79. Copular clauses*

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This article provides an overview of research on copular clauses, focussing on three questions. First, how many types of copular clauses there are, second, what meaning is contributed by the copula, and third, what so-called connectivity effects tell us about the structure of copular clauses.

1. Introduction

Copular clauses are a minor sentence type in which the contentful predicate is not a verb, but some other category like AP, NP or PP. In some languages there is no verbal element at all in these clauses; in other languages there is a verbal copula joining the subject and the non-verbal element. Copular clauses (of the verbal and of the non-verbal kind) come in a great variety of forms and intuitively seem to express different kinds of information. The English examples in (1) provide a first illustration of the range of variation.

(1) a. Emily is a carpenter.

b. What Harvey did next was wash himself thoroughly.

c. Electronically is usually fastest. (Partee 1986:(5g))

d. That's my brother.

e. Red is my favorite color.

f. My favorite color is red.

g. The only thing we couldn't agree on was whether we should go to France first.

This article is structured around three central questions in the investigation of copular clauses. The first question, which I will call the taxonomy question, is how many kinds of copular clauses there are. Intuitively the copular clauses in (1) are different in various respects (and the list could easily be expanded) and the taxonomy

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question is whether any of these differences are significant enough to posit distinct types of copular clauses and if so, which types exist. I address this question in section 2 by discussing the four-way taxonomy proposed by Higgins (1979).

The second question relates to the copula itself: what is its semantic contribution and is its contribution the same in all copular clauses? I will call this the copula question and various answers to it are discussed in section 3.

The final question concerns CONNECTIVITY EFFECTS, which is the term used in the literature for the unusual distribution of pronouns, R-expressions, negative polarity items and other elements in certain copular clauses. The copular clause in (1b) above provides an example of this: the reflexive pronoun *himself* appears to not be locally c-commanded by its antecedent *Harvey*. The connectivity question is how this unusual distribution is best accounted for. Section 4 reviews the main candidate answers from the literature.

As with any overview article, certain difficult decisions had to be made as to which material to include and which to set aside. In addition to narrowing the thematic scope of the article to the three questions outlined above, I also made the decision to focus on English copular clauses. This is a serious limitation, both because there is significant cross-linguistic variation in the form and properties of copular clauses and because some of the most important work on copular clauses is on languages other than English. However, I found that it was impossible to do justice to this variation and literature within the prescribed scope of this article. Two further limitations deserve mention. Even with the thematic narrowing defined by the three questions, there is more literature than can be included here. Thus I will not be able to discuss several important works on the taxonomy and copula questions, including Halliday (1967), Declerck (1988), and Rothstein (2001). I urge the reader to consult these independently. Finally, I will focus on copular clauses of the form 'NP be NP'. To some extent, this choice reflects a bias in the literature. However, it should be recognized that the copula, at least in many languages, is truly cross-categorial and hence that the real scope of inquiry is 'XP be XP' (or 'XP XP' for languages that lack a copula, though excluding regular verbal predication). The cross-categoriality of the copula is touched upon in section 3.4. English *be* has a variety of other uses, including progressive, passive, and modal uses, which will also not be discussed here. Existential clauses (*There is a cat outside the door*) are discussed in article 80.

2. A taxonomy of copular clauses

Much work on the syntax and semantics of copular clauses takes as its starting point the taxonomy proposed in Higgins (1979:204–293), which distinguishes four types of copular clauses:

(2) PREDICATIONAL

a. The hat is big.

b. The hat/present/thing I bought for Harvey is big.

c. What I bought for Harvey is big.

(3) Specificational

a. The director of *Anatomy of a Murder* is Otto Preminger.

b. The only director/person/one I met was Otto Preminger.

c. Who I met was Otto Preminger.

(4) Identificational

a. That (woman) is Sylvia.

b. That (stuff) is DDT.

(5) Equative

a. Sylvia Obernauer is HER.

b. Cicero is Tully.

The taxonomy is based on intuitions as well as detailed observations about English copular clauses. The intuition about predicational clauses is that they predicate a property of the subject referent. In this respect they are like non-copular clauses, though they obviously differ from these in that the property is contributed entirely by the post-verbal element (which following Higgins I call the predicate complement). Intuitively, the other three kinds of copular clauses do not involve predication. Equatives, as the name suggests, equate the referents of the two expressions flanking the copula. Neither is predicated of the other. Specificational clauses involve valuing of a variable: the subject expression sets up a variable (the x that directed *Anatomy of a Murder* in (3a)) and the post-copular expression provides the value for that variable. Identificational clauses are different again, in that they typically involve a demonstrative subject and according to Higgins "are typically used for teaching the names of people or of things" (p. 237). Each of these are discussed on more detail in the following four subsections.

A note on terminology: the examples in (2c) and (3c) are pseudoclefts, which are characterized by having a wh-clause as one the terms flanking the copula. Thus (2c) is a predicational pseudocleft, and (3c) a specificational pseudocleft. The examples in (2b) and (3b) do not involve a wh-clause, but their subjects contain a headed relative clause. As far as I can tell, there is no name for these in the literature, but I draw attention to them here, because at various points in what follows (especially in section 4 on connectivity) it is useful to distinguish these from pseudoclefts, and from "plain" copular clauses, like the ones in (2a), (3a), (4), and (5). While plain copular clauses, pseudoclefts, and copular clauses with a headed relative clause differ in form, there is consensus in the literature from Higgins and onwards that the taxonomy applies to all forms of copular clauses, and that we should seek an analysis of predicational and specificational clauses that generalizes across these form differences.

2.1 Equatives

While equative clauses, especially of the sort in (5b) have been the object of much attention in the philosophical literature, their linguistic status is somewhat murky. Some languages have been argued to lack equative clauses altogether (Adger and Ramchand 2003 make this claim for Scottish Gaelic), and to resort to more elaborate locutions (like *be the same person as* in English) to express what (5b) expresses. Similarly, Geist (2007) argues that there are no monoclausal equatives in Russian. Instead, equation is mediated, syntactically and semantically, by a demonstrative pronoun. Even within English, it must be noted that outside special cases, like *Muhammad Ali is Cassius Clay*, *Mark Twain is Samuel Clemens*, and (5b), main clause equatives involving two names are difficult to contextualize (try *Sylvia is Louise*). However, embedding under a propositional attitude verb (*Tanya thinks that Sylvia is Louise*) alleviates this for reasons discussed in Berg (1988). Equatives of the form in (5a), where one NP is a pronoun and the other a name, are easier to contextualize: they are natural answers to *Who is who?* in a situation where individuals can be identified both by name or by sight, as is the case for instance at a conference (see Aloni 2001: 13–15 for relevant discussion).

