Abstract

The analysis of the copula as a semantically vacuous word in mainstream HPSG is appropriate for some of its uses, such as the progressive and the passive, but not for its use in clauses with a predicative complement. In such clauses the copula denotes a relation of coreference between the indices of the subject and the predicative complement.

1   The Fregean treatment

The copula belongs to a class of verbs which take a subject-oriented predicative complement. Some typical members of this class are *become, remain* and *seem*, as used in (1a). Semantically, these verbs are treated as functions which take a single clausal argument, as in (1b). Ignoring tense, this formula also represents (1c).

(1) a. John seems sad.

   b. *seem*(*sad*(*John*))

   c. It seems that John is sad.

In terms of the typed feature structure (TFS) notation of HPSG the combination of the verb with its predicative complement can be expressed as in the following AVM of the German *erscheint klug* 'seems clever', quoted from Müller (2002, 105).

(2)
$$
\begin{bmatrix}
\text{CAT} \mid \text{SUBCAT} & \langle \text{NP}_{\boxed{1}}, (\text{NP}[\textit{ldat}]_{\boxed{2}}) \rangle \\
\text{CONTENT} & \begin{bmatrix}
\textit{erscheinen} \\
\text{EXPERIENCER} & \boxed{2}\ \textit{index} \\
\text{SOA} & \begin{bmatrix} \textit{klug} \\ \text{THEME} & \boxed{1}\ \textit{index} \end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

In words, the verb *erscheint* 'seems' assigns the S(TATE-)O(F-)A(FFAIRS) role to its predicative complement *klug* 'clever' and the latter assigns the THEME role to the subject of the verb. Besides, *erscheint* assigns the EXPERIENCER role to its optional dative NP complement. Its equivalent in English is the optional PP[*to*], as used in (3).

(3)   John seems sad to me.

That the PP[*to*] is an argument of the verb and not of the adjective is clear from the fact that its paraphrase is (4a), rather than (4b).

(4) a. It seems to me that John is sad.

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b. It seems that John is sad to me.

Turning now to the copula, if it were analyzed along the same lines as *seem*, (5a) would be represented as in (5b), but what one finds instead is (5c).

(5) a. John is sad.
b. *be*(*sad*(*John*))
c. *sad*(*John*)

The treatment of the copula as semantically vacuous can be traced back to Gottlob Frege, who explicitly claimed that: "it can be replaced by a verbal affix; for example, instead of saying 'this leaf is green' one can say 'this leaf greens'." Frege (1892). Some linguistic evidence for this claim is provided by the observation that the omission of the copula does not affect the meaning of the clause, as illustrated in (6).

(6) a. John seems (to be) sad.
b. With John (being) ill we cannot go on holiday.

In some languages this also holds for the finite forms, more specifically the present tense, as in the Russian (7).

(7) Ona xorosij vrac.
she good   doctor
'She is a good doctor.'

Similar observations have been made about the finite forms of the copula in African American Vernacular English, Japanese, Hungarian, Arabic and Mauritian Creole, see a.o. Bender (2001), Dalrymple et al. (2004) and Henri and Abeillé (2007).

The assumption of semantic vacuity is also adopted in HPSG. In Pollard and Sag (1994, 147), for instance, the CONTENT value of the copula is identified with that of its predicative complement.

(8) $\begin{bmatrix} \text{CAT} \mid \text{SUBCAT} & \left\langle \text{NP}, \text{XP} \left[+ \text{PRD} \right] : \boxed{1} \right\rangle \\ \text{CONTENT} & \boxed{1} \end{bmatrix}$

In words, the copula selects an NP and a predicative XP whose CONTENT value is identical to the one of the copula itself.

2   Problems with the Fregean treatment

Characteristic of the Fregean treatment of the copula is the discrepancy between syntactic and semantic structure: What is syntactically the head of the clause is absent from the semantic representation. Technically, this kind of mismatch is easy to model in a TFS-based grammar, and there is evidence that this treatment is indeed appropriate for the passive and progressive uses of the copula, as will be shown in section 4. However, for its use in predicational structures, as in (5), this treatment is less felicitous for a number of reasons. I will discuss four.

