys eich gweld (chi).
did-3SG Emrys 2PL see you(PL)
'Emrys saw you(PL).'
g. Naeth Emrys eu gweld (nhw).
did-3SG Emrys 3PL see they
'Emrys saw them.'

There is no proclitic with a non-pronominal object.

(23) Naeth Emrys weld y bachgen/bechgyn.
did-3SG Emrys see the boy boys
'Emrys saw the boy/boys.'

(24)a. * Naeth Emrys ei weld y bachgen.
did-3SG Emrys 3SGM see the boy
'Emrys saw the boy.'
b. * Wnaeth Emrys eu gweld y bechgyn.
did-3SG Emrys 3PL see the boys
'Emrys saw the boys.'

Once more, then, we have agreement with pronouns but not with non-pronominal NPs.

Welsh has what look like non-finite subordinate clauses introduced by the verb *bod* 'be'. However, as Tallerman (1998) shows, there is evidence that these clauses are finite.[8] In these clauses, *bod* shows agreement in the form of a proclitic with a following pronominal object.

(25)a. Dywedodd Gwyn fy mod (i) yn ddiog.
said Gwyn 1SG be I PRED lazy
'Gwyn said I was lazy.'
b. dy fod (di) yn ddiog.
2SG be you(SG) PRED lazy
c. ei fod (o) yn ddiog.
3SGM be he PRED lazy
d. ei bod (hi) yn ddiog.
3SGF be she PRED lazy
e. ein bod (ni) yn ddiog.
1PL be we PRED lazy
f. eich bod (chi) yn ddiog.
2PL be you(PL) PRED lazy
g. eu bod (nhw) yn ddiog.
3PL be they PRED lazy

There is no proclitic with a non-pronominal subject.

(26) fod y bachgen/yr eneth/y bechgyn yn ddiog.
be the boy the girl the boys PRED lazy

(27)a. * ei fod y bachgen yn ddiog
3SGM be the boy PRED lazy
b. * ei bod yr eneth yn ddiog
3SGF be the girl PRED lazy

c. * eu bod y bechgyn yn ddiog
3PL be the boys PRED lazy

Yet again, we have agreement with pronouns but not with non-pronominal NPs.

These agreement phenomena are clearly very similar. There are at least three similarities:

(28)a. All involve just pronouns.
b. All are obligatory.[9]
c. In all cases the pronoun follows the element which bears the agreement.

An issue here is whether the pronoun immediately follows the element which agrees with it. Examples like the following appear to suggest that the answer is no.

(29) ei gar newydd o
3SGM car new he
'his new car'

Attributive adjectives normally follow the noun and precede a possessor. Hence, when the noun agrees with the possessor as here, we apparently have agreement with a pronoun which does not immediately follow the agreeing element. However, there is evidence that a post-nominal AP is adjoined to preceding noun forming a kind of complex noun. The evidence comes from mutation. An adjective is mutated following a feminine singular noun. The following, in which the mutated adjective is in bold and the basic form in brackets, illustrates:

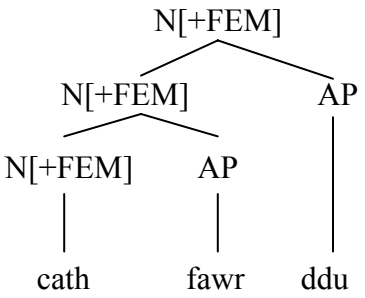
(30) cath **fawr** (mawr)
cat big
'a big cat'

A second adjective is also mutated.

(31) cath **fawr ddu** (mawr, du)
cat big black
'big cat'

This would be surprising if post-nominal APs were daughters of NP, but it is not surprising if they are right adjoined to a noun, giving structures like (32).

(32)




Here the second adjective follows a feminine singular noun just as much as the first, and so the mutation is only to be expected.[10] Thus, there is evidence that a noun and a following AP or APs form a constituent and that it is this constituent that agrees with the pronoun in examples like (29). It looks, then, as if we can probably assume that agreement is always with an immediately following element.

Whether or not the last suggestion is right, the similarities that we have surveyed suggest that we really have a single phenomenon here. A variety of researchers have come

to this conclusion. Sadler (1988: 104) concludes that agreement morphemes and clitics are 'essentially the same phenomenon', Roberts and Shlonsky (1996: 184) conclude that Welsh has a 'single agreement system', and Pollard and Sag (1994: chapter 9.3), Rouveret (1994) and McCloskey and Hale (1984: 513) all reach the same conclusion. I assume that this is right and hence that we need a unified account.

**4. Possible analyses**

We can now consider how the agreement facts that we have just outlined might be accommodated within HPSG. HPSG is a constraint-based theory, in which a grammar is essentially a set of implicational statements, saying that if a linguistic object has some property or properties then it must have some other property or properties. It is also a framework in which the VALENCE features, SUBJ (SUBJECT), SPR (SPECIFIER) and COMPS (COMPLEMENTS) and the feature ARG-ST play a central role. Hence constraints referring to these features are of considerable importance. A satisfactory analysis of the Welsh facts must ensure (a) that agreement takes the right form, and (b) that we have agreement with the correct dependent. My main concern is the latter, but I will sketch a possible approach to the former.

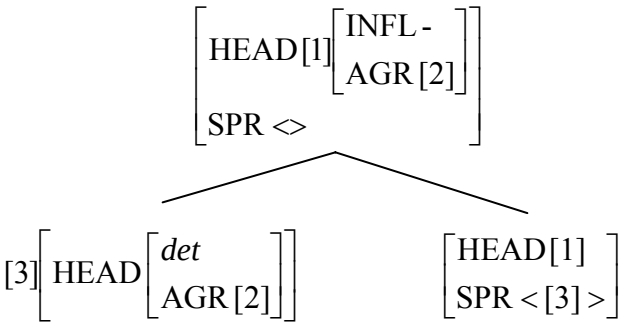
A number of researchers, e.g. Awbery (1976), Rouveret (1994) and Sadler (1997), have proposed that Welsh proclitics are determiners. If we adopt this assumption, we can propose that certain heads take an agreeing determiner. To implement this idea, I will assume firstly, essentially following Kathol (1999), that agreement, whatever form it takes, is the realisation of a feature AGR, whose value is person, number and gender features or *none* where there is no agreement.[11] I will also assume that heads where agreement takes the form of a suffix, i.e. finite verbs, prepositions, and the prepositional complementizer *i*, are [INFL +] and that heads where agreement takes the form of a proclitic, i.e. nouns, non-finite verbs and *bod*, are [INFL -]. Finally, I will assume that determiners are selected by the SPR (SPECIFIER) feature. With these assumptions, it is quite easy to ensure that agreement takes the correct form. To ensure that an [INFL -] element with an AGR feature that has any value other than *none* takes as a specifier a determiner with the same value for AGR, we can propose the following constraint, where *agr* refers to all values of AGR except *none*:

(33)

$$\begin{bmatrix} \text{INFL} - \\ \text{AGR}\,[1]\mathit{agr} \end{bmatrix} \rightarrow [\text{SPR} \langle \mathit{det}[\text{AGR}\,[1]] \rangle]$$

Given this constraint, [INFL-] heads with AGR value other than *none* will appear in structures of the following form:

(34)



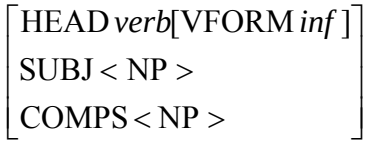

Within HPSG the internal structure of a phrase is encoded as the value of a DTRS (DAUGHTERS) feature. However, it is convenient to use the standard tree format to represent this structure.[12] To ensure that an [INFL +] element does not take a specifier, we can propose the following:[13]

(35) [INFL +] → [SPR <>]

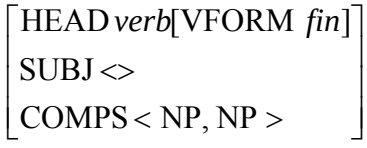
We also, of course, need appropriate morphological rules to ensure the correct suffix, but I won't go into this. Here, then, we have one possible approach to the realization of dependents. It seems quite plausible. However, the proposals developed in the following sections are compatible with various approaches to the realization of agreement.

We can now consider how to ensure agreement with the correct dependent, and in particular at what level the necessary constraints should apply. Whatever the relevant level is, missing NPs must be represented at that level. I will make a number of important assumptions here. Firstly, I will assume following Borsley (1989, 1995) that post-verbal subjects are the realization not of the single member of the SUBJ list, but of an extra member of the COMPS list. Thus, whereas a non-finite transitive verb will have the category in (36), a finite verb will have that in (37).

(36)




(37)




Secondly, I will assume following Borsley (1999) that the prepositional complementizer *i* is a head which takes two complements, an NP and a VP, which takes the NP as its subject.

(38)

$$\begin{bmatrix} \text{HEAD } \textit{prep - comp} \\ \text{SUBJ} < > \\ \text{COMPS} < [1]\text{NP}, \text{VP}[\textit{inf}, \text{SUBJ} < [1] >] > \end{bmatrix}$$

Thirdly, I will assume following Borsley (1989, 1995) that possessors are the realization of an extra member of the COMPS list. Thus a noun which takes a possessor and a PP complement will have the category in (39).

(39)

$$\begin{bmatrix} \text{HEAD } \textit{noun} \\ \text{SUBJ} < > \\ \text{COMPS} < \text{NP}, \text{PP} > \end{bmatrix}$$

Finally, I will assume that the object of a non-predicative preposition is the first member of its ARG-ST list, giving categories like (40), while the object of a predicative preposition is the second member of its ARG-ST list and the first member is an unexpressed subject, giving categories like (41).

(40)

$$\begin{bmatrix} \text{HEAD } \textit{prep} \\ \text{SUBJ} < > \\ \text{COMPS} < [1] > \\ \text{ARG - ST} < [1]\text{NP} > \end{bmatrix}$$

(41)

$$\begin{bmatrix} \text{HEAD } \textit{prep} \\ \text{SUBJ} < [1] > \\ \text{COMPS} < [2] > \\ \text{ARG - ST} < [1]\text{NP}, [2]\text{NP} > \end{bmatrix}$$

With these assumptions, finite verbs, non-predicative prepositions, the prepositional complementizer *i*, and *bod* will have categories of the form in (42) (ignoring the possibility of a missing NP):

(42)

$$\begin{bmatrix} \text{SUBJ} < > \\ \text{COMPS} < [1], \ldots > \\ \text{ARG - ST} < [1], \ldots > ] \end{bmatrix}$$

For these elements, the ARG-ST list identical to the COMPS list. Non-finite verbs, and predicative prepositions will have categories of the following form in (43):

(43)

$$\begin{bmatrix} \text{SUBJ} < [1] > \\ \text{COMPS} < [2], \ldots > \\ \text{ARG-ST} < [1],[2], \ldots > \end{bmatrix}$$

For these elements, the ARG-ST list is the result of prefixing the single member of the SUBJ list to the COMPS list. Given such categories, agreement is with the first member of ARG-ST in finite verbs, non-predicative prepositions, the prepositional complementizer *i*, and *bod* and with the second member of ARG-ST in the non-finite verbs, and predicative prepositions, but it is with the first member of COMPS in all cases. It follows that an analysis referring to ARG-ST lists will be more complex than one referring to COMPS lists. If agreement is described in terms of ARG-ST lists, two constraints are necessary to ensure that agreement appears where it should, as follows:

(44)a

$$\begin{bmatrix} \text{SUBJ} <> \\ \text{ARG-ST} < \text{NP} : \textit{ppro}[1], \ldots > \end{bmatrix} \rightarrow [\text{AGR } [1]]$$

b.

$$\begin{bmatrix} \text{SUBJ} < [1] > \\ \text{ARG-ST} < [1], \text{NP} : \textit{ppro}[2], \ldots > \end{bmatrix} \rightarrow [\text{AGR } [2]]$$

(Following standard practice, I use 'X:Y' here for a category X whose semantic content is Y. Thus, NP:*ppro* stands for an NP whose semantic content is that of a personal pronoun.) Similarly, two constraints are necessary to ensure that agreement does not appear where it should not.

(45)a.

$$\left(\begin{bmatrix} \text{SUBJ} <> \\ \text{ARG-ST}[1] \end{bmatrix} \;\&\; \neg([1] = \langle \text{NP}:\textit{ppro},\ldots\rangle)\right) \rightarrow [\text{AGR } \textit{none}]$$

b.

$$\left(\begin{bmatrix} \text{SUBJ} < [1] > \\ \text{ARG-ST} < [1] > \oplus [2] \end{bmatrix} \;\&\; \neg([2] = \langle \text{NP}:\textit{ppro},\ldots\rangle)\right) \rightarrow [\text{AGR } \textit{none}]$$

In contrast, if agreement is described in terms of COMPS lists we need just one constraint to ensure that agreement appears where it should and one to ensure that agreement does not appear where it should not, as follows:

:

(46) [COMPS <NP:*ppro*[1],...>] → [AGR [1]]

(47) ([COMPS [1]] & ¬ ([1] = <NP:*ppro*, ...>)) → [AGR *none*]

Obviously, this is simpler.