In both kinds of equatives, the issue of non-referential uses of names arises (e.g. Groenendijk et al. 1996). One reading of (5b) involves strongly referential use of both names: the speaker and hearer are both acquainted with Tully, under the name *Tully*, and with Cicero, under the name *Cicero*, but the hearer does not know that they are in fact the same individual. In that scenario, (5b) would be informative about the world. In other cases though, equatives seem to provide information about the language, in particular the names of people. In those cases, (5b) is understood roughly as 'the person you know as Cicero is also called Tully'. Similarly, (5a) is informative and natural in a context where the hearer does not know Sylvia Obernauer or does not know her vividly enough in Kaplan's sense. Consistent with these observations, there is a strand of work that argues that no copular clause in any language is truly equative (Moro 1997, den Dikken 2006, Adger and Ramchand 2003) and that even apparently symmetrical clauses like like (5b) are in fact instances of predication.

On the other hand, Heycock and Kroch (1999) argue from examples like (6)–(7) that equatives are a productive clause type, at least in English:

(6) a. Your attitude toward Jones is my attitude toward Davies.

b. My attitude toward Davies is your attitude toward Jones.

(7) Honest is honest.

They emphasize the symmetry of these clauses and liken them to coordination in that respect (p. 378, fn. 9). Like coordination, equatives seem to require two elements of the same type and to allow the two to occur in either order, as in (6).

Other terms used for equatives in the literature include identity clause and equational clause.

2.2 Predicational clauses

The subject of a predicational clauses is typically a referential NP (8), though quantificational expressions are also allowed (9):

(8) Harvey/my brother/the guest of honor/she was happy.

(9) Everyone/noone was happy.

One indication that the subject is referential in (8) is that it pronominalizes with a gendered pronoun, just like a referential subject of a non-copular clause does (the assumption that the pronoun of a tag question is controlled by the subject of the tagged clause is discussed and defended in Mikkelsen 2005: 70–72):

(10) The guest of honor was happy, wasn't she/he/*it?

(11) The guest of honor spoke after dinner, didn't she/he/*it?

Similarly, quantificational subjects pronominalize with *they*, as they do in non-copular clauses:

(12) Everyone was happy, weren't they?

(13) Everyone went to the graduation, didn't they?

The predicate complement can be an AP, as in (8) and (9), or a PP, DP or NP:

(14) Sylvia is [from Seattle].

(15) Sylvia is [an architect].

(16) Sylvia is [the architect on that project].

(17) Sylvia is [my friend].

(18) Sylvia is [mayor of Seattle].

Evidence that these predicate complements are semantically predicative comes from two observations. First, they can be targeted by VP ellipsis:

(19) Sylvia is the architect on that project, but I wish she wasn't.

Second, the elements that flank the copula in predicational clauses can express a proposition without the copula in embedded contexts (as long as the restrictions imposed by the embedding verb or preposition are obeyed):

(20) I consider [Sylvia my best friend].

(21) With [Sylvia absent], there is no point in continuing this discussion.

(22) With [Sylvia the only available candidate], there is no point.

This is not true for other kinds of copular clauses; here the copula is needed (Rothstein 1995):

(23) I consider [my best friend *(to be) Sylvia]. [specificational]

(24) With [the only available candidate *(being) Sylvia], there is no point in continuing this discussion. [specificational]

(25) I believe [that *(to be) Sylvia]. [identificational]

(26) I believe [her *(to be) Sylvia]. [equative]

Other names for predicational clauses in the literature include ascriptive and ascriptional.

2.3 Specificational clauses

The term specificational derives from the intuition that these clauses are used to specify who (or what) someone (or something) is, rather than to say anything about that person (or entity). Thus (27) is used to say who directed a particular movie, not to say something about that person:

(27) The director of *Anatomy of a Murder* is Otto Preminger.

Intuitively, we can say (with Akmajian 1979) that the subject phrase introduces a variable (the x such that x directed *Anatomy of a Murder*) and the predicate complement provides the value for that variable. In light of the preceding discussion of symmetry and refentiality in equative and predicational clauses, the profile of specificational clauses can be characterized as in (28):

(28)

	NP1	copula	NP2
equative	referential		referential
predicational	referential		non-referential
specificational	non-referential		referential

Evidence from the non-referential status of the subject of specificational clauses comes from pronominalization:

(29) The director of *Anatomy of a Murder* is Otto Preminger, isn't it?

(30) The director of *Anatomy of a Murder*, that's Otto Preminger.

Strikingly, the subject of a specificational clause pronominalizes with the pronouns *it* and *that* as opposed to the gendered pronouns *he* and *she*; compare (29) to (10) above. As argued in Mikkelsen (2005:64–86), this is evidence that the subject of specificational clauses is non-referential.

I have, deliberately, been using the term "referential" without defining it. There are several proposals in the literature as to what the relevant notion of referentiality is. Some are semantic, some pragmatic. On the semantic side, Mikkelsen (2005) and Geist (2007) propose that the relevant notion of referentiality is that expressed in Partee's (1987) family of NP types. In particular, referential is identified with type e, and non-referential with type $\langle e,t\rangle$ (or $\langle s,\langle e,t\rangle\rangle$). This semantic analysis fits naturally with a syntactic analysis of specificational clauses in which they involve movement of a predicative NP across the copula (the so-called predicate inversion analysis originally proposed by Moro 1997 and defended most recently by den Dikken 2006). Mikkelsen adopts this syntactic analysis for Danish and English and Geist assumes it for Russian, though she rejects it for English. Romero (2005) and Comorovski (2007) agree with Geist and Mikkelsen that the referential post-copular NP is type e (at least for what Romero calls Reading A, which is what is relevant here), but argue that the hallmark of a specificational subject is that it is intensional, in particular that it denotes an individual concept, i.e. a function of type $\langle s,e\rangle$. Comorovski (2007) adds the requirements that the individual concept be non-rigid and indirectly contextually anchored via a referential expression inside the specificational subject. Thus for Romero and Comorovski the asymmetry is one of intensionality, not "predicativity". Intensionality also plays a role in Alexiadou and Giannakidou's (1999) analysis, albeit a different role. They propose (p. 7) that specificational clauses equate co-extensive sets where the set denoted by the subject is given in predicate notation ($\{x|P(x)\}$), i.e. intensionally, and the set denoted by the post-copular phrase in given in list notation ($\{a,b,c\}$), i.e. extensionally. Finally, Mueller-Reichau (2007) suggests that specificational subjects denote kinds.