2.1   The semantic type of the nominal predicates

As suggested by Frege's paraphrase of 'this leaf is green' as 'this leaf greens', he assumes that the predicative complement, i.c. *green*, takes on a verbal role, reducing the copula's role to that of a verbal affix. The equivalent of this assumption in HPSG is the stipulation that the predicative complement denotes a state of affairs. More specifically, while the predicative complement can belong to any syntactic category (N, A, V, P), its CONTENT value is invariably of type *soa* (*state-of-affairs*). Objects of that type are canonically assigned to verbs and VPs, and consist of a list of quantifiers, ordered in terms of scope, and a nucleus, as exemplified by the representation of *visit* in (9).

$$
(9) \quad
\begin{bmatrix}
soa \\
\text{QUANTS} \quad list\left(quant\text{-}rel\right) \\
\text{NUCLEUS} \quad
\begin{bmatrix}
visit\text{-}rel \\
\text{VISITOR} \quad i \\
\text{VISITED} \quad j
\end{bmatrix}
\end{bmatrix}
$$

The assignment of the *soa* type to the predicative complements not only reflects the Fregean treatment, it also follows from the analysis of the copula in (8): Since the combination of the copula with its predicative complement is a VP and since the CONTENT value of a VP is of type *state-of-affairs*, it follows, given the structure sharing in (8), that the predicative complement must denote a state of affairs as well.

   This, however, is a problem for the nominal predicates, since nominals have a CONTENT value of type *scope-object*. Objects of that type consist of an index and a set of restrictions on its reference, as exemplified by the representation of *table* in (10).

$$
(10) \quad
\begin{bmatrix}
scope\text{-}obj \\
\text{INDEX} \quad \boxed{1}\ index \\
\text{RESTR} \quad \left\{table(\boxed{1})\right\}
\end{bmatrix}
$$

As a consequence, the nominals must undergo a **type shift** when they are used in predicative position. The notion of type shift was introduced in Partee (1987). In Pollard and Sag (1994, 360) it is modeled in terms of the following lexical rule.[1]

(11)   PREDICATIVE NP LEXICAL RULE:

$$
\begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{noun} \\ \text{PRD} & - \end{bmatrix} \\ \text{SUBJ} \ \langle \ \rangle \end{bmatrix} \\ \text{CONTENT} \begin{bmatrix} \textit{scope-obj} \\ \text{INDEX} & \boxed{1} \\ \text{RESTR} & \boxed{2} \ \textit{set(psoa)} \end{bmatrix} \end{bmatrix} \Rightarrow \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{noun} \\ \text{PRD} & + \end{bmatrix} \\ \text{SUBJ} \ \langle \text{XP}_{\boxed{1}} \rangle \end{bmatrix} \\ \text{CONTENT} \ \boxed{2} \end{bmatrix}
$$

In words, for every nonpredicative noun which denotes a scope-object, there is a homonymous predicative noun which denotes the set of restrictions which are part of the scope-object ($\boxed{2}$). In the type hierarchy of Pollard and Sag (1994), which treats the RESTRICTION value as a set of parametrized states of affairs, this rule yields a semantic object which can be identified with the CONTENT value of the copula.[2] A consequence of this treatment is that the nouns are systematically ambiguous.

A lexical rule is not the only possible way to model the type shift in HPSG terms. Another possibility is proposed in Müller (2009). Quoting Kasper (1995), Müller points out that the lexical rule of Pollard and Sag (1994) is inappropriate for the analysis of nominal predicates which contain an adjunct. Given the canonical HPSG treatment of adjuncts, the prenominal adjective in (12), for instance, selects an N-bar head and identifies its own index with that of the noun.
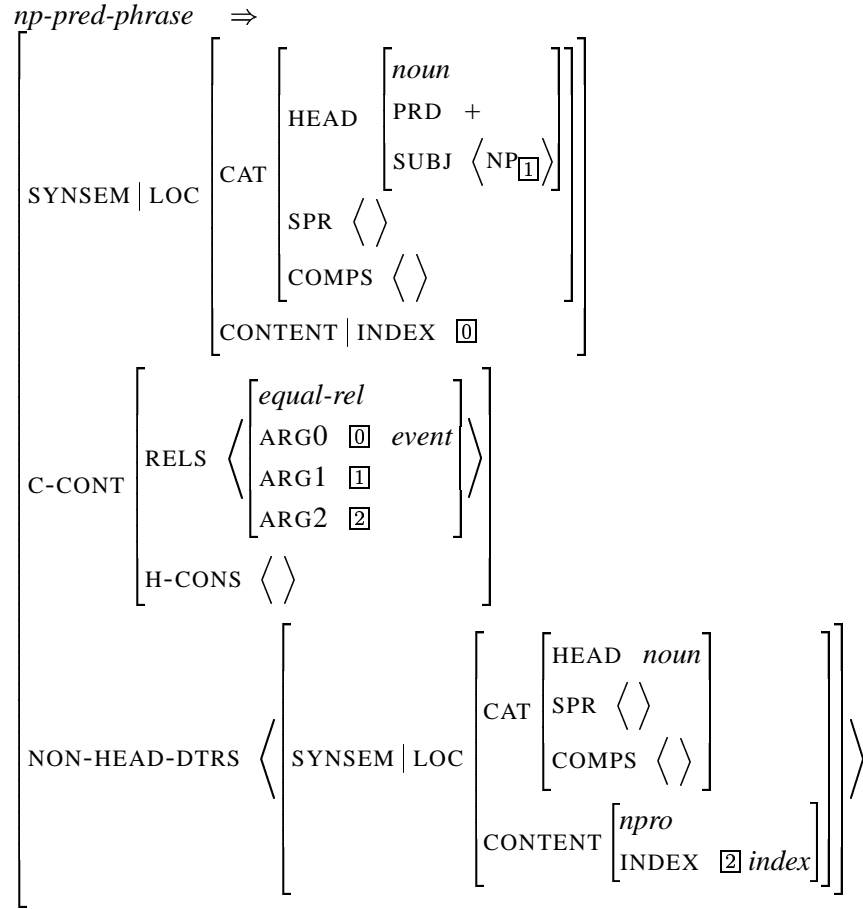
(12)   John is a good candidate.

