

# One of those constructions that really needs a proper analysis

Doug Arnold   
University of Essex

Christopher Lucas   
SOAS, University of London

Proceedings of the Joint 2016 Conference on Head-driven Phrase Structure  
Grammar and Lexical Functional Grammar

Polish Academy of Sciences, Warsaw, Poland


Doug Arnold, Miriam Butt, Berthold Crysmann, Tracy Holloway King, Stefan  
Müller (Editors)

2016

Stanford, CA: CSLI Publications

pages 43–63

Keywords: HPSG, English, syntax, semantics, agreement mismatch

Arnold, Doug & Christopher Lucas. 2016. One of those constructions that really needs a proper analysis. In Doug Arnold, Miriam Butt, Berthold Crysmann, Tracy Holloway King & Stefan Müller (eds.), *Proceedings of the Joint 2016 Conference on Head-driven Phrase Structure Grammar and Lexical Functional Grammar*, Polish Academy of Sciences, Warsaw, Poland, 43–63. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2016.3. 

## Abstract

We describe, and provide an HPSG account of, a hitherto little studied English construction (of which the title of the paper is an instance) involving an agreement mismatch: a partitive construction in which a plural nominal is apparently modified by a singular relative clause.

## 1 Introduction

Example (1) seems impeccable to almost all English speakers:

- (1) This is one of those problems that really bothers me.

This should be surprising, since it involves an ‘agreement mismatch’, a failure of agreement between a plural nominal head (*those problems*) and a singular modifier – the relative clause *that really bothers me* contains a third person singular verb, indicating that the subject is singular, as made explicit in (2). Normal agreement would produce (3).

- (2) This is one of those problems<sub>pl</sub> [which  $\Delta_{sg}$  really bothers me].  
(3) This is one of those problems<sub>pl</sub> [which  $\Delta_{pl}$  really bother me].

We think any remotely plausible grammatical theory that provides an account of partitive constructions and relative clauses will predict that (2) is ungrammatical, and that speakers should reject it in favour of (3), but they do not. On the contrary, the ‘mismatch’ construction exemplified in (2) is widely attested, and normally goes un-noticed (some slightly edited corpus examples can be seen in (4), the first three are from the British National Corpus; as a reading aid, here and below we underline the plural noun and item in the relative clause that signals that there is a mismatch). It is in fact far more frequent than the alternative construction, even in relatively careful writing, at least with typical nouns such as *things* – searching Google Books for *one of the things that bothers me*, which is an instance of the mismatch construction, gives about 5860 results; searching for the corresponding form with regular agreement (i.e. with *bother* in place of *bothers*) gives 698 hits.<sup>1</sup>

---

<sup>†</sup>As well as HeadLex 2016 in Warsaw, versions of this paper have been presented at the Third European Workshop on HPSG (‘Auf nach Frankfurt’, in Frankfurt, November 2015), and the 2016 meeting of the Linguistics Association of Great Britain. We are grateful to participants at those meetings, to our colleagues at Essex and SOAS, and anonymous referees for HeadLex 2016 for discussion, comments, and support. Remaining deficiencies are entirely our responsibility.

<sup>1</sup>We assume here that (2) and (3) are equivalent, except that the mismatch construction is more frequent. This may be an over-simplification: for example, while the present authors think there is not much to choose between (2) and (3), we find it much more natural to talk about *one of the things that bugs me about you*, where there is an agreement mismatch, than to use the plural verb form *bug* in the relative clause.

- (4) a. Dr Hemingway and colleagues [...] have also found one of the genes that makes malaria-transmitting mosquitoes resistant to pesticides such as DDT. [AKD/871]
- b. This generation of vipers has again bitten one of the hands that was stretched out in blessing it. [B1J/1984]
- c. The Cullen report is widely recognised as one of the most excellent reports that has ever been produced on matters that affect industrial safety. [HHX/19354]
- d. It was, and remains, one of the best goals that has ever been scored at Carrow Road. . . [Edward Couzens-Lake, *Norwich City in the Eighties*, Amberley Pub., Stroud, 2015]

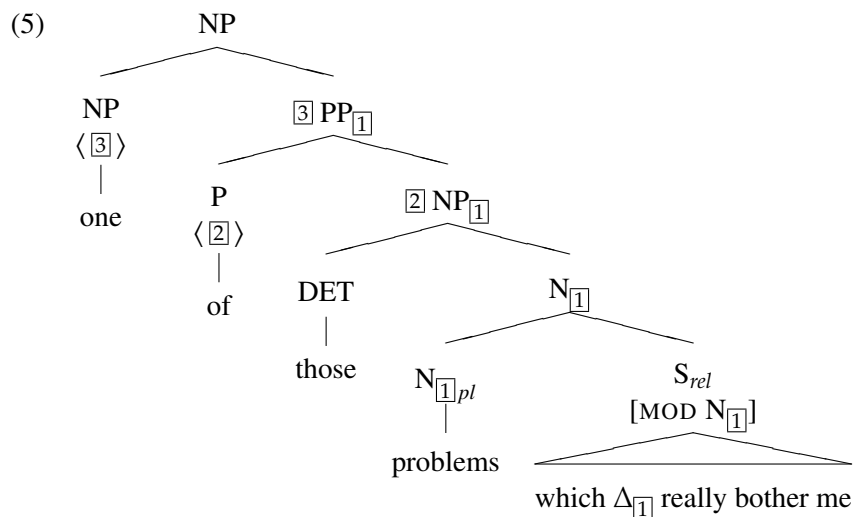
While the mismatch construction in (2) has been noted before (e.g. Huddleston and Pullum (2002, p506), Pinker (2014, p250) and in some prescriptive grammars, e.g. Burchfield (2004, p30,550)) it has not received much attention in the formal literature: de Hoop et al. (n.d.) is the only discussion we are aware of.<sup>2</sup> The goal of this paper is to provide a relatively detailed discussion of the construction, by exploring a number of potential, but flawed, approaches (Section 2). On the basis of this, in Section 3 we will outline a rather straightforward, and descriptively plausible, formal account, using very standard HPSG apparatus. Section 4 notes some problems and open questions.<sup>3</sup>

## 2 The Problem, and Some Non-solutions

It is useful to begin with discussion of cases involving ‘normal’ agreement, such as (3), for which (5) is a plausible representation. Overall, what we have in (5) is a partitive construction where the ‘quantity word’ is *one*. Following existing analyses of partitive constructions in HPSG (e.g. Kim (2002), Flickinger (2008), Kim and Sells (2008)), we assume that *one* is a nominal here, which selects a PP complement headed by *of*, which must itself contain a plural NP. We assume that *of* is a non-predicative preposition here, so that it has the same content (CONT) as its complement NP. As a consequence it has the same INDEX value, which we have indicated as a boxed subscript (as is standard in HPSG, we assume indices are feature bundles containing PERSON, NUMBER, and GENDER attributes). As one would expect, this index is also shared by the

<sup>2</sup>A good collection of links and prescriptive grammar sources that mention the construction can be found at <http://english.stackexchange.com/questions/232255/is-this-correct-one-of-the-things-that-makes-him-great-is>.