Moving into the domain of pragmatics, several authors have proposed that specificational clauses are like question–answer pairs (Ross 1972, den Dikken et al. 2000, Schlenker 2003), with the question-denoting element preceding the copula and its answer following the copula. Schlenker (2003) provides the most thorough implementation of this line of analysis and I discuss it in detail in section 4.1.

There is another strand of work arguing that semantically specificational clauses involve equation of individuals, just like (true) equatives do and that the difference between them is not at the level of semantic types, but rather along some pragmatic dimension. Heycock and Kroch (1999, 2002) suggest that the relevant dimension is an information-structural one: specificational clauses are equatives with a particular information structure, one where the GROUND is constructed entirely from the subject phrase and the focus falls on the post-copular expression (in line with early observations by Akmajian 1979 and Higgins 1979). Heller (2005) agrees with Heycock and Kroch that specificational clauses are pragmatically asymmetric (and semantically symmetric), but she proposes that the relevant pragmatic dimension is DISCRIMINABILITY. Equi-extensional terms may be more or less discriminate: simpli-

fying somewhat, proper names are more discriminate than definite descriptions with contentful nouns, which in turn are more discriminate than definite descriptions with bleached nouns (like *thing*, *place*, *person*), which in turn are more discriminate than free relative clauses. Specificational clauses, as opposed to equatives and to predicational clauses, exhibit rising discriminability: the pre-copular expression is less discriminate than the post-copular expression. In the end Heller is unable to provide a definition of discriminability, but her study nonetheless offers valuable insights into the nature of specificational clauses. Heller's work is also important because she draws attention to the relevance of pragmatic factors other than topic and focus, which have dominated the literature since Higgins (1979).

Specificational clauses exhibit other important properties. Probably the most famous one is connectivity and section 4 is devoted to that. Higgins (1979:298–328) also points out a series of restrictions on specificational pseudoclefts: the focal (i.e. post-copular) item cannot be extracted or deleted; nothing can be moved out of the post-copular element; subject-auxiliary inversion is not possible; the copula must be finite and cannot be gapped; the tense of the copula must agree with the tense of the verb in the wh-clause (tense harmony); sentential adverbials, "straight" negation and tag questions are not allowed. Predicational pseudoclefts are not subject to these restrictions. Most of them do not hold of plain specificational clauses either, which indicates that these restrictions should not be pinned on the notion of specification itself. Perhaps for this reason, these restrictions have received less attention in the subsequent literature, though den Dikken et al. (2000) and Sharvit (2003) are important exceptions.

There is one further distinction associated with specificational pseudoclefts that should be mentioned here. In the examples given above, the wh-clause precedes the copula (see e.g. (3c)). However, it is also possible for the wh-clause to follow the copula while maintaining a specificational reading:

(31) Otto Preminger was who I met.

(32) Important to himself is what John is. (den Dikken et al. 2000:(2b))

den Dikken et al. (2000) argue that such reversed pseudoclefts constitute a separate subtype of specificational clause (their Type B). They show that Type B pseudoclefts exhibit different properties from unreversed pseudoclefts (their Type A) and propose that the two involve different syntactic derivations. Following the literature, I will continue to focus on Type A, that is specificational pseudoclefts where the wh-clause precedes the copula.

Another term for specificational is specifying.

2.4 Identificational clauses

Identificational clauses are characterized by having a demonstrative pronoun or demonstrative phrase in the subject position. Some of Higgins' examples (from pp. 237–239, and 244) are given in (33). Note that the demonstrative must be understood as having deictic, not anaphoric, reference (Higgins 1979:220, 224, 245).

(33) a. That (man) is Joe Smith.

b. That (woman) is the Mayor of Cambridge.

c. That (place) is Boston.

d. That's a teacher who has been helping me with my polynomials.

According to Higgins the subject of identificational clauses is referential, while the predicate complement is 'Identificational' (the meaning of the latter term is unclear to me). As regards their function, Higgins says (p. 237) that these sentences are "typically used for teaching the names of people or of things". This function is easy to contextualize for the examples in (33a–c). Imagine that you are at a party with your friend. You don't know anyone, but your friend does, so she starts filling you in, using (33a) and (33b) together with a discrete nod of her head. Similarly, imagine that you are looking out the window from an airplane and you see a city beneath you which you identify as Boston. Then you can use (33c), together with a pointing motion, to share this piece of information with your travel partner.

Identificational clauses can also be used as responses to questions for more information about an individual. An example is (33d) used as a response to (34).

(34) John? Who's that?

Here we imagine a prior mention of John by the speaker of (33d). The name was not enough to satisfy the speaker of (34), hence the request for more information in (34).

There is another type of copular clauses which Higgins does not discuss, but which might be considered identificational. These are like the clauses in (33), except that the subject is not a demonstrative but the pronoun *it*:

(35) It is Joe Smith/the mayor of Cambridge/Boston.

These are called TRUNCATED CLEFTS by Hedberg (2000:898) based on their similarity with the *it*-clefts in (36), see also Declerck (1988:124–139), Büring (1998:42–47), Mikkelsen (2007) and references cited there.

(36) a. It is Joe Smith/the Mayor of Cambridge who is standing over there.

b. It is Boston that we see underneath us.