It is fairly clear, then, that a COMPS-based approach is preferable to an ARG-ST-based approach. The COMPS-based approach is essentially the approach proposed in Pollard and Sag (1994: chapter 9, section 3). Thus, this is not really a new approach. One point to note is that it is essentially accidental on this approach that agreement is with an immediately following element. Agreement is with the initial member of a COMPS list and this just happens to immediately follow the agreeing element. Within this approach, it would not matter if agreement was not always with an immediately following constituent. Thus, whether or not a noun and a following AP forms a constituent is not important for this approach.

Consider now what follows if we accept this approach. If agreement constraints refer to COMPS lists, missing NPs must be included in COMPS lists. This is contrary to the assumptions of Pollard and Sag 1994, chapter 9, section 5) and much recent work.

## 5. Some further data

In the preceding section, we compared an ARG-ST list-based approach to Welsh agreement and a COMPS list-based approach, and argued that the latter is preferable. We have not shown, however, that this is the best approach. In this section, I will argue that there is evidence from coordination for a more superficial approach.

In all the data we have considered so far we have a simple, non-coordinate NP in the position associated with agreement. Naturally it is also possible to have a coordinate NP in these positions. As noted by Rouveret (1994) and Sadler (1999), when a coordinate NP appears in a position associated with agreement, the agreement is with the first conjunct provided it is a pronoun. Consider, for example, the following:

(48) Weles i a Megan ddraig.
saw-1SG I and Megan dragon
'I and Megan saw dragon.'

(49) arnaf i a Megan
on-1SG I and Megan
'on I and Megan'

(50) fy mrawd i a Megan
1SG brother I and Megan
'my and Megan's brother'

(51) Wnaeth Emrys fy ngweld i a Megan
did-3SG Emrys 1SG see I and Megan
'Emrys saw me and Megan.'

There would be no problem if we could assume that coordinate NPs have the person, number and gender features of their first conjunct. However, there is evidence from examples containing reflexives that coordinate structures have their own person and number features distinct from those of the first conjunct. Welsh reflexives agree with their antecedents rather like English reflexives. We have data like the following:

(52)a. Weles i a Megan ein hunain.
saw-1SG I and Megan 1PL self
'I and Megan saw ourselves.'
b. Welest ti a Megan eich hunain.
saw-2SG you(SG) and Megan 2PL self
'You and Megan saw yourselves.'
c. Welodd e a Megan eu hunain.
saw-3SG he and Megan 3PL self
'He and Megan saw themselves.'

In all of these examples the antecedent of the reflexive is a coordinate structure and the reflexive agrees with it. Thus, it is fairly clear that coordinate structures may have their own person, number and gender features distinct from those of the first conjunct.

There are two conclusions one might draw from this data. Either coordinate structures must have two sorts of person, number and gender features relevant to different kinds of agreement or what looks like agreement between a head and one conjunct is just that. Discussing similar Arabic data, Munn (1999) comes to the former conclusion. McCloskey (1986) discussing somewhat similar data in Modern Irish comes to the latter conclusion.

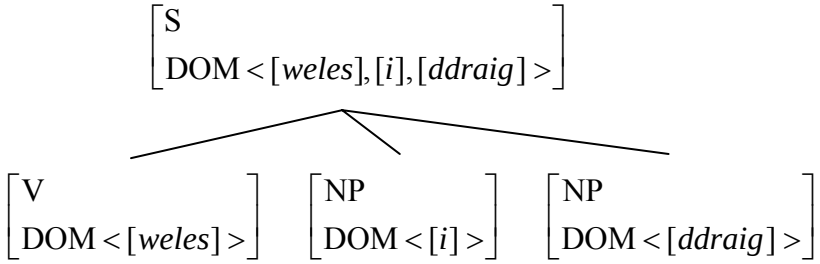
Which of these conclusions should be preferred? In an important recent discussion of agreement, Wechsler and Zlatić (2000) in effect distinguish different sorts of person, number and gender features. However, they assume that subject-verb agreement and antecedent anaphor agreement involve the same person, number and gender features, INDEX features within their HPSG analysis. Thus, the idea that the data in (52) is reflection of different sorts of person, number and gender features seems dubious. It looks, then, as if what looks like agreement with a single conjunct is probably just that.

It seems, then, that a head does not necessarily agree with the initial member of a COMPS list. Rather it agrees with the first following NP if and only if it is a pronoun. This may be the initial member of a COMPS list or part of the initial member.

We can implement this idea within the version of HPSG developed in Kathol (2000). Kathol proposes that constituents have both daughters and domain elements, the members of their order domain, to which ordering constraints apply. The domain elements of a constituent may be 'compacted' to form a single element in the order domain of the mother or they may just become elements in the mother's order domain. In the latter case the mother has more domain elements than daughters. Within this framework, the simple example in (53) will have the schematic analysis in (54), where, as before, we use the standard tree format to represent constituent structure, and the order domains of constituents appear as values of a DOM(AIN) feature.:

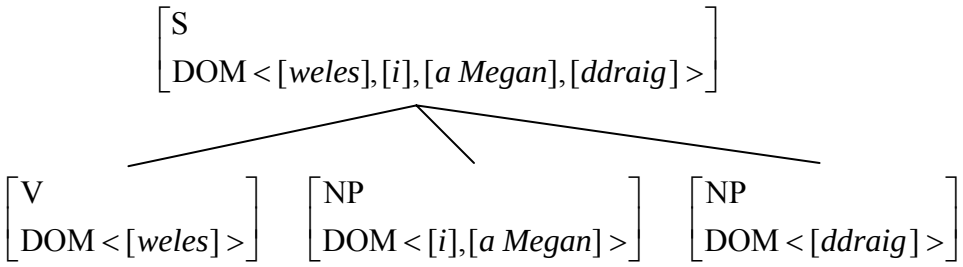
(53) Weles i ddraig.
saw-1SG I dragon
'I saw a dragon'

(54)




Here, the S has the same number of domain elements as daughters. If we assume that coordinate structures are not compacted, we will have the following analysis for (48):

(55)

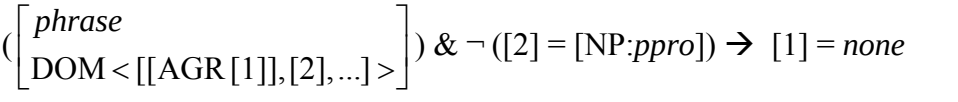



Here, S has three daughters but four domain elements. We can now propose that agreement involves a constraint on order domains. We suggested at the end of section 2 that a noun and a post-nominal AP form a constituent and hence that the agreeing element is always immediately followed by the pronoun with which it agrees. If we assume that they not only form a constituent but also a domain element, then we can propose the following constraint to ensure that a domain initial element agrees with an immediately following pronoun:

(56) [DOM <[[AGR [1]], NP: *ppro*[2], …>] → [1] = [2]

To ensure that agreement does not appear where it should not is a little more complex. Given examples like (29), we cannot say that there is no agreement when an agreeing element is immediately followed by anything other than a pronoun. However, if we assume that the combination of a noun and a postnominal AP does not count as a phrase, we can say that there is no agreement when an agreeing member of a phrasal order domain is immediately followed by anything other than a pronoun. Thus, we can propose the following constraint:

(57)



We would need slightly different constraints if a noun and a post-nominal AP could not be analyzed as a constituent and a domain element. It seems, however, that a DOM-based approach to agreement is preferable to a COMPS-based approach.