<sup>3</sup>Our discussion here is restricted to English. We have some indications that a similar construction exists in several other languages, including Maltese and Spanish. However, we will not pursue this here. See de Hoop et al. (n.d.) for discussion of a similar construction in Dutch.



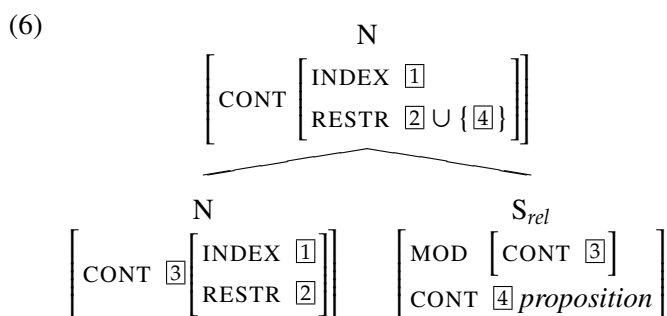
head noun *problems*, which is plural, so  $\boxed{1}$  in (5) stands for [NUM *pl*].<sup>4</sup>

Our assumptions about relative clauses reflect the analysis of Sag (1997), except that we take (restrictive) relative clauses to be modifiers of N (or perhaps Nom), rather than NP, and that subject relatives involve a gap (both are for presentational reasons, neither has significant implications for the analysis). The fact that relative clauses are nominal modifiers is indicated by their MOD value.<sup>5</sup> General principles require that in head-adjunct structures the SYNSEM value of the head daughter must be identical to the MOD|SYNSEM value of the adjunct daughter, with the consequence that the index of the head (SYNSEM|LOCAL|CONTENT|INDEX) must be identical to the index in the MOD value of the adjunct: since *problems* is  $N_{\boxed{1}}$ , the relative clause *that really bother me* must be [MOD  $N_{\boxed{1}}$ ], as it is in (5). The grammar of relative clauses involves a set-valued feature REL, which in English is constrained to contain at most one element. This element is identical to the index of the modified noun, and (in the case of *that*-relatives as in (5)) the index of the relativized NP. Hence in (5) the relative clause is [MOD  $N_{\boxed{1}}$ ], and the index of the subject is also  $\boxed{1}$ , i.e. [NUM *pl*]. Normal agreement processes require the third person plural form *bother*, which is what we have. Similar constraints apply in *wh*-relatives and non-finites.

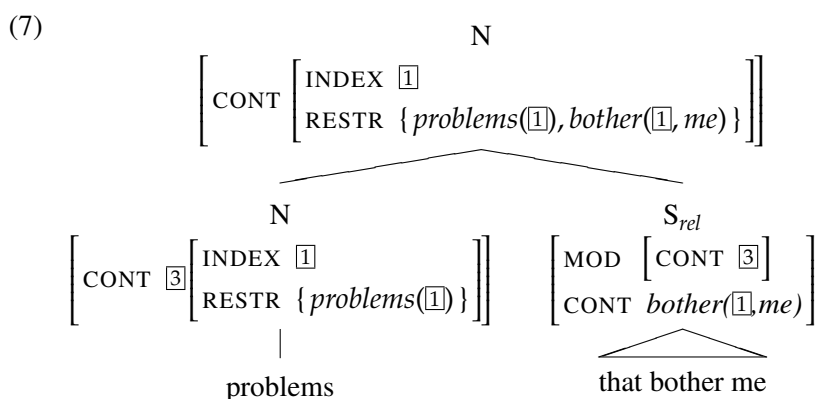
<sup>4</sup>Alternative analyses might treat *one* as a determiner associated with a phonologically empty head noun which takes the PP as a complement, or perhaps involve some kind of an ellipsis (cf. *one problem of those problems*). Technical details aside, nothing in what follows depends on this.

<sup>5</sup>Much recent work uses the SELECT feature in place of MOD: changing this would have no effect on the analysis here.

As regards the semantics, Sag's analysis of relative clauses involves a constraint like (6). In words: if a relative clause modifies a nominal whose index is  $\boxed{1}$  and whose restrictions are  $\boxed{2}$ , it produces a nominal whose index is  $\boxed{1}$ , and whose restrictions are  $\boxed{2}$  plus the propositional content of the relative clause.



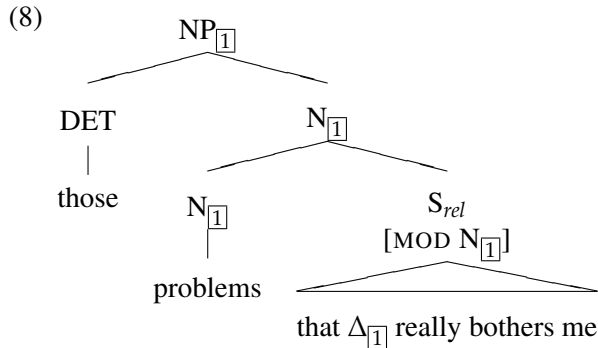
In the case of a normal plural relative modifying a plural nominal as we have in (5), this will amount to (7), where the propositional content of the relative clause has been added to the restrictions of the noun. Intuitively, the value of CONT on the mother node here describes a plurality  $X$  such that  $X$  is a plurality of problems, and where this plurality bothers the speaker.



We can now see quite sharply what is problematic about the mismatch construction from (2), repeated here:

(2) This is one of those problems<sub>pl</sub> [that  $\Delta_{sg}$  really bothers me].

The obvious analysis will give a representation as in (8) for the downstairs NP.



Just like the case of normal agreement in (5), the mismatch construction in (8) contains an N and a relative clause, and there is an index  $\boxed{1}$ , which must be the same everywhere indicated. The difference is that in (8) it clearly *cannot* be the same everywhere, because the subject of *bothers* must be [INDEX | NUM *sg*], and *problems* is clearly [INDEX | NUM *pl*], because of its morphology and the plural determiner *those*. And of course, (8) is completely ungrammatical if it appears anywhere apart from the construction we are discussing here:

(9) \*those problems which really bothers me

On the face of it, this construction poses a serious challenge for standard accounts of agreement in HPSG e.g. Pollard and Sag (1994), Kathol (1999), Wechsler and Zlatić (2003).