However, if the noun is in predicative position, it has no index! To repair this Müller (2009) applies the type shift at the level of the full NP, rather than at the lexical level. To model this he employs a unary syntactic rule which transforms nonpredicative NPs into predicative ones.

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[1]Pollard and Sag (1994) uses the term *nominal-object* for what is called a *scope-object* in Ginzburg and Sag (2000). I use the latter term.

[2]In the type hierarchy of Ginzburg and Sag (2000), which treats the RESTRICTION value as a set of facts, the type shift has to be modeled in another way, but since the equivalent of (11) in Ginzburg and Sag (2000) does not mention the CONTENT values, it is not made clear how this is done.

(13) PREDICATIVE NP PROJECTION SCHEMA:

np-pred-phrase ⇒

$$
\begin{bmatrix}
\text{SYNSEM} \mid \text{LOC}
\begin{bmatrix}
\text{CAT}
\begin{bmatrix}
\text{HEAD}
\begin{bmatrix}
noun \\
\text{PRD} \quad + \\
\text{SUBJ} \ \left\langle \text{NP}_{\boxed{1}} \right\rangle
\end{bmatrix} \\
\text{SPR} \ \left\langle \ \right\rangle \\
\text{COMPS} \ \left\langle \ \right\rangle
\end{bmatrix} \\
\text{CONTENT} \mid \text{INDEX} \quad \boxed{0}
\end{bmatrix} \\[2em]
\text{C-CONT}
\begin{bmatrix}
\text{RELS} \ \left\langle
\begin{bmatrix}
equal\text{-}rel \\
\text{ARG0} \quad \boxed{0} \quad event \\
\text{ARG1} \quad \boxed{1} \\
\text{ARG2} \quad \boxed{2}
\end{bmatrix}
\right\rangle \\
\text{H-CONS} \ \left\langle \ \right\rangle
\end{bmatrix} \\[2em]
\text{NON-HEAD-DTRS} \ \left\langle
\begin{bmatrix}
\text{SYNSEM} \mid \text{LOC}
\begin{bmatrix}
\text{CAT}
\begin{bmatrix}
\text{HEAD} \quad noun \\
\text{SPR} \ \left\langle \ \right\rangle \\
\text{COMPS} \ \left\langle \ \right\rangle
\end{bmatrix} \\
\text{CONTENT}
\begin{bmatrix}
npro \\
\text{INDEX} \quad \boxed{2} \ index
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\right\rangle
\end{bmatrix}
$$

In words, the rule turns a fully saturated nonpronominal NP which denotes a scope-object (= the non-head-daughter) into a predicative NP which selects a subject and which denotes an object of type *event* (= the mother). The C-CONT attribute captures the constructional aspects of the semantic composition. In this case, it represents a requirement of equality between the indices of the subject (□1) and the NP daughter (□2). Since the INDEX value of the NP mother (□0) is inherited by the copula, the latter has an index of type *event*.

This treatment avoids the problem with (11), since the type shift is now applied after the addition of the adjuncts. At the same time, since (13) explicitly requires a fully saturated NP daughter, it does not subsume the determinerless predicates in (14) and the German (15).

(14) Sylvia is mayor of Seattle.

(15) Er ist Lehrer.
      he is teacher
      'He is a teacher.'

To cover these, Müller (2009) keeps a version of lexical rule (11). It will presumably be more constrained than (11), since only some of the (singular count) nouns can be used in this way (typically nouns denoting roles, functions and professions), but since the paper does not spell out the rule, this is left unclear.

Together, rule (13) and the implicit lexical rule solve the mismatch, but the price to pay is a systematic ambiguity for the NPs and for those nouns which can be used without determiner in predicative position.