Overall, identificational clauses have received less attention in the subsequent literature than the other members of Higgins' taxonomy and when they are discussed it is typically with the aim of showing that they do in fact not form a separate category (Sharvit 2003: 387–391, Heller 2005: 193–1999, Mikkelsen 2005: 118–130).

2.5 What is the taxonomy a taxonomy of?

The presentation above mostly relied on the surface characteristics of the different kinds of copular clauses. An important question though, one that Higgins himself struggled with (pp. 204–208, 360), is what exactly the taxonomy is a taxonomy of. Higgins' somewhat vague answer was that it is a taxonomy of "functions" of copular

clauses. Later research has provided three broad answers to this question. One is that the taxonomy categorizes semantic species of copular clauses: each species is distinguished by the meaning of its pieces and/or their semantic composition. This approach thus posits different meanings for the elements flanking the copula and possibly, though not necessarily, also different meanings for the copula itself. Though quite different from each other, I would include the analyses of Partee (1986), Rothstein (2001), and Schlenker (2003) in this category. Another strand of research, which includes Heggie (1988), Moro (1997), and den Dikken (2006) argues that there is a single, semantically uniform, underlying structure for copular clauses, and that the varieties catalogued by Higgins are different surface realizations of this underlying copular structure. Under this conception the taxonomy classifies surface syntactic configurations. A third position is that the taxonomy is a taxonomy of syntax-semantics alignments which is further conditioned by information structure (Mikkelsen 2005, Geist 2007, and to some extent Heller 2005). This is an issue that deserves further consideration, especially in regards to the notion of construction (Kay and Fillmore 1999).

2.6 Reducing the taxonomy

While Higgins' taxonomy has been the starting point of much work on copular clauses over the past three decades, it has not been universally accepted. Several researches have argued that one or more of the four categories are spurious and should be collapsed with some other category. Heycock and Kroch (1999) and den Dikken (2006) have argued that the distinction between specificational and equative clauses is spurious, though they differ in which category they take to be real: Heycock and Kroch propose that specificational clauses are a subtype of equatives, whereas den Dikken categorizes both as specificational. Mikkelsen (2005:118–130) maintains the distinction between specificational and equative clauses, but suggests that the identificational class be eliminated. Her proposal is that identificational clauses with a pronominal subject (like *That/It is Joe Smith*) are in fact specificational, whereas identificational clauses with a phrasal demonstrative subject (*That man is Joe Smith*) are equative. Birner et al. (2007) take issue with this reclassification and instead group all identificational clauses with equatives. Both of these proposals thus yield a three-way distinction between predicational, specificational, and equative clauses. Heller (2005:198ff) tentatively proposes to reduce Higgins' taxonomy even further. She suggests, with Heycock and Kroch (1999), that specificational clauses are a subtype of equative, and, in a novel move, that identificational clauses should be grouped with predicational clauses (see also Heller and Wolter 2008). This leaves just two types of copular clauses: predicational clauses and equative clauses.

3. The meaning(s) of the copula

A natural question to ask in the light of Higgins' taxonomy is whether the different kinds of copular clauses involve different copulas. The most extreme positive answer would hold that each of the four clause types involve a different copula; thus there

would be a copula of equation, a copula of predication, a copula of specification, and a copula of identification. As far as I know, no one has defended this position, though one could perhaps argue that this position is implicit in Higgins (1979). Weaker positive answers have been defended in the literature, in particular that there are two copulas and that there are three. In opposition to both of these positions there is a substantial body of work arguing that there is only one copula. For ease of reference, I will refer to these positions as the 3-be, 2-be, and 1-be positions, respectively. As will become clear, this division is somewhat artificial since the specific proposals within each category are quite different in spirit and in detail and some proposals do not fall unambiguously into one category. Nonetheless, the division helps structure the material in this section. It should also be noted that this section does not aim to exhaust the literature on the meaning of the copula, though it does aim to convey the range and variety of proposals that have been put forth.

3.1 3-be positions

I do not know of any works that explicitly argue for a 3-be position, but it is implicit in Schlenker (2003), Romero (2005), and Comorovski (2007). These authors posit a specificational copula and argue that it is different from the copula found in equatives. Whereas the equative copula typically equate individuals (though see section 3.4 below), the specificational copula equate propositions (according to Schlenker), or equate an individual with the value of an individual concept applied to the world of evaluation (according to Romero and Comorovski). (See specific denotations in Romero 2005: 715, (67a) and Comorovski 2007: 72, (49).) Since neither the equative nor the specificational copula can reasonably be assumed to be involved in predicational clauses (for reasons made clear by Geach 1962), these analyses effectively entail the existence of three semantically distinct copulas.

3.2 2-be positions

Echoing Russell (1919:119), 2-be positions draw a distinction between a contentful copula of identity and a essentially meaningless copula of predication. The denotations in (37) and (38) are representative:

(37) $[\![\text{be}_{ident}]\!] = \lambda\text{x}\lambda\text{y}[y = x]$

(38) $[\![\text{be}_{pred}]\!] = \lambda\text{P}\,\lambda\text{x}[P(x)]$

2-be positions differ, however, in their assumptions about the distribution of these two copulas across the clause types distinguished by Higgins (1979). Mikkelsen (2005) assumes that the copula of identity is found in equatives and that the copula of predication is found in both predicational and specificational clauses. (Recall from section 2.6 above that in that account, Higgins' identificational class is split up and distributed into the equative and specificational classes.) In contrast, Heller (2005) assumes that the identity copula is found in equative and specificational clauses, whereas the copula of predication is used in predicational and identificational clauses.

3.3 1-be positions

The most influential 1-be position is the one put forth in Williams (1983) and further developed in Partee (1986). Williams (1983) proposes that *be* always takes one referential and one predicative element and that the semantic role of *be* is to predicate the latter of the former. What is unusual about *be* is that it may take these two arguments in either order: in a predicational clause the copula combines first with the predicative element to its right and then with the referential element in subject position (39a); in a specificational clause the copula combines first with the referential element to its right and then with the predicative element in subject position (39b).