There is clearly something wrong: such a construction should be impossible, but not only is it possible, it seems to be generally used, and even preferred, by native speakers. But it is far from obvious *what* is wrong. In the remainder of this section we will consider a number of more or less plausible suggestions.

Perhaps the best starting point for an analysis is a consideration of other agreement mismatches, of which there are several in English. It seems to us very unlikely that the mismatch construction can be analysed as one of them.

Examples like (10) show a plural expression (*ten days in Florida*) being treated as singular (cf the singular determiner *that*, and singular agreement on the verb). Huddleston and Pullum (2002, p354) talk about the plural nominal here being ‘respecified’ as singular (cf also Maekawa (2015), other cases of ‘respecification’ are discussed in Pollard and Sag (1994, Ch2)):

(10) [That ten days we spent in Florida] was fantastic.

But this is rather unlike our construction. What we have in (10) is a plural NP respecified as singular (denoting a single entity – a group or collection), our construction is rather the reverse in that it involves a singular predicate being understood as plural.

Measure phrases (pseudo-partitives) also show some odd (variable) agreement behaviour, witness (11):

- (11) a. That pile of problems that has puzzled philosophers down the ages. . .  
b. That pile of problems that have puzzled philosophers down the ages. . .

But of course our construction does not involve a measure phrase, and what we see in (11) seems to be a straightforward matter of high vs. low attachment – the relative clause can either be attached high, and interpreted as modifying *pile* (in which case it is singular) or attached low, modifying *problems*, in which case it is plural. As will become clear below, this line of analysis is of no help with our construction.

Some measure phrases seem to be ‘transparent’ to number, e.g. *a lot of problems* seems to be internally singular (because of the singular article), but it is externally plural. For these the only option is plural agreement:

- (12) [A lot of problems] have/\*has been solved today.

However, notice that with measure phrases like this the mismatch construction is never allowed:

- (13) a. One of those problems<sub>pl</sub> that  $\Delta_{sg}$  annoys you . . .  
b. \*A lot of those problems<sub>pl</sub> that  $\Delta_{sg}$  annoys you . . .

Conceivably, an alternative analysis might be that there is something special about the head noun, e.g. that in (8) *problems* is not plural. But this seems utterly implausible: not only does *problems* have plural morphology, it has a plural determiner (*those*), and in partitives involving countable nouns the downstairs NP is *always* plural (and only countables will be possible with a numeral like *one*) – a fact which makes intuitive sense given the meaning of the partitive, which involves selecting from a set or collection.

A potentially more plausible approach might involve the idea that there is something odd about the relative clause. While one cannot rule this out completely, the difficulty is that there are no obvious restrictions on the kind of relative clause that is possible in the mismatch construction. The example we have discussed so far is a subject relative with *that*. But relatives involving *which* and other relative pronouns are possible:

- (14) a. This is one of those problems which really bothers me.  
b. She is one of those people who really annoys me.

As (15) shows, the relativized NP need not be a ‘top-level’ subject:

- (15) This is one of those problems that<sub>i</sub> [we think [ $\Delta_i$  deserves urgent attention]].

Examples involving relativised subjects of finite verbs are the most obvious, because of agreement phenomena, but examples involving non-subject relatives can also be constructed. In (16) the relativised NP is the object of *add*, so there is no indication of its number on the verb, but it must be singular, because it is co-indexed with the singular *itself*. Similarly, in (17) the relative pronoun *who* is interpreted as the object of *leave*, and is co-indexed with singular *himself*. (18) makes the same point: *who* is the object of *understand*, it must be singular because it is co-indexed with singular *his*.

- (16) This is one of those numbers (that) you can add  $\Delta_i$  to itself<sub>*i*</sub> to get an interesting result.  
 (17) He is one of those people (who<sub>*i*</sub>) you should leave  $\Delta_i$  strictly to himself<sub>*i*</sub>.  
 (18) He is one of those patients (who<sub>*i*</sub>) you can't understand  $\Delta_i$  until you have met his<sub>*i*</sub> mother.

Notice that in each of these *that* or the relative pronoun are optional, i.e. bare relatives are possible. The following exemplify some other kinds of relative clause. The examples in (19) involve pied-piping, and (20) shows examples with non-finite relative clauses:

- (19) a. He's one of those people [about whom<sub>*i*</sub>] even his<sub>*i*</sub> best friends have reservations.  
 b. He's one of those candidates [about whose<sub>*i*</sub> electoral prospects] not even his<sub>*i*</sub> strongest supporters could be certain.  
 c. He may turn out to be one of those musicians [whose<sub>*i*</sub> appeal] is only clear when you actually see him<sub>*i*</sub> live.  
 (20) a. His sister had married one of the first merchants [to establish himself as a plantation owner in Virginia].  
 b. The Weisswurst is one of those sausages [intended to be eaten without its skin].

What this suggests is that there is nothing inherently odd about the kind of relative clause that appears in the mismatch construction, and consequently no motivation for introducing a special kind of 'mismatch relative' which only appears in this construction. This means that we are stuck with the idea that the construction involves a singular relative (i.e. one specified as [MOD  $N_{[sg]}$ ]).

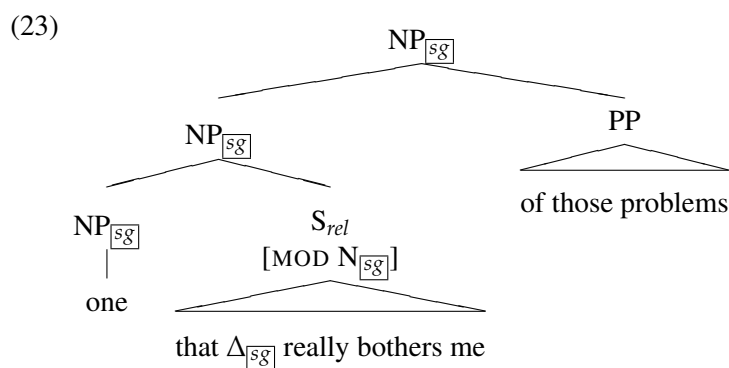
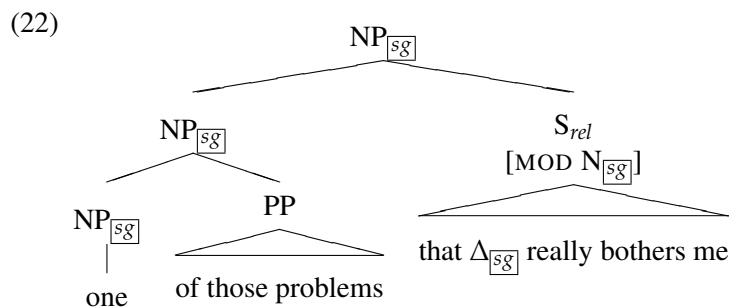
The following is a more initially appealing, but still fatally flawed, approach. Externally, partitive NPs with the quantity word *one* trigger singular agreement, and in general behave like normal singular indefinites, regardless of whether they show normal or 'mismatch' agreement. For example, (21) shows mismatch NPs in several syntactic environments (complement of existential *be*, normal subject, object of a preposition, and coordinated with a normal singular



indefinite). This is not at all surprising, of course: one would expect an NP whose quantifier is *one* to be singular and behave in this way, and in general a partitive like *one of those problems* and a singular indefinite like *a problem* are very similar in meaning.