2.2   Quantified predicate nominals

As admitted in Pollard and Sag (1994, 360), the canonical HPSG treatment does not account for the semantic contribution of the determiner in predicate nominals.[3] This is hardly surprising, since the Fregean analysis on which it is based has the same problem. To show this, let us compare the treatment of the indefinite article in (16) with that in (17).

(16)   a. John knows a teacher.

      b. $\exists x \, [teacher(x) \, \& \, know(John, x)]$

(17)   a. John is a teacher.

      b. $teacher(John)$

In the analysis of (16a) the contribution of the indefinite article is captured in terms of the existential quantifier, but in the analysis of (17a) the article is assumed to be semantically vacuous, just like the copula.[4] This not only introduces another discrepancy between syntactic and semantic structure, it also raises the question of how predicative NPs with another determiner, such as *the* or *my*, have to be differentiated from those with the indefinite article.

2.3   Stipulation of an ambiguity for the copula

Another problem for the treatment of the predicate nominals concerns the pronouns and the proper nouns. They can be used in postcopular position, as exemplified in (18), but semantically it makes no sense to treat them as states-of-affairs or events. In fact, Stefan Müller's unary rule (13) explicitly requires the NP daughter to be nonpronominal.

(18)   a. Cicero is Tully.

      b. The winner is Jimmy Logan.

      c. That must be her.

      d. That book is mine.

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[3]This criticism does not apply to the analysis in Müller (2009).

[4]For more discussion of this point, see Allegranza (2006, 78).

To handle these it is commonly assumed that the copula is not used in its predicational sense here, but in an equational or identificational sense. Also this assumption is due to Frege (1892) and has been very influential, both in logic and linguistics, see a.o. Pollard and Sag (1987, 66), Declerck (1988), Mikkelsen (2005) and Müller (2009).

In spite of its wide-spread acceptance, though, few have bothered to spell out what it is that distinguishes the predicational use from the identifying use. Matters would be easy, of course, if the latter would simply coincide with the combinations with proper nouns and pronouns, but this is not the case. On the one hand, there are other kinds of NPs that are canonically treated as complements of the identifying copula, such as the definite ones in (19).

(19)   a. Clara is her youngest sister.

        b. Tim is the man with the black tie in the left corner.

On the other hand, there are combinations with proper nouns or pronouns in which the copula has its usual predicating sense, as in (20).

(20)   a. This was characteristic of Helen. A fine person in many ways, but this ability to forget completely the true state of our finances and start dreaming up major new spending opportunities, this was very Helen. [quoted from Kazuo Ishiguro, *Nocturnes. Five stories of music and nightfall.* Faber & Faber, 2009. page 130]

        b. This movie is SO Woody Allen.

        c. Susan is somebody we can trust.

        d. Cicero is not just anybody; he is the greatest orator of all time.

This makes it very hard to formulate any criteria for drawing the distinction between the identifying and the predicating *be*. Moreover, the distinction sometimes gets in the way. Speaking of the treatment of pied piping in NPs, Ginzburg and Sag (2000, 195) remarks that "this analysis provides an account of examples like *I wondered [whose cousin] she was pretending to be __*, if we assume that complements of the identity copula are also predicative NPs." In other words, the treatment of pied piping is more uniform and straightforward if we do NOT distinguish between the predicational and the identifying senses.

2.4   Assignment of the EXPERIENCER role

As already pointed out in section 1, some of the predicate selecting verbs, such as *seem*, take an optional experiencer. Such verbs can obviously not be treated as semantically vacuous, since otherwise there is no way to assign the EXPERIENCER role to the relevant NP or PP. As a consequence, if the copula can take an optional experiencer, it follows that it cannot be semantically vacuous. The following evidence from Dutch suggests that this is indeed the case.

(21)　a.　Dat lijkt/is　me echt　te　duur.
　　　　　　that seems/is me really too expensive.
　　　　　　'That seems/is really too expensive to me.'

　　　　b.　Het lijkt/is　ons nu　wel duidelijk dat　ze　niet zullen komen.
　　　　　　it　　seems/is us　now –　clear　　that they not　will　come
　　　　　　'It seems/is clear to us now that they won't come.'

　　　　c.　Het juiste aantal　bleek/was　　hen　nog niet bekend.
　　　　　　the　exact number appeared/was them still not　known
　　　　　　'The exact number appeared/was not yet known to them.'

Given that the pronominal objects *me* 'me', *ons* 'us' and *hen* 'them' are canonically treated as complements of resp. *lijken* 'seem' and *blijken* 'appear' and that they receive the EXPERIENCER role from these verbs, it would only be logical to treat them in the same way in the combination with the copula. Conversely, if one decides instead to treat the pronominal objects as adjuncts or as raised arguments in the case of the copula, then it would only be logical to treat them in the same way when they are combined with *seem* or *appear*, contrary to the canonical practice.