(39) a. $[\![\text{be}]\!] = \lambda\text{P}\,\lambda\text{x}[P(x)]$

b. $[\![\text{be}]\!] = \lambda\text{x}\lambda\text{P}[P(x)]$

If equative clauses like *Cicero is Tully* involve two referential elements, neither of the denotations in (39) can be used to compose these clauses. Partee (1986) argues that this type-mismatch is resolved by type-shifting the post-copular NP. In particular, the type-shifter IDENT, a member of the family of type-shifters proposed in Partee (1987), applies to the denotation of *Tully* (represented as t) and derives the predicative denotation $\lambda\text{y}[y = \text{t}]$. This makes equatives type-identical to predicational clauses and the *be* in (39a) applies straightforwardly. Williams (1983) and Partee (1986) do not discuss identificational clauses, but if these are in fact not a separate category, but rather belong with one (or more) of the other three categories, then they too are covered by Partee's (1986) analysis.

Geist (2007) follows Partee (1986) as far as predicational and specificational clauses are concerned, but suggests (§3.1) that the type-mismatch in equatives are resolved by type-shifting the copula itself. Concretely, Geist proposes that the *be* of predication in (39a) function composes with the identity function $\lambda\text{u}\lambda\text{y}[y = u]$. This yields a *be* of identity ($\lambda\text{u}\lambda\text{x}[x = u]$), which then combines with the two referential expressions.

Heycock and Kroch (1999) assume that the two elements flanking the copula form a small clause underlyingly and that the copula combines with this small clause. Thus, in contrast to the analyses of Williams, Partee, and Geist, the pre- and post-copular elements compose semantically without the mediation of the copula. In the case of predicational clauses, the composition of the small clause is straightforward: the type $\langle\text{e,t}\rangle$ element applies to the type e element. In the case of equatives (which they take to include specificational clauses), Heycock and Kroch (1999:381–382) point to the existence of an equative small clause which, when embedded under a semantically vacuous copula, produces equative copular clauses. Under that view, the identity relation resides in a null functional head of the small clauses.

All three 1-be analyses thus assume that (at least some) equatives involve an identity relation, but differ on how the identity relation enters the semantic composition. Geist (2007) is the only one that locates the identity relation in the (type-shifted) copula itself, which is important given the observation that equative readings are typically unavailable in embedded contexts without *be* (though see Heycock and Kroch 1999: 381 for relevant discussion):

(40) *I believe [Cicero Tully]

Geist attributes the ungrammaticality of (40) to the fact that the identity relation is tied to the copula: no copula, no identity relation. Heycock and Kroch (1999) could perhaps appeal to subcategorization: if predicational and equative small clauses are headed by different functional heads, then the embedding verb could subcategorize for the former, but not the latter (see relevant data at the end of section 2.2). It is less clear to me how Partee's (1986) analysis could be extended to account for the ill-formedness of (40). Note that (40) is well-formed if the embedded clause is a full copular clause: *I believe Cicero to be Tully.*

3.4 Polymorphic *be*

Above I have concentrated on copular clauses of the form 'NP be NP' and the meaning(s) of the copula that have been proposed for such clauses. However, the copula occurs with phrases of other categories, as the examples in (41) illustrate (these are borrowed from Partee 1986: 355; see also Heycock and Kroch's 'AP be AP' example in (7) above).

(41) a. To love is to exult.
b. From A to B is 600 miles.
c. Because he was out of money wasn't his only reason.
d. Outside from one point of view may be inside from another.
e. Electronically is usually fastest.

This leads Partee (1986) to propose that the copula is polymorphic, in particular that "*be* takes arguments of types $\mathcal{X}$ and $\langle\mathcal{X}$,t$\rangle$ for any type $\mathcal{X}$" (p. 355). The denotations in (39) instantiate this denotation schema for $\mathcal{X}$ = e. Most other analyses are not as explicit about the polymorphism of the copula, but it seems to me that most of them can be extended along the lines drawn by Partee. For instance, the analyses of Romero (2005) and Comorovski (2007) could be generalized as follows (more realistic type-assignments would have $\langle$s,t$\rangle$ in place of t). Equative clauses equate expressions of like types for any type, hence equative *be* is of type $\langle\mathcal{X},\langle\mathcal{X}$,t$\rangle\rangle$. Specificational *be* combines expressions of types $\mathcal{X}$ and $\langle$s,$\mathcal{X}\rangle$ and is of type $\langle\mathcal{X},\langle\langle$s,$\mathcal{X}\rangle$,t$\rangle\rangle$. Finally, predicational *be* combines expressions of types $\langle\mathcal{X}$,t$\rangle$ and $\mathcal{X}$ (as proposed by Partee) and is itself of type $\langle\langle\mathcal{X}$,t$\rangle,\langle\mathcal{X}$,t$\rangle\rangle$.

One question that to my knowledge has not received much explicit attention in the literature is whether all four types of copular clauses in Higgins' taxonomy exhibit equal degrees of freedom as regards the syntactic category and semantic type of the elements flanking the copula. This is relevant not only for deepening the understanding of the taxonomy itself, but also for evaluating the proposals regarding the meaning of the copula reviewed above. If the copula is equally polymorphic in all four kinds of copula clauses, that would seem to support a 1-be position. If, on the other hand, there is variation in degree of polymorphism and if that variation lines up with the various subtypes of copular clauses, then that would seem to favor a multiple-be position.

4. Connectivity

Connectivity in copular clauses refers to the phenomenon where an element is present or interpreted in a way that is normally associated with a certain syntactic configuration seemingly without that configuration obtaining. (Higgins 1979 used the term "connectedness", but since Kayne used this term for an unrelated concept, the term "connectivity" has become standard and I will use it throughout.) Four kinds of connectivity effects figure in the literature: binding theory connectivity (for Principles A, B and C), bound variable connectivity, negative polarity item (NPI) connectivity, and opacity connectivity. The first three concern phenomena that are usually assumed to involve c-command, whereas opacity connectivity concerns semantic selection, which is typically taken to require sisterhood. The examples in (42)–(47) illustrate the four kinds of connectivity. In each case, the a. example is a specificational clause exhibiting the relevant type of connectivity, the b. example is a non-copular clause in which the elements under consideration stand in their standard structural relationship (c-command within a certain domain or sisterhood), and the c. example is a non-copular clause in which they do not. (Some speakers find (45c) grammatical, which raises questions about the c-command requirement on variable binding and hence the import of examples like (45a).)