There is more to be said here. First, notice that although coordinate structures are *ex hypothesi* not compacted, their domain elements must remain adjacent. Thus, as the translation makes clear, (58) can only be an example with a coordinate NP in object position. It is not an alternative form of (48).

(58) Gweles i ddraig a Megan.
saw-1G I dragon and Megan
'I saw a dragon and Megan.'

It seems, then, that we need to allow not only constraints requiring one domain element to precede another but constraints requiring one domain element to immediately precede another.

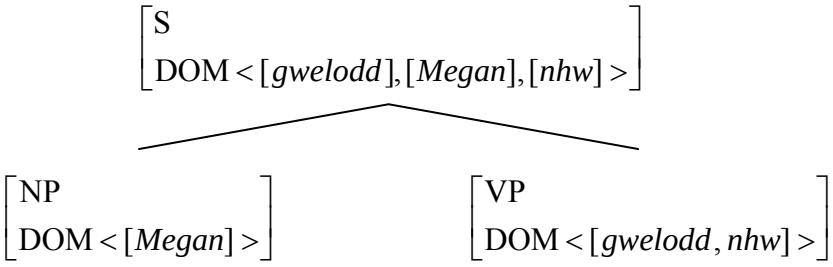
Second, an issue arises about nouns, non-finite verbs and *bod*. We are assuming that it is these elements that agree with the pronoun, but that the agreement takes the form of a proclitic, which in the case of nouns may be followed by a numeral or an adjective. It looks as if we have an agreeing element here which may not be domain-initial. We will assume, however, that proclitics and prenominal adjectives are part of a complex head and hence part of the initial domain element.

Finally, as Andreas Kathol has pointed out to me, problems might arise if we assumed an NP VP structure for VSO clauses. Consider the following example:

(59) Gwelodd Megan nhw
saw Megan them
'Megan saw them.'

If we assumed an NP VP structure for VSO clauses, this would have the schematic analysis in (60).

(60)

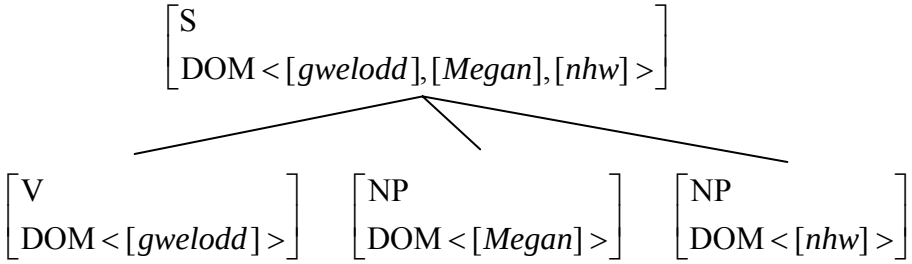



Here, within the order domain of the VP, the verb *gwelodd* is immediately followed by the object pronoun *nhw*. Thus, we would expect to have agreement. However, there is no agreement in (59), and agreement is not possible, as the following shows:

(61) * Gwelsan Megan nhw
saw-3PL Megan them

There is no problem here if we assume a flat structure for VSO clauses. This will give us the following schematic analysis for (59).

(62)




Here, *gwelodd* is only followed by other domain elements within the order domain of the S and the first NP that follows it is the proper name *Megan*. Hence, we do not expect agreement. I have argued elsewhere (Borsley 2002) that there is no motivation for an NP VP analysis of Welsh VSO clauses and that it faces certain problems. I think, then, that it is safe to assume that the right analysis is (62) and not (60) and hence that there is no problem here.

The DOM-based approach to agreement raises certain questions. It looks, however, as if it is preferable to a COMPS-based approach. If agreement constraints refer to DOM lists, then missing NPs must appear in DOM lists. This means that they must appear in constituent structures.

There is one further point that we should note here. This is that missing NPs do not occur as conjuncts. We do not have the following parallel to (48) – (51).

(63) * Gweles a Megan ddraig.
saw-1SG and Megan dragon

(64) * arnaf a Megan
on-1SG and Megan

(65) * fy mrawd a Megan
1SG brother and Megan

(66) * Wnaeth Emrys fy ngweld a Megan
did-3SG Emrys 1SG see and Megan

This would not be surprising if missing NPs were ARG-ST list elements with no counterparts in a VALENCE list or VALENCE list members with no counterpart in constituent structure. It is rather surprising, however, if they are empty elements of constituent structure. It presumably requires some additional stipulation. It still seems, however, that examples like (48) – (51) provide quite strong evidence for a DOM-based approach to agreement and hence for the assumption that missing NPs appear in constituent structure. I suggest, then, that the ungrammaticality of (63) – (66) is the result of an additional constraint on empty NPs.

## 6. Mutation

We can turn now to relevant another area of Welsh grammar, the area of mutation. We will see that some instances of mutation appear to be potentially triggered by missing NPs and seem to provide some further support for the idea that missing NPs are present in constituent structures.

The term mutation refers to systems of word-initial consonant alternations. Three types of mutation are traditionally identified in Welsh, soft mutation, aspirate mutation and

nasal mutation. By far the most common is soft mutation, which involves the following changes:

(67) Soft mutation

| | | |
|---|---|---|
| p > b | b > f([v]) | m > f([v]) |
| t > d | d > dd([ð]) | ll [ ] > l |
| c([k]) > g | g > ∅ | rh[$r^h$] > r |

Soft mutation is triggered by a variety of lexical items. The following illustrate:

(68) Aeth Megan i **Fangor**. (Bangor)
went Megan to Bangor
'Megan went to Bangor.'

(69) Mae Gwyn yn **feddyg**. (meddyg)
is Gwyn PRED doctor
'Gwyn is a doctor.'