　　Notice, furthermore, that the combination is not only possible with adjectival predicates, but also with nominal ones, as in (22), and with prepositional ones, as in (23).

(22)　a.　Wat　dit　betekent is me　　nog steeds　een raadsel.
　　　　　　what this means　　is to-me still always a　　puzzle
　　　　　　'What this means is still a puzzle to me.'

　　　　b.　Het is ons een waar genoegen.
　　　　　　it　　is us　a　　real　pleasure
　　　　　　'It is a real pleasure to us.'

(23)　a.　Dat kereltje　is ons tot last.
　　　　　　that guy-DIM is us　to　burden
　　　　　　'That little guy is a real burden for us.'

　　　　b.　Dat is me om　　het even.
　　　　　　that is me about the same
　　　　　　'It is all the same to me.'

2.5　Summing up

The Fregean treatment of the copula complicates the treatment of the predicate nominals, requiring a type shift which makes the nominals systematically ambiguous, it does not account for the semantic contribution of the determiner in predicate nominals, it presupposes a distinction between predicating and identifying uses, which is very hard to substantiate, and it does not account for the assignment of the EXPERIENCER role.

As a final remark, notice that the main linguistic argument in favor of the treatment is not very strong. The omissibility of the copula in certain contexts and in certain languages, as in (6-7), is not by itself an argument for semantic vacuity. Otherwise, the existence of languages without articles, such as Latin and Russian, would entail that the articles do not contribute any content either, also in languages which have them. This, it goes without saying, is a conclusion which few semanticists would be happy to welcome.

3   A Montagovian treatment

The mismatch between syntactic and semantic structure which is characteristic of the Fregean treatment of the copula did not particularly appeal to Richard Montague. His insistence on compositionality made him more sympathetic to a treatment in which the copula is treated along the same lines as the other verbs. His analysis is briefly presented in 3.1, translated in HPSG terms in 3.2 and demonstrated to be superior to the Fregean treatment in 3.3. It will also be shown to be extensible to other verbs that select a predicative complement in 3.4.

3.1   The Quine-Montague proposal

The Montagovian treatment can be traced back to a proposal in Quine (1960, 114–118): "the sign '=' of identity is a relative term; thus a transitive verb, we might say ... Like any such term it joins singular terms to make a sentence. The sentence thus formed is true if and only if those component terms refer to the same object." (p. 115)

In terms of the PTQ model (Montague, 1974, 247–270) with its distinct representations for disambiguated English (DL) and intensional logic (IL), Richard Montague treated the copula as a transitive verb in disambiguated English and as the relation of identity in intensional logic. Defining the link between them is the following translation rule.[5]

(24)   **be** translates into $\lambda \mathcal{P} \; \lambda x \; \mathcal{P} \; \{\hat{y} \; [\check{}x = \check{}y]\}$.

In other words, it is not only the identifying or equational *be* that is assumed to denote the identity relation, but also the predicational *be*: "our uniform symbolization of *be* will adequately cover both the *is* of identity and the *is* of predication." (Montague, 1974, 267).[6] As an illustration, let us take the analysis of (25).

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[5]In the PTQ notation *j, m, ...* are constants of type entity (*e*), *u, v, ...* are variables of type entity (*e*), *x, y, ...* are variables for individual concepts ($<s, e>$), *P, Q, ...* are variables for properties of individual concepts ($<s,<<s, e>, t>>$), and the rounded $\mathcal{P}, \mathcal{Q}, ...$ are variables for properties of properties of individual concepts ($<s,<<s,<<s, e>, t>>, t>>$) (Montague, 1974, 260).

[6]The same claim is made in Montague (1970): 'the 'is' of such formulas as 'v_0 is a horse' may be identified with the 'is' of identity, and the indefinite singular term 'a horse' treated, as usual, existentially."

(25)   Mary is a woman.

(26)   a. $\lambda x \, \exists y \, [woman(y) \, \& \, {}^{\vee}x = {}^{\vee}y]$

  b. $\exists y \, [woman(y) \, \& \, m = {}^{\vee}y]$

  c. $woman(\hat{}\,m)$

(26a) is the IL formula for the VP *is a woman*. It results from applying the IL
representation of the copula, given in (24), to the intensionalized representation of
a woman, followed by three λ reductions. Truth-conditionally, (26a) stands for the
set of individual concepts that can truthfully be said to be a woman. (26b) is the
IL formula for the sentence as a whole. It results from applying the IL formula of
the subject *Mary* to the intension of the IL formula for the VP, i.e. (26a), followed
by two λ reductions. In a final step, the variable in (26b) is replaced by a constant,
yielding (26c); this replacement is possible since the variable and the constant are
co-extensional.