(42) Principle A

a. What Harvey$_i$ did next was wash himself$_i$ thoroughly.

b. Harvey$_i$ washed himself$_i$ thoroughly.

c. *Before Harvey$_i$ left, Miriam washed himself$_i$ thoroughly.

(43) Principle B

a. *What Harvey$_i$ did next next was wash him$_i$ thoroughly.

b. *Harvey$_i$ washed him$_i$ thoroughly.

c. Before Harvey$_i$ left, Miriam washed him$_i$ thoroughly.

(44) Principle C

a. *What he$_i$ did next was wash Harvey$_i$ thoroughly.

b. *He$_i$ washed Harvey$_i$ thoroughly.

c. Before he$_i$ left, Miriam washed Harvey$_i$ thoroughly.

(45) Bound variable connectivity

a. What [every tennis player]$_i$ loves is his$_i$ racket.

b. [Every tennis player]$_i$ loves his$_i$ racket.

c. *After [every tennis player]$_i$ left the court, someone picked up his$_i$ racket.

(46) NPI connectivity

a. (They found a lot of interesting things at the house, but) what they didn't find was any photos from his childhood.

b. They didn't find any photos from his childhood.

c. *Even though they didn't look very hard, they found any photos from his childhood.

(47) Opacity connectivity

a. What they are looking for is a nanny.

b. They are looking for a nanny.

c. The one they are looking for found a nanny. (no de dicto reading)

While connectivity effects are canonically associated with pseudoclefts, as in the a. examples above, most connectivity effects are also found in specificational clauses where the subject is a headed relative clause, see (48) and (49), and binding connectivity effects are also found when there is no relative clause at all, as in (50).

(48) The thing he$_i$ did next was wash himself$_i$/him$_{*i}$/Harvey$_{*i}$ thoroughly.

(49) The thing we didn't find was any photos from his childhood.

(50) His$_i$ biggest worry is himself$_i$/him$_{*i}$/Harvey$_{*i}$.

There are three broad approaches to explaining connectivity, which I will refer to as the ellipsis approach, the logical form approach, and the semantic approach. As we will see each of them is associated with a different analysis of specificational clauses. Furthermore, the semantic approach is revisionist (to use Schlenker's 2003 term) in the sense that c-command is rejected as a requirement for NPI licensing and binding, and sisterhood as a requirement for semantic selection, contra mainstream assumptions. The other two approaches maintain the standard theories of binding, NPI licensing, and selection and propose that the relevant syntactic configurations do obtain, though they are not observable at the surface.

4.1 The ellipsis approach

The account of connectivity effects under the ellipsis approach is beautifully simple: the distribution and interpretation of the relevant elements in the post-copular phrase (pronouns, R-expressions, NPIs, and de dicto indefinites) are licensed exactly the way they generally are, but the syntactic licensing relationships are obscured by ellipsis. Thus the example exhibiting Principle A connectivity in (42a) has the structure in (51), where the post-copular expression is a full IP. That IP contains a subject which licenses the reflexive locally, but the subject (and the past tense) are ellided:

(51) What Harvey$_i$ did next was [$_{\text{IP}}$ ~~he$_i$ PAST~~ wash himself$_i$ thoroughly].

Similarly, principle Principle B connectivity (43a) and Principle C connectivity (44a) arise from the presence of a c-commanding, coindexed subject in the post-copular phrase, illicitly binding the pronoun (52) or R-expression (53):

(52) What Harvey$_i$ did next was [$_{\text{IP}}$ ~~he$_i$ PAST~~ wash him$_i$ thoroughly].

(53) What he$_i$ did next was [$_{\text{IP}}$ ~~he$_i$ PAST~~ wash Harvey$_i$ thoroughly].

The analysis extends straightforwardly to bound variable connectivity (54), NPI connectivity (55), and opacity connectivity (56):

(54) What [every tennis player]$_i$ loves is [$_{\text{IP}}$ ~~[every tennis player]$_i$ loves~~ his$_i$ racket].

(55) What they didn't find was [$_{\text{IP}}$ ~~they didn't find~~ any photos from his childhood].

(56) What they are looking for is [$_{\text{IP}}$ ~~they are looking for~~ a nanny].

The challenge for the ellipsis account lies in motivating the semantic and syntactic assumptions necessary for this very simple and attractive account of connectivity effects: (i) that the pre-copular element is a question, at least semantically, (ii) that the post-copular phrase is syntactically a full IP, though part of it goes unpronounced and (iii) that there is a reasonable semantic composition that derives the intended meaning from the three parts. This challenge is taken up by Schlenker (2003) and den Dikken et al. (2000), and though their analyses and arguments differ, I discuss them together here.

Assumption (i) breaks into three cases based on the form of the subject. When the subject is a *wh*-clause (*what Harvey did next*), the assumption is that this is an embedded interrogative as opposed to a free relative clause (see den Dikken et al. 2000: 71–81, Schlenker 2003: 168, and Caponigro and Heller 2007: 245–252 for relevant discussion). When the subject contains a headed relative (*the thing Harvey did next*), the assumption is that this NP is the idiosyncratic spell-out of an underlying interrogative structure (den Dikken et al. 2000: 82–83, Schlenker 2003: 190). Finally, when the subject is an NP without a relative clause (*Harvey's biggest worry*), the assumption is that this NP is a concealed question: a syntactic NP with the meaning of a question.

The second assumption that must be justified under the ellipsis account of connectivity is that the post-copular element is a full IP underlyingly. The account of connectivity rests entirely on this assumption (see (51)–(56)). Perhaps the most direct evidence for this assumption comes from the possibility (for some speakers for some examples; den Dikken et al. 2000: 45–46) of pronouncing the entire IP:

(57) What I did then was [I called the grocer]. (Ross 1972:(39b))

Indirect evidence for the syntactic presence of a full IP comes from the fact that the post-copular element may vary in "size" and form in just the way a regular answer

does. If such fragment answers are derived by ellipsis (Merchant 2004), it is natural to assume that the same ellipsis operations are at work in specificational clauses.