- (21) a. There's [one of those letters that always annoys me] in the post.  
 b. [One of those letters that annoys me] has found its way into the post.  
 c. I have just torn up [one of those letters that always annoys me].  
 d. It's either [[a circular] or [one of those letters that always annoys me]].

This might lead one to try to analyse the singular relative clause in the mismatch construction as a modifier of the singular NP *one of those problems*, or the quantity word *one*, rather than the plural noun *problems*, assigning a structure along the lines of (22) or (23) (of course, (23) cannot be a representation of the surface syntax, but the surface syntax could presumably be derived by assuming some form of extraposition).<sup>6</sup>



One problem with these analyses can be seen from the interpretation of the pronoun *them* in (24).

<sup>6</sup>Taking the relative clause as a modifier of *one* in this way seems to be the basis of de Hoop et al. (n.d.)'s approach.

(24) This is one of those problems that really bothers me. I wish I could ignore *them*.

The interpretation of *them* in (24) involves the intersection of ‘problems’ and ‘things that bother me’ – what the speaker wishes she could ignore is not just a set of problems, it is a set of ‘problems that bother her’. To get this reading, the singular relative clause *that really bothers me* must be interpreted as a restrictive modifier of *problems*, exactly like a normal plural relative. It cannot be interpreted as a modifier of *one* or *one of those problems*.<sup>7</sup> Strong reinforcement of this point can be seen by considering examples involving negative polarity items (NPIs) and superlative adjectives. As is well known, superlative adjectives create contexts which permit NPIs like *ever* in their scope. Witness the contrast in (25): (25a) is grammatical, but without the superlative *most impressive* the NPI *ever* is disallowed, making (25b) ungrammatical.

- (25) a. the most impressive goals that have ever been seen in this stadium  
b. \*the goals that have ever been seen in this stadium

Unsurprisingly, this contrast can be seen in partitives involving normal agreement:

- (26) a. one of the most impressive goals that have ever been seen in this stadium  
b. \*one of the goals that have ever been seen in this stadium

We assume that what is happening here is that the superlative operator scopes over the adjective, the nominal that the adjective modifies, and all other intersective modifiers of that nominal.

The important point here that exactly the same pattern can be seen with ‘mismatch’ relatives:

- (27) a. one of the most impressive goals that has ever been seen in this stadium  
b. \*one of the goals that has ever been seen in this stadium

In this example, and in attested examples like (4c) and (4d), we see NPIs in relative clauses in the mismatch construction. This is natural if the relative clause is in the semantic scope of the superlative (as it is in the ‘normal’ cases),

---

<sup>7</sup>Treating the relative clause as a modifier of *one of those problems* as in (22) amounts to treating it as a non-restrictive relative, which requires *which* in place of *that* (in general, *that* relatives cannot be interpreted as non-restrictive):

(i) This is one of those problems, which really bothers me.

This is interpreted like *This is one of those problems, and it really bothers me*, and as one would expect, it provides ‘(those) problems’, but not ‘problems that bother me’ as an antecedent for *them*.

e.g. if mismatch examples involve the same basic structure as ‘normal’ ones. But it is inexplicable if the input to compositional interpretation is a structure like (22), where the relative clause is only in the scope of *one*.

A natural reaction to agreement mismatches in general is to wonder whether it may be possible to exploit the distinction between INDEX and CONCORD agreement: INDEX agreement is ‘semantic’ – to do with denotation and how discourse entities are individuated and tracked across discourse; CONCORD agreement is simply ‘formal’ or morphosyntactic (see, e.g. Kathol (1999), Wechsler and Zlatić (2003)).<sup>8</sup> This approach is also not promising. It is not at all clear how this could work in practice, but the general idea might be that combining a relative clause with its head (sometimes) involves CONCORD, where the CONCORD and INDEX values can differ. One problem is that it is normally assumed that for number values (as opposed to gender values), CONCORD and INDEX are identical, so this would be something of an innovation.<sup>9</sup> A second problem would be over-generation: there seem to be no other cases of singular relatives modifying plural nouns – as noted above (see (9)) examples like (28) are normally completely ungrammatical – so one would have to find some way of restricting the domain of application of the relevant principles to just the partitives we are discussing here (e.g. those with *one* as the quantity word).

(28) \*I want to talk about [those problems which has been bothering me].

More seriously, this sort of approach would provide at most a partial solution, because, though it might deal with some issues on the syntactic side of things, it does not address the semantic issue at all. It is very hard to avoid the assumption that the antecedent N in the mismatch construction is semantically plural, hence [INDEX | NUM *pl*] (e.g. it clearly denotes a plurality). Moreover, relevant aspects of agreement inside the relative clause involve INDEX values: subject-verb agreement, and pronoun antecedent agreement are generally assumed to involve INDEX values, so we have clear evidence that the relative pronoun in the mismatch construction is [INDEX | NUM *sg*]. What this means is that whatever we do about CONCORD values, we will still be faced with combining a semantically plural predicate (corresponding to the head N) with a seman-

---

<sup>8</sup>We are grateful to an anonymous referee for mentioning another suggestion, which we think is on the same lines, and subject to the same objections. Müller (1999) introduced a feature REF which is used for reference tracking, and which is at least partially independent of morphosyntactic properties, leaving the INDEX feature free to reflect morphosyntactic properties.