(70) dau **fachgen** (bachgen)
two boy
'two boys'

In (68), the mutation is triggered by the preposition *i* 'to'. In (69), it is triggered by the predicative particle *yn*. Finally, in (70), the trigger is the numeral *dau*. Most instances of soft mutation can be seen as triggered by a specific lexical item or class of lexical items, but there are a variety of cases where such an analysis seems impossible. Particularly notable is the mutation of objects of finite verbs, as e.g. in (71).

(71) Gweles (i) **gi**. (ci)
saw-1SG I dog
'I saw a dog.'

What sort of a phenomenon is mutation? One might suppose that it is a form of case. It is clear, however, that this is not generally the case, among other things because it can affect finite verbs, which one would not expect to have case. Thus, an affirmative declarative sentence may be introduced by the particle *mi* or *fe*. If it is, the verb is mutated, as (72) shows.

(72) Mi/fe **weles** (i) **gi**. (gweles, ci)
PRT saw-1SG I dog
'I saw a dog.'

It is in fact common to have the mutation even when the particle is not present. One might accept this but still suggest that the mutation of objects is a realisation of case, and this has been proposed in Zwicky (1984) and Roberts 1998). However, as Borsley (1988) shows, there are a variety of reasons for scepticism about this idea. One problem is that what appears to be the same mutation affects non-finite VP complements and predicates. The following illustrate:

(73) Dechreuodd Emrys [**ddarllen** y llyfr] (darllen)
began Emrys read the book
'Emrys began to read the book.'

(74) cyn i Megan [**fynd** i Aberystwyth] (mynd)
before to Megan go to Aberystwyth
'before Megan went to Aberystwyth'

Assuming that the mutation in (71) is not a realization of case, what sort of account would be appropriate? Borsley (1999), building on earlier work by Harlow (1989) and

Borsley and Tallerman (1996), proposes that a number of instances of soft mutation, including those in (71), (73) and (74), result from something like the following rule:

(75) A complement bears soft mutation if it is immediately preceded by a phrasal category.

Notice that phrasal categories here must include missing NPs since we have mutation in (71) whether or not there is an overt subject. Obviously it is necessary to ask at what level immediate precedence by a phrasal sister is required. It is easy to show that it cannot be ARG-ST. The evidence comes from the contrast between (71) and the following:

(76) Dw i wedi gweld ci.
am I PERF see dog
'I have seen a dog.'

Here we have a so-called periphrastic sentence involving a form of the copula and the perfective particle *wedi*. Unlike in (71), the object is not mutated. Given the assumptions made here, the finite verb in (71) will have the category in (77), while the non-finite verb in (76) will have that in (78).

(77)

$$\begin{bmatrix} \text{HEAD } \textit{verb}[\text{VFORM } \textit{fin}] \\ \text{SUBJ} <> \\ \text{COMPS} < [1]\text{NP}, [2]\text{NP} > \\ \text{ARG-ST} < [1], [2] > \end{bmatrix}$$

(78)

$$\begin{bmatrix} \text{HEAD } \textit{verb}[\text{VFORM } \textit{inf}\,] \\ \text{SUBJ} < [1]\text{NP} > \\ \text{COMPS} < [2]\text{NP} > \\ \text{ARG-ST} < [1], [2] > \end{bmatrix}$$

The two words have the same ARG-ST list, in which the object is immediately preceded by a phrasal category. Thus if (75) applied to ARG-ST lists we would expect mutation in both cases. It is more plausible to suggest that (75) applies to COMPS lists. In (77) the object NP is immediately preceded by an NP in the COMPS list, but this is not the case in (78). Thus, (75) will give the right results here if it refers to COMPS lists. However, if one assumes order domains, it would also be possible for (75) to apply to DOM lists. In (71) the S will have the DOM list in (79), while in (76) the VP *weld ci* will have that in (80).

(79) [DOM <[*weles*], [*i*], [*gi*]>]
(80) [DOM <[*weld*], [*ci*]>]

In (79), the object is immediately preceded by a phrasal category, but this is not the case in (80).

Can we choose between a COMPS-based approach and a DOM-based approach? There are in fact a number of cases where what might be seen as a superficial word order reflected only in DOM lists is crucial for mutation.[14] Consider firstly the following:

(81)a. Mae ci yn yr ardd.
is dog in the garden
'A dog is in the garden.'
b. Mae yn yr ardd **gi**. (ci)
is in the garden dog
'A dog is in the garden.'

(81a) shows the normal subject-complement order, and (81b) shows a marked complement-subject order. In the former the subject is unmutated, but in the latter it is mutated. Consider next the following:

(82)a. Mae Emrys wedi rhoi darlun o Gwyn i Megan.
is Emrys PERF give picture of Gwyn to Megan
'Emrys has given to Megan a picture of Gwyn.'
b. Mae Emrys wedi rhoi i Megan **ddarlun** o Gwyn. (darlun)
is Emrys PERF give to Megan picture of Gwyn
'Emrys has given to Megan a picture of Gwyn.'

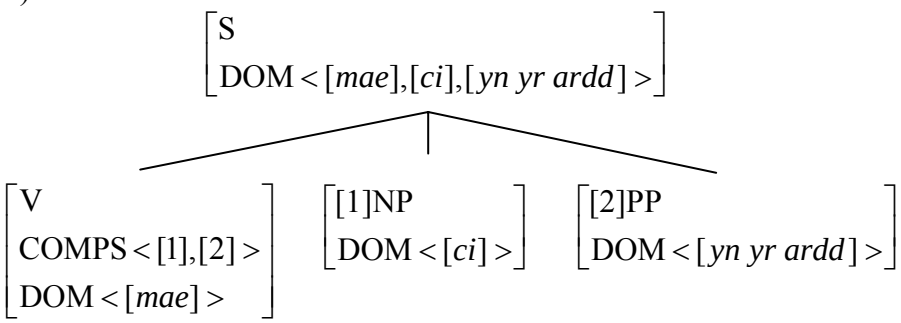
(82a) contains an NP and a PP complement in that order, while (82b) is essentially an example of heavy-NP-shift with the NP following the PP. In the former the NP is unmutated while in the latter it is mutated. Consider finally the following:

(83)a. Mae chwant mynd adref arna' i.
is desire go home on-1SG I
'I desire to go home.'
b. Mae chwant arna' i **fynd** adref. (mynd)
is desire on-1SG I go home
'I desire to go home.'