   In contrast to the Fregean treatment, this analysis does not reduce the role of
the copula to that of a verbal affix. Instead, it assumes that the copula denotes a
relation, just like the other verbs. It also captures the contribution of the determiner
in predicate nominals, and it provides a uniform treatment of the predicating and
identifying *be*.

3.2   Back to HPSG

Following the lead of Quine and Montague, I do not treat the copula as semantically
vacuous, but rather as denoting a relation of coreference between the indices of the
subject and the predicative complement. This implies that the latter belongs to an
index bearing type, in other words that its CONTENT value is of type *scope-object*,
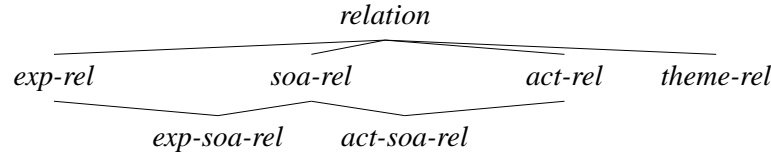rather than of type *state-of-affairs*.

   Besides, I add an optional argument whose index provides the value of the
EXPERIENCER attribute. The resulting AVM looks as follows.[7]

(27)
$$\begin{bmatrix} \text{ARG-ST} \quad \left\langle X_{\boxed{1}} \,, (Y_{\boxed{2}}\,,) \, Z_{\boxed{3}} \right\rangle \\[2em] \text{SS} \mid \text{LOC} \mid \text{CONTENT} \begin{bmatrix} soa \\ \text{NUCL} \begin{bmatrix} exp\text{-}soa\text{-}rel \\ \text{EXPERIENCER} \quad \boxed{2} \, index \\ \text{SOA} \begin{bmatrix} soa \\ \text{NUCL} \begin{bmatrix} coref\text{-}rel \\ \text{THEME} \qquad \boxed{1} \, index \\ \text{ATTRIBUTE} \quad \boxed{3} \, index \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

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[7]I follow the more recent practice in HPSG of modeling the selection of syntactic arguments in
terms of the ARG-ST feature, rather than in terms of the SUBCAT feature.

(27) subsumes all verbs which take a subject-oriented predicative complement, including the copula. Those verbs take three syntactic arguments which each have a CONTENT value of type *scope-object*, and denote a state of affairs. Its nucleus is a relation of a type that is subsumed by both *soa-rel* and *exp-rel*, which implies that it has both an EXPERIENCER and a SOA attribute. Technically, this can be modeled in terms of a hierarchy of relational types, as in Davis (2001).

$$
\begin{array}{c}
\textit{relation} \\
\textit{exp-rel} \quad\quad \textit{soa-rel} \quad\quad \textit{act-rel} \quad \textit{theme-rel} \\
\textit{exp-soa-rel} \quad \textit{act-soa-rel}
\end{array}
$$

Each type is associated with a corresponding semantic role.

(28) $\begin{bmatrix} \textit{act-rel} \\ \text{ACTOR} \quad \textit{index} \end{bmatrix}$ $\begin{bmatrix} \textit{soa-rel} \\ \text{SOA} \quad \textit{soa} \end{bmatrix}$ $\begin{bmatrix} \textit{exp-rel} \\ \text{EXP} \quad \textit{index} \end{bmatrix}$ $\begin{bmatrix} \textit{theme-rel} \\ \text{THEME} \quad \textit{index} \end{bmatrix}$

The value of the SOA attribute is a state of affairs and has as its nucleus the relation of co-reference, which holds between the indices of the subject and the predicative complement.[8] Notice that these indices are co-referent but not token-identical. Token-identity would be too strong a requirement, since the presence of PERSON, NUMBER and GENDER features in the HPSG indices would then impose agreement for these features between the subject and the predicative complement, thus erroneously excluding (30).

(29) $\begin{bmatrix} \textit{index} \\ \text{PERSON} \quad \textit{person} \\ \text{NUMBER} \quad \textit{number} \\ \text{GENDER} \quad \textit{gender} \end{bmatrix}$

(30) a. If I were you, ...
      b. We are a good team.

The resulting analysis bears a resemblance to Stefan Müller's analysis of the German *erscheinen* in (2). The only important difference concerns the assumption that the predicative complement denotes a scope-object, rather than a state of affairs.

Having shown how the Montagovian treatment can be expressed in the HPSG notation, I will now demonstrate how the resulting analysis solves the problems with the Fregean treatment.

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[8]If the subject has a non-referential index, as in *it is Friday*, the THEME role is left unassigned. The same holds for the EXPERIENCER role, if there is no constituent which expresses it.

3.3   Solving the problems with the Fregean treatment

The four problems with the Fregean treatment which were discussed in section 2 disappear.