Finally, it must be shown how the copula, subject and predicate complement compose semantically to arrive at a proper meaning for specificational clauses. Schlenker proposes that the copula found in specificational clauses, be_{spec}, equates propositions. Being a declarative IP, the post-copular phrase straightforwardly denotes a proposition. As for the subject, Schlenker adopts the semantics for questions proposed in Groenendijk and Stokhof (1997), according to which the extension of a question is a proposition, namely the unique, exhaustive, true answer to the question in the world of evaluation. The difference, then, between specificational clauses and equatives is that only the former equates propositions, in particular a question and its answer, whereas the latter equates other semantic objects.

4.2 The logical form approach

In a certain, derivational sense the logical form account of connectivity is the inverse of the ellipsis account. Where the ellipsis account assumes that the relevant syntactic configuration is established at an early stage of the derivation (and is then later obscured by ellipsis), the logical form account, as developed by Heycock and Kroch (1999:388–394), posits that the relevant syntactic configuration is created at a very late stage in the derivation, one that Heycock and Kroch dub 'logical form'. This stage is later than regular L(ogical)F(orm) and is derived from it by a special operation of ι-reduction. They illustrate these assumptions by deriving the logical form for the specificational sentence in (58), which does not exhibit any connectivity effects.

(58) What Fiona bought was that ancient dictionary.

Like Schlenker, Heycock and Kroch assume an equative semantics for specificational clauses, but unlike Schlenker, they take the wh-clause to be a free relative clause, and not an embedded question. In (58) the gap in the free relative is type e, and Heycock and Kroch assume that the free relative denotes an element of the same type as the gap, in particular the ι-expression in (59), where y is a variable over individuals and where the ι-operator is defined as in (60).

(59) ιy[Fiona bought y] [= H&K's (65)]

(60) ιy[f(y)] denotes a iff f(a) AND $(\forall z)$(f(z) iff $z \leq a$) [= H&K's (66)]

The post-copular DP straightforwardly denotes an individual, and we thus arrive at (61), which is "a representation of the surface structure of [(58)] considered as a semantically interpreted object and hence [...] the starting point of the derivation of the sentence's logical form" (p. 388).

(61) ιy[Fiona bought y] = 'that old dictionary' [= H&K's (67)/(84b)]

ι-reduction applies to (61) to yield (62c). As I understand it, there are three sub-steps to ι-reduction. First, the ι-operator is eliminated by applying the definition in (60). This yields (62a). Then the focus of the pseudocleft, i.e. the right-hand argument of the identity relation, substitutes for the ι-bound variable, as shown in (62b). This substitution is licensed by the identity relation itself (p. 388). Finally, the second clause, which imposes maximality, is dropped. (62c) is the resulting logical form.

(62) a. Fiona bought y AND $(\forall z)$ (Fiona bought z iff $z \leq y$) = 'that ancient dictionary'

b. Fiona bought that ancient dictionary AND $(\forall z)$ (Fiona bought z iff $z \leq$ 'that ancient dictionary')

c. Fiona bought that ancient dictionary

In essence, what is created at logical form for a specificational pseudocleft is the corresponding simple clause paraphrase. This goes a long way towards accounting for connectivity effects, because in the simple clause paraphrase the expected syntactic licensing relationship does obtain: compare the a. and b. sentences in (42)–(47) above. The final assumption that Heycock and Kroch must make is that logical form is the level relevant for binding, NPI licensing, and semantic selection. In support of this somewhat radical assumption, they point to the existence of connectivity effects in question–answer pairs (63) and other discourse contexts (64).

(63) A: What did Mary$_i$ see?
B: Herself$_i$/Her$_{*i}$ in the mirror.

(64) There is something he$_i$ still wants to commission;
it's a portrait of himself$_i$/him$_{*i}$/John$_{*i}$.

In the example analyzed in (59)–(62) it is individuals that are being equated, but Heycock and Kroch point out that their analysis can be extended to specificational clauses with other types of foci, which is relevant for examples like (42)–(44) and (47) above, by allowing "the type of the ι-bound variable to range over all the semantic types that free relatives can denote" (p. 383). Additionally, appropriate definitions of the ι-operator must be provided for each of these types.

Finally, to account for connectivity in specificational clauses that do not contain relative clause, like (65) below and (50) above, Heycock and Kroch (1999:390) propose that "at the level of interpretation [i.e. LF; LM], a noun phrase like *his claim* in [65] must be represented in the same way as the free relative *what he claimed* [...] so as to be equally subject to ι-reduction".

(65) His$_i$ claim was that John$_i$ was innocent.

4.3 The semantic approach

The semantic approach to connectivity, as developed by Jacobson (1994), Sharvit (1999), Cecchetto (2000), and Heller (2002, 2005), holds that there is no hidden syntactic structure in specificational clauses, nor any post-LF transformations, and that the apparent lack of syntactic licensing (between antecedent and anaphor, between binder and variable, between negation and NPI, and between intensional predicate and de dicto NP) is real. From this they draw the general conclusions that c-command is not a necessary condition for anaphor licensing, variable binding, or NPI licensing, nor is sisterhood required to license de dicto readings of NPs. The task then is to explain why "unlicensed" reflexives, bound variable pronouns, NPIs, and de dicto readings are possible in specificational clauses, but (typically) not in non-specificational clauses.

Jacobson (1994) provides an account of bound variable connectivity in copular clauses, in particular the example in (66) (apart from the subject being a headed relative clause, rather than a wh-phrase, this is like the tennis player example in (45a)):

(66) The woman who every Englishman$_i$ loves is his$_i$ mother.

Her account account is couched in a variable-free semantics with a Categorial Grammar syntax and differs radically from the ones reviewed above: not only is there no c-command at any level of representation between *every Englishman* and *his*, in fact there is no binding relation between these two elements at all. Instead, the effect of binding that we observe in the relevant interpretation of this sentence (that it is true iff every Englishman loves his own mother) is the result of equating functional interpretations of the pre- and post-copular phrases. The relevant functional interpretations will be discussed in detail below, but intuitively (though not quite accurately) they are i) the function f such that for every Englishman x, x loves f(x) and ii) the-mother-of function. Both are functions from individuals to individuals and (66) equates these functions.