<sup>9</sup>Though perhaps it cannot be ruled out entirely. Wechsler and Zlatić (2003, p50ff) discuss a class of collective nouns in Serbo-Croatian (the *deca*-type) which trigger singular agreement inside NP, but antecede plural pronouns, and Corbett (2006, Ch5) lists a number of other mismatches which might invite this kind of analysis, so this alignment of number values can be only a default generally. However, dissociating INDEX | NUM and CONCORD | NUM would still be a significant innovation for English, where it is otherwise not attested.

tically singular predicate (corresponding to the relative clause), and this will not be straightforward. Standard views on the semantics of plurality (see, e.g. Winter and Scha, 2015) regularly draw a sharp distinction between pluralities and ‘ordinary’ individuals: a plurality is a collection of ordinary individuals. The difference is that whereas, for example, the ultimate component parts of a plurality of people are individual persons, the component parts of an individual person are not. Sometimes this is analysed as a difference of logical type (pluralities are treated as sets, of type  $\langle e, t \rangle$ , whereas ordinary individuals are of type  $e$ ), or as a difference among sorts of individual of the same type (e.g. pluralities satisfy an ‘atomicity’ requirement which ordinary individuals fail to satisfy). Whatever analysis is chosen, compositional semantics will deliver a singular predicate for *that bothers me*, and a plural predicate for *problems*, and combining them will not be a straightforward matter. An analysis which deals only with the syntax of the mismatch construction does not provide a solution.<sup>10</sup>

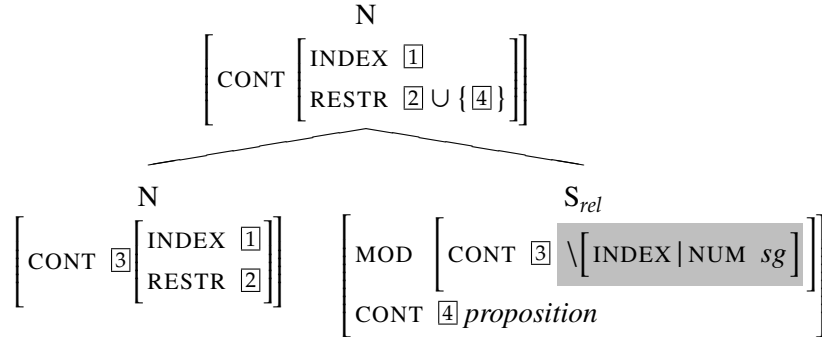
For those familiar with the LFG literature, a natural response to feature mismatches is to try to employ the ‘restriction’ operator introduced into LFG by Kaplan and Wedekind (1993). Intuitively, where  $P$  is a collection of attributes and values, the notation  $\boxed{1} \setminus P$  should be read as: the value  $\boxed{1}$  with the attributes and values in  $P$  ‘restricted out’. If  $\boxed{1}$  is as in (29a), then  $\boxed{1} \setminus [\text{INDEX} \mid \text{NUM } sg]$  will be as in (29b).

$$(29) \text{ a. } \left[ \text{INDEX} \begin{array}{l} \text{PER } 3 \\ \text{GEN } \textit{neut} \\ \text{NUM } \textit{sg} \end{array} \right] \quad \text{b. } \left[ \text{INDEX} \begin{array}{l} \text{PER } 3 \\ \text{GEN } \textit{neut} \end{array} \right]$$

The leading intuition here would be that the constraint on phrases consisting of a noun and a relative clause given in (6) is too strict in requiring *identity* of index values between head noun and relative clause, what we should require is identity modulo the number value. (6) could be replaced by (30), with the addition highlighted.

<sup>10</sup>This is one reason why we do not consider other purely formal approaches, such as the following. The reason there is a mismatch between  $\text{INDEX } sg$  and  $\text{INDEX } pl$  is that  $sg$  and  $pl$  are maximal types. We could thus avoid a mismatch if we introduced a common sub-type ( $sg-pl$ , say), to which  $sg \wedge pl$  would resolve. This might provide a solution to the morphosyntactic problem (assuming one could avoid the massive overgeneration that would result in this value being available everywhere), but it would leave the conceptual/semantic issues unresolved.

(30)



The intention here would be to remove the singular specification in the MOD value of the relative clause: though the internal makeup of a particular relative clause may result in a MOD value which requires an index value like (29a) (i.e. a relative clause that can only modify a third person singular neuter nominal), the specification in (30) would replace (29a) with (29b), and allow a singular relative clause to combine with a nominal regardless of its number, which seems to be what we want in the mismatch construction.

Unfortunately, this is not a solution. Leaving aside the issue of overgeneration (how would we ensure that this method of combining nominals and relative clauses only applies in the construction under discussion?), the problem is that though the restriction in (30) may allow us to ignore the mismatch between the singular specification in the MOD value of the relative and plural on the modified noun, it does not avoid the fact that we will be trying to combine incompatible values, as will be seen elsewhere in the structure. For example, in a singular relative clause like *that*  $\Delta_{\boxed{1}}$  *bothers me when I think about it* $_{\boxed{1}}$ , the singular index  $\boxed{1}$  appears on the subject, in the specification of the properties of the subject of the verb *bothers*, in the semantics of the first argument of *bothers* (i.e. *bothers*( $\boxed{1}$ , *me*)), on the co-indexed pronoun *it*, and in the REL value of the relative clause, and in all these places it must be [NUM *sg*]. But the same index also occurs in the content of the head noun *problems*, where it is [NUM *pl*]. The restriction operator in (30) seems to allow us to ignore one feature mismatch, but it does not allow us to ignore all the others. To get the effect we want, we would have to restrict out the value of INDEX | NUM *everywhere* in the relative clause structure, which is of course impossible, because we cannot know where it may occur, ahead of time.<sup>11</sup>

<sup>11</sup>A reader familiar with the use of the restriction operator in LFG may wonder why this is not a problem for its use in LFG. The difference is this: in LFG, the operator is used on f-structures, which are ‘models’, that is solutions to constraints, and re-entrance in f-structures means that all paths to a particular value are equivalent. Of course, the same is true in the models of HPSG constraints. However, the structures that one sees in presentations of HPSG – such as (30) – do not represent models or solutions to constraints, but the constraints themselves, and so changing

However, one might try to develop a different intuition about (30), along the following lines. While it is true that (30) combines a nominal with a plural index and a relative clause with a singular index in several places, (30) is the only place where a link is made. One could think of the restriction operator as severing this link: then the noun can remain plural, and the relative clause can remain singular. The problem with this is that if we sever the link between the index on the nominal and the indices in the relative then we cannot get the intersective semantics we require. To get the right semantics we need something like the normal plural agreement case, as in (31a), which will produce restrictions like (31b).

- (31) a.  $\text{problems}_{\boxed{1}} \text{ that } \Delta_{\boxed{1}} \text{ bother me}$   
 b.  $\text{problems}(X) \wedge \text{bother}(X, me)$

If we sever the link between the index on the nominal and the indices in the relative, we will get something like (32a), and restrictions like (32b), where  $y$  is an unbound variable.