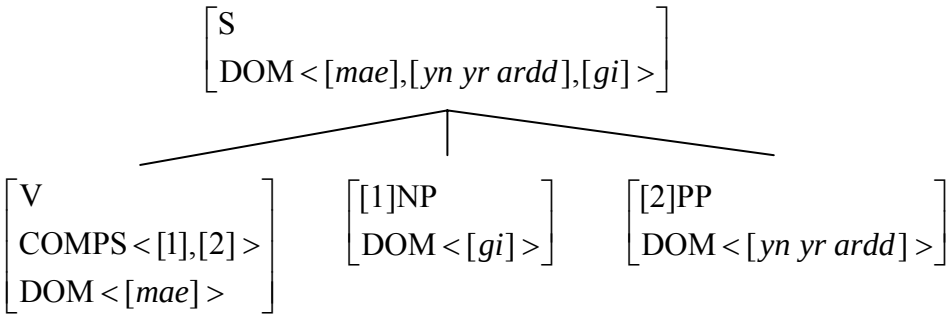
(83a) contains as a subject a complex NP containing an abstract noun and a clausal complement, while in (83b) the complement is extraposed. In (83a) the complement is unmutated while in (83b) it is mutated.[15]

How should these examples be analyzed? It seems quite plausible to suggest that the members of each pair have the same constituent structure and just differ in their order domains. In other words it seems plausible to suggest that we have the following schematic structures:

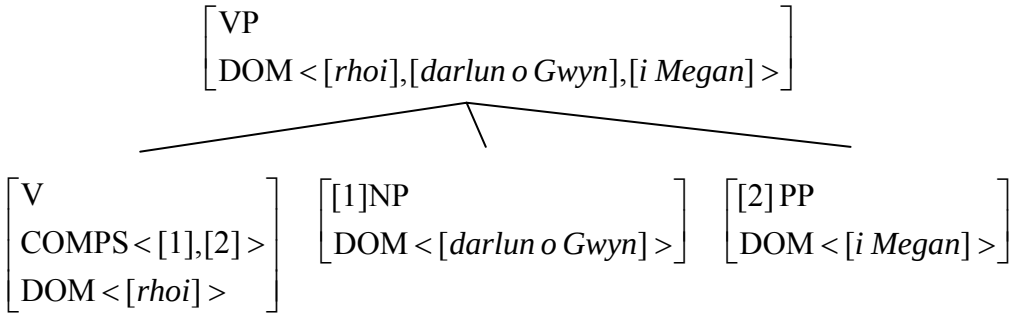
(84)a.



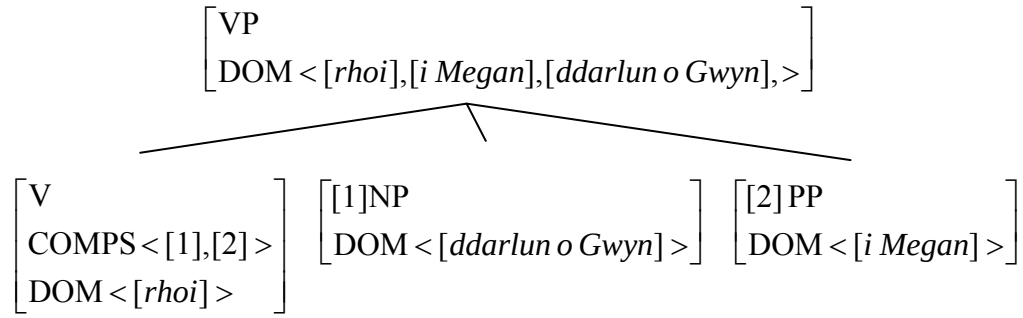
b.


S
DOM < [mae],[yn yr ardd],[gi] >
V
COMPS < [1],[2] >
DOM < [mae] >
[1]NP
DOM < [gi] >
[2]PP
DOM < [yn yr ardd] >

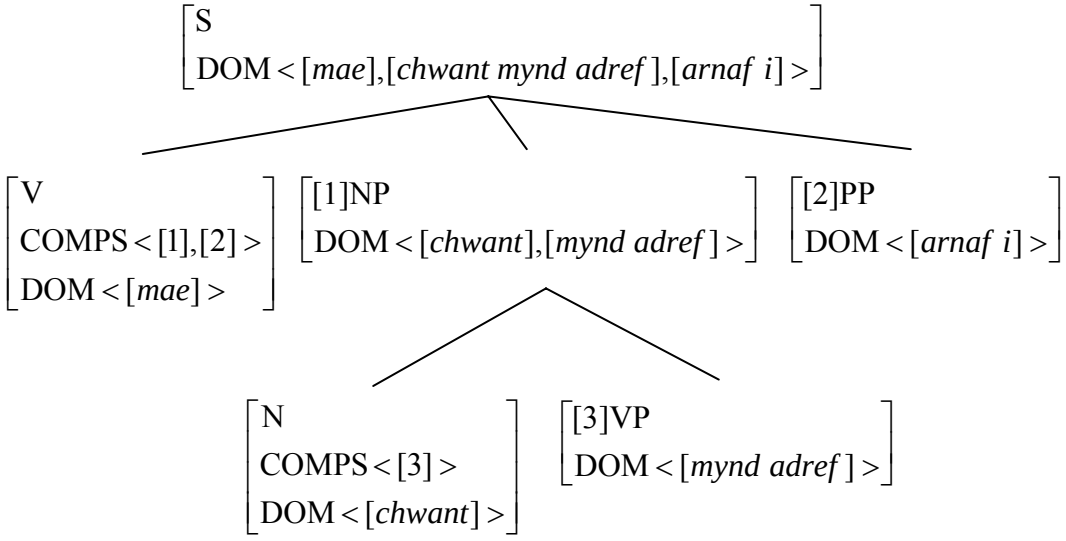
(85)a.


VP
DOM < [rhoi],[darlun o Gwyn],[i Megan] >
V
COMPS < [1],[2] >
DOM < [rhoi] >
[1]NP
DOM < [darlun o Gwyn] >
[2] PP
DOM < [i Megan] >