First, there are no complications anymore with the semantic type of the nominal predicates, since their usual type, i.e. *scope-object*, is exactly what the copula and the other predicate selectors require. In other words, there is no need for type shifting. Moreover, this treatment does not cause any problems for the non-nominal predicates. Adjectival predicates, for instance, can be treated as scope-objects as well. In fact, the standard predicate logic treatment of adjectives is essentially the same as that of common nouns. In the same way that the common noun *dog* stands for the set of dogs, represented by '$x \mid dog(x)$', the adjective *tall* stands for the set of all things tall, represented by '$x \mid tall(x)$'. Prepositional predicates fit the mould as well. The PP in *she is in Paris*, for instance, denotes the set of all things in Paris, represented by '$x \mid in(x, paris)$'. For a more lengthy demonstration that all all types of predicative complements denote a scope-object, see Van Eynde (2008).

Second, the semantic contribution of the determiner in predicative nominals can be integrated in the usual way. For the indefinite article, this has already been spelt out in (26a-26b): It contributes an existential quantifier which is then omitted in the substitution of a constant for the variable. This treatment also works for sentences with a quantified subject, as in (31), and for sentences with a predicative nominal that is introduced by another determiner, such as *no* in (32).[9]

(31)   a. Every candidate is a woman.
      b. $\forall u\ [candidate(u) \rightarrow \exists v\ [woman(v)\ \&\ u = v]]$
      c. $\forall u\ [candidate(u) \rightarrow woman(u)]$

(32)   a. Kim is no fool.
      b. $\neg\ \exists u\ [fool(u)\ \&\ u = k]$
      c. $\neg\ fool(k)$

Third, there is no need to differentiate between predicational and identifying uses of the copula.

Fourth, the optional second argument can be assigned the EXPERIENCER role in the same way as the second argument of a verb like *seem*.
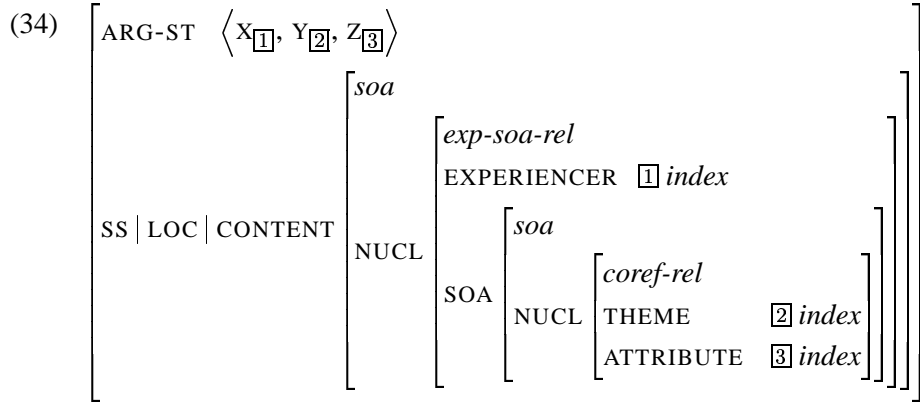
3.4   An extension

Besides the fact that the Montagovian treatment solves the problems with the Fregean one, it also has the advantage of being easily extensible to clauses with an object-oriented predicate, as in (33).

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[9]These are formulae of first order logic, in which the variables and the proper nouns denote entities and in which the common nouns denote sets of entities. They are, hence, simpler than Montague's IL representations.

(33) I consider him a winner.

The only difference between the selectors of subject-oriented predicates and verbs like *consider* concerns the linking between the syntactic arguments and their semantic roles. Whereas the first argument supplies the theme and the (optional) second one the experiencer in the case of *seem* and the copula (27), it is the other way round in the case of *consider* and its cognates.

(34)
$$
\begin{bmatrix}
\text{ARG-ST} \quad \left\langle X_{\boxed{1}},\ Y_{\boxed{2}},\ Z_{\boxed{3}} \right\rangle \\[2ex]
\text{SS} \mid \text{LOC} \mid \text{CONTENT}
\begin{bmatrix}
\textit{soa} \\[1ex]
\text{NUCL}
\begin{bmatrix}
\textit{exp-soa-rel} \\
\text{EXPERIENCER} \quad \boxed{1}\ \textit{index} \\[1ex]
\text{SOA}
\begin{bmatrix}
\textit{soa} \\[1ex]
\text{NUCL}
\begin{bmatrix}
\textit{coref-rel} \\
\text{THEME} \qquad \boxed{2}\ \textit{index} \\
\text{ATTRIBUTE} \quad \boxed{3}\ \textit{index}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Notice that the CONTENT value contains the same coreference relation as in (27). It is, hence, unnecessary to assume a phantom occurrence of *be* to get this effect.