- (32) a.  $\text{problems}_{\boxed{1}} \text{ that } \Delta_{\boxed{2}} \text{ bothers me}$   
 b.  $\text{problems}(X) \wedge \text{bothers}(y, me)$

It is not immediately obvious how one should interpret unbound variables, but one idea is that they are existentially bound by default. This would give something like (33b) as the interpretation of (33a). This will be true if there is some unique plurality  $X$  of problems, and Kim solved  $X$ , and some entity  $y$  (potentially unrelated to  $X$ ) that bothers me. This does not capture the meaning of (33a).<sup>12</sup>

- (33) a. Kim has solved one of the problems that bothers me.  
 b.  $\exists X. \text{unique}(X) \wedge \text{problem}(X) \wedge \exists y. \text{bothers}(y, me) \wedge \text{solved}(Kim, X)$

To summarise: we have in the mismatch construction a genuine agreement mismatch, involving a conflict of INDEX values, in which a normal, syntactically singular, relative clause must be interpreted as a restrictive modifier of a plural nominal. We have looked at a number of possible approaches, all of which more or less implausible or inadequate. In the following section we will remedy this.

---

one path to a value does not necessarily change all. It is easy to be misled by the fact that both LFG and HPSG use the same structures (attribute-value matrices) in such different ways.

<sup>12</sup>Alternative ways of dealing with unbound variables include assigning them universal force (which would wrongly make (33a) entail that everything bothers me), or treating them as indicators of ungrammaticality (which would wrongly make (33a) ungrammatical).

### 3 An HPSG Analysis

Though we saw above that the problem of the mismatch construction cannot be solved by having the relative clause modify *one*, it is clear that *one* plays a crucial role in the construction, since it is not a general property of quantity words that they allow the mismatch construction.<sup>13</sup>

(34) \*Two/\*Some/\*Many\*/All/\*None of the problems that bothers you have been solved.

The obvious (and we think correct) way to capture this is to treat the relative clause as a dependent (specifically, an optional complement) of *one*. In what follows we will develop this proposal.

The following is a plausible starting point for normal partitive *one* (as it appears in normal partitives e.g. *one of the problems*).

$$(35) \left[ \begin{array}{l} \text{ARG-ST} \left\langle \left[ \begin{array}{l} \text{LOC} \mid \text{CONT} \left[ \begin{array}{l} \text{INDEX } \boxed{X} \\ \text{RESTR } \boxed{R} \end{array} \right] \right] \right\rangle \\ \text{SS} \mid \text{LOC} \left[ \begin{array}{l} \text{CONT} \left[ \begin{array}{l} \text{one-part-rel} \\ \text{INDEX } \boxed{x} \left[ \text{NUM } \textit{sg} \right] \\ \text{RESTR } \left\{ \boxed{x} \in \boxed{X} \right\} \cup \boxed{R} \end{array} \right] \end{array} \right] \end{array} \right]$$

According to this, partitive *one* takes a PP *of* complement, which has a plural index  $\boxed{X}$  and some restrictions  $\boxed{R}$  (for clarity and readability we will from now on indicate singular indices with lowercase variables like  $\boxed{x}$ , and plural ones with uppercase variables like  $\boxed{X}$ ). It takes this index and these restrictions and produces content whose relation is the ‘*partitive-one-rel*’, and whose index is singular  $\boxed{x}$ , which is a part of the plurality. For example, given a PP like *of those problems*, whose content is as in (36), the content of *one of those problems* will be as in (37).<sup>14</sup>

<sup>13</sup>In fact, not all forms of *one* license the construction, in particular determiner *one* (i.e. *one* that appears with an explicit noun) does not license it – examples like the following require a plural relative:

(i) \*one token/example/instance of the problems that bother/\*bothers me

In what follows, all lexical entries for *one* should be understood as relating to nominal *one* (i.e. specified as SYNSEM|LOCAL|CAT|HEAD *noun*).

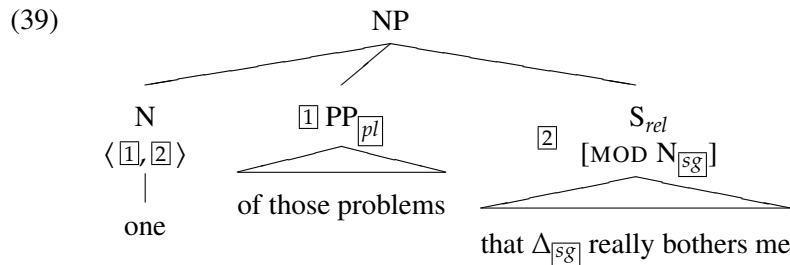
<sup>14</sup>Since *of* is a non-predicative preposition, its content is the same as that of its NP complement, i.e. a *nominal-object*, specifically an *npro* (non-pronominal).

$$(36) \left[ \begin{array}{l} npro \\ \text{INDEX } \boxed{X} \\ \text{RESTR } \{ \textit{those\_problems}(\boxed{X}) \} \end{array} \right]$$

$$(37) \left[ \begin{array}{l} \textit{partitive-one-rel} \\ \text{INDEX } \boxed{x} \\ \text{RESTR } \{ \boxed{x} \in \boxed{X}, \textit{those\_problems}(\boxed{X}) \} \end{array} \right]$$

Treating the relative clause as a complement of *one* involves providing it with an additional lexical entry, for which (38) is a first approximation, and where the additions with respect to (35) have been highlighted ((35) and (38) can easily be collapsed into a single entry). This will give structures like (39).

$$(38) \left[ \begin{array}{l} \text{ARG-ST } \left\langle \left[ \begin{array}{l} \text{LOC | CONT } \left[ \begin{array}{l} npro \\ \text{INDEX } \boxed{X} \\ \text{RESTR } \boxed{R} \end{array} \right] \right] , \left[ \begin{array}{l} \text{Relc} \\ \text{REL } \{ \boxed{y} \} \\ \text{LOC } \left[ \text{CONT } \boxed{p} \right] \end{array} \right] \right\rangle \\ \text{SS | LOC } \left[ \begin{array}{l} \text{CONT } \left[ \begin{array}{l} \textit{partitive-one-rel} \\ \text{INDEX } \boxed{x} \left[ \text{NUM } sg \right] \\ \text{RESTR } \{ \boxed{x} \in \boxed{X} \} \cup \boxed{R} \cup \boxed{R'} \end{array} \right] \end{array} \right] \end{array} \right]$$



The relative clause specified in (38) has a REL value containing the (singular) index  $\boxed{y}$  with a proposition  $\boxed{p}$  as its content. Since in relative clauses like this the index that appears in the REL value is the index of the relativised NP, for an example like *that  $\Delta$  bothers me*, this proposition will be something like *bothers( $\boxed{y}$ , me)*.