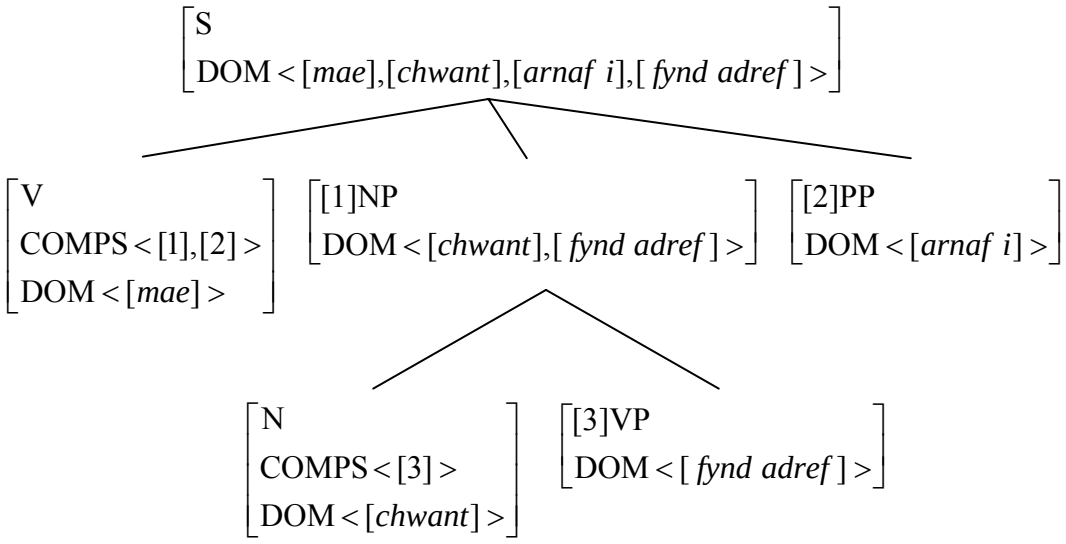
b.


VP
DOM < [rhoi],[i Megan],[ddarlun o Gwyn], >
V
COMPS < [1],[2] >
DOM < [rhoi] >
[1]NP
DOM < [ddarlun o Gwyn] >
[2] PP
DOM < [i Megan] >

(86)a.

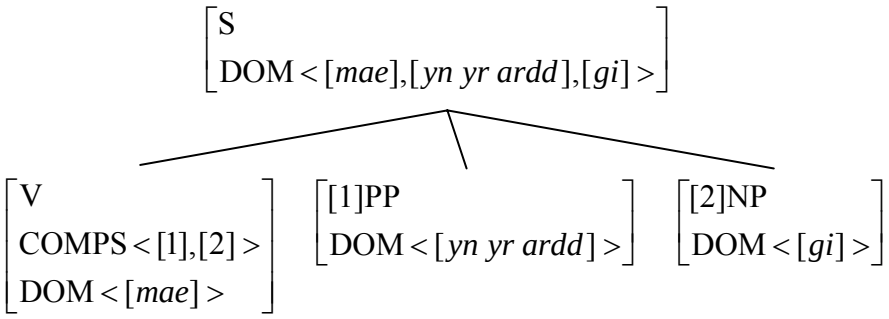



b.




Given structures like those, (75) would have to apply to order domains. The alternative to this would be to assume that the (a) and (b) members of (81) - (83) are a reflection of different COMPS lists. The (a) examples would have the analyses above, but the (b) examples would have different analyses. (81b), for example, would have the following analysis:

(87)




Here the order elements within the COMPS list of the head is identical to the order of elements within the order domain of the mother. Given such structures, it would be possible for (75) to apply to COMPS lists. However, if the (a) and (b) members of (81) - (83) have different COMPS lists, DOM lists will have little if any real role in accounting for Welsh word order. Thus, if DOM lists are going to play a real role in accounting for Welsh word order, it is natural to assume that the (a) and (b) members of (81) - (83) differ in their DOM lists but not in their COMPS lists. If they do, (75) will have to refer to DOM lists. If it does, missing NPs must appear in DOM lists and hence in constituent structures.

**7. Unbounded dependency gaps**

In the introduction I highlighted two types of missing NPs: missing subjects in null-subject sentences and NP gaps in unbounded dependency constructions. Until now I have said nothing about the latter. In this section, I want to look briefly at unbounded dependency gaps.

On the face of it, Welsh has two sorts of NP gaps in unbounded dependency constructions: gaps with no associated agreement, as in (88), and gaps with associated agreement as in (89).

(88) y dynion a brynodd ___ y tŷ
the men PRT bought-3SG the house
'the men that bought the house'

(89) y bobl y gwerthodd Ieuan y tŷ iddynt ___
the people PRT sold-3SG Ieuan the house to-3PL
'the people that Ieuan sold the house to'

Awbery (1977) and Sadler (1988) propose that gaps with no agreement are the result of movement and gaps with agreement empty resumptive pronouns. Overt resumptive pronouns appear in certain positions where no agreement is possible. Consider, for example, (90).

(90) y car y cefais i gwared ag ef
the car PRT got-1SG I rid of it
'the car that I got rid of'

If all gaps with associated agreement were empty resumptive pronouns, then agreement in unbounded dependency constructions would provide no further evidence for the superficial nature of missing NPs. It has been argued, however, by Willis (2000), that

gaps in non-finite object position are not resumptive pronouns although they are associated with agreement. If this is right, the gap in the following is not a resumptive pronoun:

(91) y dynion y byddwch yn eu cwrdd
the men PRT will-be-2PL PROG 3PL meet
'the men that you will be meeting'

It looks, then, as if we may evidence here for a second type of missing NP which must be present in DOM lists and hence in constituent structures.

Mutation appears to provide further evidence for the same conclusion. Consider the following example:

(92) Pa dynion welodd **gi**. (ci)
which men saw-3SG dog
'Which men saw a dog?'

Here, as in (71), the object is mutated. It is clear that the gap is not an empty resumptive pronoun. The filler is plural, and so on standard assumptions the gap must be also plural. However, the verb is third person singular. In other words there is no agreement and so the missing NP cannot be a resumptive pronoun. It seems, then, that we have further evidence here for a second type of missing NP which must be present in DOM lists and hence in constituent structures.[16]

## 8. Conclusions

In this paper I have been concerned with the implications of Welsh data for questions about the nature of missing NPs, especially as these arise in HPSG. Three views of missing NPs have been explored within the HPSG literature. On the first, they are phonologically empty elements of constituent structure. On the second, they are represented in a VALENCE list but not in constituent structure. On the third, they are represented in an ARG-ST list but not in any VALENCE list or in constituent structure. The obvious way to choose between these approaches is ask what sorts of phenomena are sensitive to missing NPs and at what level they should be described. Whatever the relevant level is, one can conclude that missing NPs must be present at the relevant level. I have focused in particular on agreement phenomena, which license a missing NP. After outlining the basic facts, I showed in section 4 that an analysis referring to COMPS lists is preferable to one referring to ARG-ST lists and hence that missing NPs must be represented in COMPS lists and not only in ARG-ST lists as much HPSG work has assumed. Then, in section 5, I looked at further agreement data and argued that they provide evidence for a DOM-list based approach, in which agreement is with the first following NP if and only if it is a pronoun. It follows that missing NPs must be represented in DOM lists and hence in constituent structures. In section 6, I argued that mutation may provide further evidence for the same conclusion. Finally, in section 7, I considered missing NPs in unbounded dependency constructions and suggested that some cases may involve a different element which must be represented in DOM lists and hence in constituent structures. I conclude that there is quite strong evidence that missing NPs in Welsh are represented in constituent structures and not just at some more abstract level contrary to the assumptions of much work in HPSG and frameworks such as Lexical Functional Grammar, Categorial Grammar and Word Grammar.