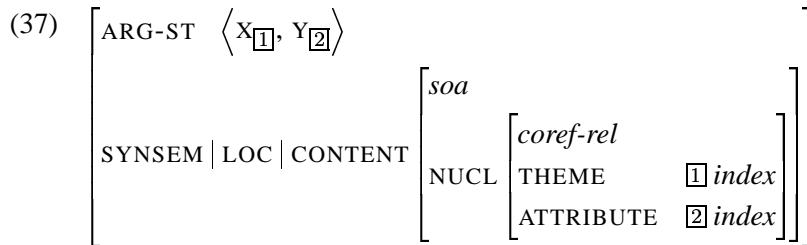Much the same can be said about the use of *made* in (35).

(35) She made me happy.

The only difference with *consider* is that the subject has a more active role. This can be modeled by assigning it a NUCLEUS value of type *act-soa-rel*, so that the first argument is linked with the ACTOR role.

The treatment is also extensible to the use of *with* in the so-called absolute construction. A relevant example is the one in (6), repeated here:

(36) With John ill we cannot go on holiday.

The only difference between this use of *with* and the predicate selecting verbs is that it never takes an experiencer, so that its CONTENT value is less complex.

(37)
$$
\begin{bmatrix}
\text{ARG-ST} \quad \left\langle X_{\boxed{1}},\ Y_{\boxed{2}} \right\rangle \\[2ex]
\text{SYNSEM} \mid \text{LOC} \mid \text{CONTENT}
\begin{bmatrix}
\textit{soa} \\[1ex]
\text{NUCL}
\begin{bmatrix}
\textit{coref-rel} \\
\text{THEME} \qquad \boxed{1}\ \textit{index} \\
\text{ATTRIBUTE} \quad \boxed{2}\ \textit{index}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Notice also here that there is no need to assume a phantom occurrence of *be*.

3.5 Summing up

Building on the proposals of Quine and Montague I have developed an HPSG treatment of the copula which solves the problems with the Fregean treatment and which is straightforwardly extensible to other predicate selectors.

To avoid misunderstandings it is worth stressing that (27) subsumes those uses of the copula in which it combines with a predicative complement. Its other uses require another treatment, as will be demonstrated in section 4.

4 Other uses of *be*

Since (27) explicitly requires the predicative complement to denote a scope-object, it does not subsume the combination of *be* with a VP complement that denotes a state-of-affairs, as in (38).

(38) a. They are going home.

b. She was bitten by a big black dog.

c. You are to leave this room at once.

The progressive and the passive *be*, as used in (38a) and (38b), do not introduce a new state of affairs, but inherit the one of their participial complement, as spelled out in (39).

(39)
$$
\begin{bmatrix}
\text{ARG-ST} & \left\langle \text{NP, VP}[\textit{ptc}] : \boxed{2} \right\rangle \\
\text{SYNSEM} \,|\, \text{LOC} \,|\, \text{CONTENT} & \boxed{2}\,\textit{soa}
\end{bmatrix}
$$

The modal *be*, as used in (38c), introduces a state of affairs which is distinct from the one of its infinitival complement; it takes the latter as the value of its SOA argument, just like the other modals.

(40)
$$
\begin{bmatrix}
\text{ARG-ST} & \left\langle \text{NP, VP}[\textit{inf}] : \boxed{2} \right\rangle \\[4pt]
\text{SYNSEM} \,|\, \text{LOC} \,|\, \text{CONTENT} &
\begin{bmatrix}
\textit{soa} \\
\text{NUCL} &
\begin{bmatrix}
\textit{soa-rel} \\
\text{SOA} & \boxed{2}\,\textit{soa}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

This, admittedly, results in a modicum of lexical ambiguity, but as compared to the distinction between the predicating and identifying uses of the copula, the distinctions between predicating *be*, progressive *be*, passive *be* and modal *be* are easy to capture and resolve. Moreover, they are independently motivated by the fact that the predicating *be* corresponds to the most commonly used copular verbs of other languages, such as *zijn* in Dutch, *sein* in German, and *être* in French, whereas the progressive, passive and modal *be* either have no translational equivalent or one that differs from the copula. The Dutch equivalent of passive *be*, for instance, is

worden, rather than *zijn*, the one of modal *be* is *moeten* 'must' or *hebben te* 'have to', and the progressive *be* has no equivalent in Dutch.[10]

5   Conclusion

The anaylsis of the copula as a semantically vacuous word is appropriate for some of its uses, such as the progressive and the passive, but not for its use in clauses with a predicative complement. In such clauses, it denotes a relation of co-reference between the indices of the subject and the predicative complement. Moreover, it takes an optional experiencer.

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[10]The combination of the copula with the Dutch *aan het* + INF cannot be considered a translational equivalent of the English progressive.

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