What (38) does not address is how the restrictions of the relative clause should be added to those of the PP (i.e. we have not specified the relationship between  $\boxed{R'}$  and the content of the relative clause). Notice that we cannot identify  $\boxed{y}$  with either of the other indices in (38): we cannot identify it with  $\boxed{X}$  because  $\boxed{y}$  is singular, whereas  $\boxed{X}$  is plural; and if we identify it with  $\boxed{x}$  we



will get the wrong reading, where it is only a single problem that bothers the speaker (cf. the ‘one (which bothers me) of those problems’ reading that we would get from representations like (22) and (23), above). However, we can capture the intended reading if we ‘distribute’ the interpretation of the relative clause across the parts of the plurality  $\bar{x}$ . This can be implemented if  $\bar{R}'$  in (38) is specified as in (40), giving Figure 1 as the full entry.

$$(40) \quad \bar{R}' = \left\{ \left[ \begin{array}{l} \text{QUANTS} \left[ \begin{array}{l} \textit{foreach} \\ \text{INDEX } \bar{y} \\ \text{RESTR } \{ \textit{partof}(\bar{y}, \bar{x}), \textit{atomic}(\bar{y}) \} \end{array} \right] \\ \text{NUCLEUS } \bar{p} \end{array} \right] \right\}$$

Intuitively, the restriction this adds is that every atomic part of the plurality  $X$  satisfies  $p$ , which is the content of the relative clause. In the case of *one of those problems that bothers me*, this additional restriction is that for every  $y$  which is an atomic part of the plurality of problems  $X$  – that is, every individual problem –  $y$  bothers the speaker. This is spelled out in (41a), which we can abbreviate as (41b), giving (42) as the overall content. In words, this amounts to ‘one of those problems each of which bothers me’.

$$(41) \quad \text{a. } \left\{ \left[ \begin{array}{l} \text{QUANTS} \left[ \begin{array}{l} \textit{foreach} \\ \text{INDEX } \bar{y} \\ \text{RESTR } \{ \textit{partof}(\bar{y}, \bar{x}), \textit{atomic}(\bar{y}) \} \end{array} \right] \\ \text{NUCLEUS } \textit{bother}(\bar{y}, \textit{me}) \end{array} \right] \right\}$$

b.  $\{ \textit{foreach}(\bar{y}, \bar{y} \in \bar{x}, \textit{bother}(\bar{y}, \textit{me})) \}$

$$(42) \quad \left[ \begin{array}{l} \textit{partitive-one-rel} \\ \text{INDEX } \bar{x} \\ \text{RESTR } \{ \bar{x} \in \bar{x}, \textit{those\_problems}(\bar{x}), \textit{foreach}(\bar{y}, \bar{y} \in \bar{x}, \textit{bother}(\bar{y}, \textit{me})) \} \end{array} \right]$$

This is the right interpretation, and it correctly reflects the idea that the relative clause is interpreted as a singular throughout, in the sense that the relative pronoun and everything that is co-indexed with it is singular, but is nevertheless interpreted as describing a property of every element of the plurality introduced by the head noun. Notice in particular that it correctly predicts that the antecedent of *them* in (24), repeated here, is a collection of problems that bother the speaker (because it is a collection of problems *each of which* bother the speaker). In this way, it avoids the problems associated with the sort of analysis represented in (22) and (23).<sup>15</sup>

<sup>15</sup>In the previous section, we noted cases where a mismatch relative clause contains a negative

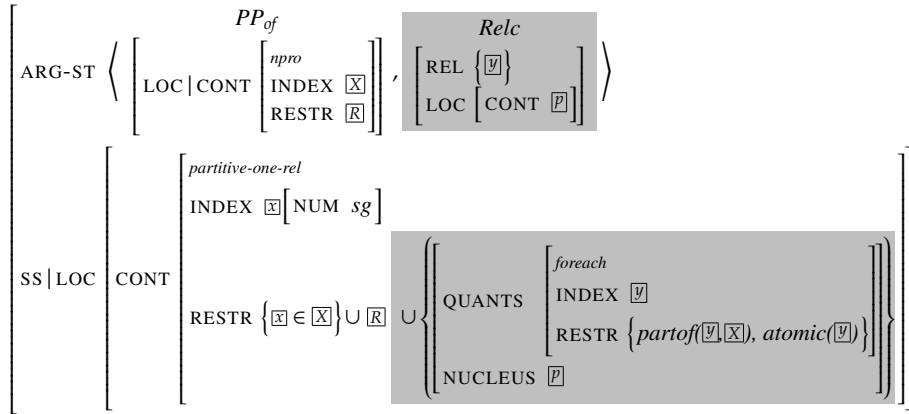


Figure 1: Lexical Entry for *one* in the Mismatch Construction

(43) This is one of those problems that really bothers me. I wish I could ignore *them*.

In this section we have proposed a rather straightforward solution to the problems posed by the mismatch construction, which captures the key distributional facts (dependence on partitive *one*), and gets the semantics right, by showing how a singular relative clause can be interpreted as holding of a plurality. There remain, however, a number of complexities and some open questions which we have not addressed. These are outlined in the final section.

## 4 Open Questions

One obvious objection to the analysis we have presented is that it involves treating a relative clause as a complement (of *one*), whereas relative clauses are normally adjuncts. It is not clear to us how important this objection is. First, cases where heads select as complements expressions that are normally adjuncts are well-known. For example, the verbs *word* and *treat* both select adverbs, as can be seen in (44a) and (44b), and (44c) suggests that adverbs are a necessary part of resultative constructions:<sup>16</sup>

---

polarity item. We assume that adding the restrictions given in (40) to the restrictions of the PP (and hence the lower NP, and the Nominal it contains) is sufficient to put them in the scope of the superlative, and thus account for the possibility of negative polarity items. This is different from (and much simpler than) the account that we gave in the abstract for the conference, and at the conference itself, which involved the use of apparatus for extraposition. We no longer think this is necessary.

<sup>16</sup>Of course, the analysis of at least some adjuncts as complements has been a well-established in the HPSG literature since Bouma et al. (2001). As regards relative clauses specifically, it seems to us arguable that relative clauses associated with superlative adjectives are complements of the

- (44) a. I worded the letter \*(carefully).  
 b. The management has treated Sandy \*(contemptuously).  
 c. This book reads \*(easily).