**FOOTNOTES**

1. An earlier version of this paper was presented at the Ninth International Conference on Head-driven Phrase Structure Grammar, Seoul, Korea, August 8-9, 2002. It draws on material presented at the Spring Meeting of the Linguistics Association of Great Britain at University College London in April 2000. I am grateful to members of both audiences for various helpful comments. I have also benefited from comments from and/or discussion with David Adger, Emily Bender, Andreas Kathol, Ad Neeleman and Ivan Sag. Any bad bits are my responsibility.

2. A number of researchers have reached somewhat similar conclusions within other theoretical frameworks about data like that considered here. Thus, Adger (2000) argues within a version of minimalism that feature-checking in Scots Gaelic, including the feature-checking that is responsible for agreement, is a morphological process. In a related minimalist discussion, Ackema and Neeleman (forthcoming) argue that Germanic complementizer agreement involves feature-checking in PF.

4. The Irish data discussed by McCloskey and Hale is quite similar to the Welsh data discussed here. Hence, the arguments developed here could probably also be developed on the basis of Irish.

5. As is implicitly here, Welsh has some prepositions which do not inflect, e.g. *gyda* 'with'. One might try to ensure that such prepositions have no agreement features. Alternatively, one might assume that they have a set of categories with different agreement just like inflecting prepositions but have the same phonological form whatever their agreement features. I will not try to choose between these two approaches.

6. A number of the proclitics trigger one of the morphophonological alternations affecting initial consonants which are traditionally known as mutations, but this is of no real importance in the present context.

7. Non-finite verbs are traditionally known as verb-nouns. It is this similarity that is the main reason for this label. See Borsley (1993) for relevant discussion.

8. It seems that *bod* in these examples is a special present or imperfect forms. The normal present and for many speakers imperfect forms of the copula do not appear in complement clauses. Thus, (i) is ungrammatical for most speakers and (ii) is ungrammatical for many.

(i) * Mae Aled yn credu [y mae Elen yn darllen y llyfr]
is Aled PROG believe PRT is Elen PROG read the book
'Aled believes that Elen is reading the book.'

(ii) % Mae Aled yn credu [roedd Elen yn darllen y llyfr]
is Aled PROG believe was Elen PROG read the book
'Aled believes that Elen was reading the book.'

The normal forms do appear in negative complements, as the following illustrate:

(i) Mae Aled yn credu [nad ydy Elen yn darllen y llyfr]
is Aled in believe NEG is Elen in read the book
'Aled believes that Elen is not reading the book.'

(ii) Mae Aled yn credu [nad oedd Elen yn darllen y llyfr]
is Aled PROG believe NEG was Elen PROG read the book
'Aled believes that Elen was not reading the book.'

Notice, however, that the copula has different forms in a negative clause.

9. Agreement may be missing in the most colloquial forms of Welsh. However, it is obligatory in more standard varieties.

10. Rouveret (1994) proposes that post-nominal adjectives are left adjoined to a following NP, from which the noun is extracted. He argues that this approach explains the order of adjectives in an example like (i).

(i) cwpan mawr gwyrdd Sieineaidd
cup big green Chinese
'a big green Chinese cup'

Here the order is the same as in English, where it is plausible to assume that adjectives are adjoined to a following NP. However, as Willis (2003) points out, examples like the following show that the order of adjectives is not always the same as in English.

(ii) athro ifanc hoffus
teacher young likeable
'a likeable young teacher'

(iii) bardd ifanc addawol
poet young promising
'a promising young poet'

I don't think, then, that adjective order provides any evidence against the analysis proposed in the text.

11. Kathol assumes that the AGR feature in nouns encodes their inherent properties. I assume that these features should be handled in some other way.

12. A less informal version of (34) would be as follows, where 'SS' stands for SYNSEM, a feature whose value encodes the main syntactic and semantic properties of an expression:

(i)

$$\begin{bmatrix} \text{SS}\begin{bmatrix} \text{HEAD}[1]\begin{bmatrix}\text{INFL} - \\ \text{AGR}[2]\end{bmatrix} \\ \text{SPR} <> \end{bmatrix} \\ \text{DTRS} < [3]\begin{bmatrix}\text{SS}\begin{bmatrix}\text{HEAD}\begin{bmatrix}\textit{det} \\ \text{AGR}[2]\end{bmatrix}\end{bmatrix}\end{bmatrix}, \begin{bmatrix}\text{SS}\begin{bmatrix}\text{HEAD}[1] \\ \text{SPR} < [3] >\end{bmatrix}\end{bmatrix} > \end{bmatrix}$$

13. It may be that (35) is too strong. It is possible in a very literary variety of Welsh to have a proclitic associated with the pronominal object of a finite verb. Thus, the following is possible in this variety of Welsh.

(i) Fe 'u cerais i nhw.
PRT 3PL loved I them
'I loved them.'

If proclitics are specifiers, such examples a specifier with an [INFL +] category contrary to (35). However, given their very literary character, it may be that such examples should not be seen as part of the ordinary grammar of Welsh, in which case there will be no objection to (35). An important fact about Welsh is that no specifier can occur with a noun that has a non-pronominal possessor. Thus, the following is ungrammatical:

(ii) * y tad y bachgen
the father the boy
'the boy's father'

We can rule out such examples with the following constraint:

(iii)

$$\begin{bmatrix} \text{HEAD } \textit{noun} \\ \text{COMPS} < \text{NP} : \textit{npro}, \ldots > \end{bmatrix} \rightarrow [\text{SPR} <>]$$

14. Such cases provide further evidence against the view that the mutation that we are concerned with here is an instance of case. One does not expect case to be quite as superficial as this.

15. Some further relevant data are highlighted in Tallerman (2003). She notes that objects of impersonal verbs are unmutated if they immediately follow the verb but are mutated if they are separated from it by some adverbial expression. Thus, we have contrasts like the following:

(i) Lladwyd plant.
kill.IMPERS.PAST children
'Children were killed.'

(ii) Lladwyd hyd yn oed blant. (plant)
kill.IMPERS.PAST even children
'Even children were killed.'

16. Levine and Hukari (forthcoming, chapter 8) provide independent arguments that unbounded dependency gaps must be represented in constituent structures.

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