The following is a more subtle objection. Our analysis treats the relative clause in the mismatch construction as a complement of *one*, and intuitively, one would expect this to explain why the relative clause is singular. But our analysis does not really capture this (or captures it only rather indirectly). According to our analysis, the reason the relative clause is singular is because the index  $\bar{y}$  is singular, and the reason this is singular is because of the atomicity condition (*atomic*( $\bar{y}$ )) – the condition that it be anchored to an atomic part of the plurality denoted by the partitive noun (it is reasonable to assume that atomic parts are always associated with singular variables). Notice, in particular, that there is no real ‘agreement’ between *one* and the relative clause, e.g.  $\bar{x}$ , the index of *one*, figures nowhere in the part highlighted part of Figure 1, which is the part of the lexical entry for *one* that is associated with the relative clause. Again, it is not clear to us how compelling this objection is.

We have described the mismatch construction as crucially depending on the presence of partitive *one*, and given a lexical account. But this is a simplification. First, a number of expressions that include partitive *one* seem to permit the construction.

- (45) a. At least one of the problems that bothers me has been solved.  
 b. More than one of the problems that bothers me has been solved.  
 c. Every one of the problems that bothers me has been solved.  
 d. Not one of the problems that bothers me has been solved.  
 e. Not a single one of the problems that bothers me has been solved.

Moreover, it seems that some other words allow it, at least for some speakers (the following are from the BNC):

- (46) a. *another* of those volcanoes which was thought to be extinct until something nasty happened. [ASR/837]  
 b. *another* of those chores which is easier to carry out during post-production editing... [CBP/901]  
 c. an individual programme fitted for *each* of those who is going on. [ASY/1463]

It is not obvious how to extend our basic account to deal with these data – it would of course be straightforward to deal with the examples in (46) by providing a lexical entry for *another* parallel to that for *one*, but the examples in (45) seem more challenging. Notice in particular that the impossibility of (47a)

superlative, e.g. in cases like *This is the best [(that) we could hope for at present]*.

and (47b) indicates that it is not simply a matter of the mismatch construction being allowed whenever the quantity expression contains *one*. All of this raises the possibility that there may be something more general and more interesting going on.

- (47) a. \*Less than one of the problems that bothers me has been solved.  
b. \*Fewer than one of the problems that bothers me has been solved.

A further, and in some ways more worrying, issue with our analysis is the following. The intuition expressed by our analysis is that the quantity word *one* allows a singular adjunct to be interpreted distributively over the elements of the plural in the partitive. This obviously suggests that the construction should be impossible with relative clauses involving non-distributive predicates – that is, predicates that cannot be applied to ordinary singular individuals, but only to pluralities. There is something in this, as the following data suggest. The predicate *sleep in separate beds* cannot be predicated of singular individuals, as (48a) shows, and as (48b) suggests, it is problematic in a singular relative clause in the mismatch construction.

- (48) a. \*He sleeps in separate beds. (vs. They sleep in separate beds.)  
b. ???one of those people who sleeps in separate beds

The problem is that, while (48b) seems to us to be bad, it is not nearly as bad as it should be (in particular, not as bad as (48a), which is awful). Other examples are even better: the present authors find (49b) and (50b) acceptable, though they involve predicates which should not permit singulars. There is clearly more to investigate here.

- (49) a. \*She is numerous. (vs. They are numerous.)  
b. one of those crazy people who is so numerous on demonstrations these days
- (50) a. \*He meets every week. (vs. They meet every week.)  
b. one of the people who meets every week to discuss semantics

## References

- Bouma, Gosse, Malouf, Rob and Sag, Ivan A. 2001. Satisfying Constraints on Extraction and Adjunction. *Natural Language and Linguistic Theory* 19(1), 1–65.
- Burchfield, R. W. 2004. *Fowler's Modern English Usage*. Oxford: Oxford University Press, revised 3rd edition edition.
- Corbett, Greville G. 2006. *Agreement*. Cambridge: Cambridge University Press.
- de Hoop, Helen, Hogeweg, Lotte and Ramacher, Stefanie. n.d. Singular Agree-

- ment in ‘Special’ Partitive Constructions, unpublished ms.
- Flickinger, Dan. 2008. Transparent Heads. In Stefan Müller (ed.), *The Proceedings of the 15th International Conference on Head-Driven Phrase Structure Grammar*, pages 87–94, Stanford, CA: CSLI Publications.
- Huddleston, Rodney and Pullum, Geoffrey K (eds.). 2002. *The Cambridge grammar of the English language*. Cambridge: Cambridge University Press.
- Kaplan, Ronald M. and Wedekind, Jürgen. 1993. Restriction and correspondence-based translation. In *Proceedings of the 6th Conference of the Association for Computational Linguistics European Chapter*, pages 193–202, Utrecht University.
- Kathol, Andreas. 1999. Agreement and the Syntax-Morphology Interface in HPSG. In Robert D. Levine and Georgia Green (eds.), *Studies in Contemporary Phrase Structure Grammar*, pages 209–260, Cambridge: Cambridge University Press.
- Kim, Jong-Bok. 2002. On the structure of English partitive NPs and agreement. *Studies in Generative Grammar* 12, 309–338.
- Kim, Jong-Bok and Sells, Peter. 2008. *English Syntax: An Introduction*. Stanford, CA: CSLI Publications.
- Maekawa, Takafumi. 2015. ‘Agreement mismatch’ between sort/kind/type and the determiner. In Stefan Müller (ed.), *Proceedings of the 22nd International Conference on Head-Driven Phrase Structure Grammar, Nanyang Technological University (NTU), Singapore*, pages 136–156, Stanford, CA: CSLI Publications.
- Müller, Stefan. 1999. *Deutsche Syntax deklarativ. Head-Driven Phrase Structure Grammar für das Deutsche*. Linguistische Arbeiten, No. 394, Tübingen: Max Niemeyer Verlag.
- Pinker, Steven. 2014. *The Sense of Style: the Thinking Person’s Guide to Writing in the 21st Century*. London: Allen Lane.
- Pollard, Carl J. and Sag, Ivan A. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: University of Chicago Press.
- Sag, Ivan A. 1997. English Relative Clause Constructions. *Journal of Linguistics* 33(2), 431–484.
- Wechsler, Stephen and Zlatić, Larisa. 2003. *The Many Faces of Agreement*. Stanford, CA: CSLI Publications.
- Winter, Yoad and Scha, Remko. 2015. Plurals. In Shalom Lappin and Chris Fox (eds.), *The Handbook of Contemporary Semantic Theory*, pages 77–113, Oxford: Blackwell, second edition.