The functional reading of *his mother* is derived as follows: the pronoun denotes the identity function on individuals, λx[x], as personal pronouns generally do in Jacobson's system. Ordinarily the common noun *mother* denotes a relation between individuals (type $\langle$e,$\langle$e,t$\rangle\rangle$), but in this syntactic context it shifts to a type $\langle$e,e$\rangle$ meaning, namely the function mapping each individual into their mother: λx[ιy[mother$'$(x)(y)]]. The two functions compose and the result is that function that maps each individual into their mother, a.k.a. the-mother-of function:

(67) λx[ιy[mother$'$(x)(y)]] $\circ$ λx[x] = λx[ιy[mother$'$(x)(y)]]

The semantic composition of the pre-copular phrase is more involved. Lets first consider the interpretation of the verb in the relative clause. The ordinary meaning of *love* is a relation between individuals (i.e. type $\langle$e,$\langle$e,t$\rangle\rangle$), but it can shift to a type $\langle\langle$e,e$\rangle$,$\langle$e,t$\rangle\rangle$ meaning by rule z, which is defined in (68):

(68) Let α be an expression with meaning of type $\langle X,\langle e,Y\rangle\rangle$. Then there is a homophonous expression β with meaning of type $\langle\langle e,X\rangle,\langle e,Y\rangle\rangle$, where $\beta'=z(\alpha')$. The definition of z is: For any function g, $z(g) = \lambda f[\lambda x[g(f(x))(x)]]$ (for f a variable of type $\langle e,X\rangle$).

In (69), rule z is applied to *love*:

(69) $z(love')= \lambda f[\lambda x[love'(f(x))(x)]]$

The shifted meaning of *love* is "a relation between individuals and functions from individuals to individuals, such that to z(love) some function f is to be an x who stands in the ordinary *loves'* relation to f(x)" (p. 165). This achieves the effect of variable binding in a sentence like *Every Englishman loves his mother*. The object noun phrase *his mother* has the functional interpretation derived in (67) and hence is of the right type ($\langle e,e\rangle$) to combine with z(love'). The resulting VP meaning is a function from individuals to truth values, which yields true for an individual x if x z-loves the-mother-of function, that is, if x loves the mother of x. This VP meaning in turn can serve as the argument for the quantificational subject *every Englishman* and we arrive at the bound variable interpretation, namely that every Englishman has the VP property of z-loving the-mother-of function, that is the property of loving ones mother. Rule z thus effects binding by linking the pronoun in the object of *love* to a higher argument argument position, here the subject. It targets the pronoun inside the lower argument by requiring a functional interpretation for that argument (see the "lift" on the first argument of *love* from X to $\langle e,X\rangle$ in (68)). Now back to the relative clause in (66). Here there is a gap in the object position of *love*, namely the gap of relative clause extraction. Under Jacobson's Categorial Grammar assumptions such gaps have no meaning at all. Nonetheless, *love* shifts by rule z and, since there is no object to combine with, function composes with the meaning of the subject:

(70) $\text{every-Englishman-loves}' = \text{every-Englishman}' \circ z(\text{love}')$
$= \lambda f[\text{every-Englishman}'(\lambda x[\text{love}'(f(x))(x)])]$

The next piece is the meaning of the relative pronoun *who*. In Jacobson's analysis *who* is responsible for combining the relative clause meaning derived in (70) with the meaning of the common noun *woman* and it does so by intersecting the sets denoted by each of these. In the case of (66), the set denoted by the relative clause is a set of functions from individuals to individuals (see (70)). Hence *woman* also needs to denote a set of such functions (otherwise the intersection would be guaranteed to be empty), in particular the set of functions into women:

(71) type $\langle\langle e,e\rangle,t\rangle$ meaning for *woman* $= \lambda g[\forall x[\text{woman}'(g(x))]]$

Relative *who* in turn takes as arguments these two sets of functions and returns their intersection:

(72) $\text{who}' = \lambda A[\lambda B[\lambda f[B(f) \wedge A(f)]]]$
(for A and B variables of type $\langle\langle e,e\rangle,t\rangle$ and f a variable of type $\langle e,e\rangle$)

The last piece we need to derive the meaning of the pre-copular phrase is a suitable denotation of for the definite article. Here Jacobson assumes a variant of Partee's (1987) IOTA operator, in particular that *the* maps a set of functions to the unique member of that set. The derivation for the subject of (66) is given in (73) (I have renamed the function variable f in the meaning of *every Englishman loves* h):

(73) a. every-Englishman-loves′ = (70)

b. who′ = (72)

c. who-every-Englishman-loves′ = who′(every-Englishman-loves′)
$= \lambda A[\lambda B[\lambda f[B(f) \wedge A(f)]]](\lambda h[\text{every-Englishman}'(\lambda x[\text{love}'(h(x))(x)])])$
$= \lambda B[\lambda f[B(f) \wedge \lambda h[\text{every-Englishman}'(\lambda x[\text{love}'(h(x))(x)])](f)]]$
$= \lambda B[\lambda f[B(f) \wedge \text{every-Englishman}'(\lambda x[\text{love}'(f(x))(x)])]]$

d. woman′ = (71)

e. woman-who-every-Englishman-loves′ = who-every-Englishman-loves′(woman′)
$= \lambda B[\lambda f[B(f) \wedge \text{every-Englishman}'(\lambda x[\text{love}'(f(x))(x)])]](\lambda g[\forall x[\text{woman}'(g(x))]])$
$= \lambda f[\lambda g[\forall x[\text{woman}'(g(x))]](f) \wedge \text{every-Englishman}'(\lambda x[\text{love}'(f(x))(x)])]$
$= \lambda f[\forall x[\text{woman}'(f(x))] \wedge \text{every-Englishman}'(\lambda x[\text{love}'(f(x))(x)])]$

f. the-woman-who-every-Englishman-loves′
= IOTA(woman-who-every-Englishman-loves′)
$= \iota f[\forall x[\text{woman}'(f(x))] \wedge \text{every-Englishman}'(\lambda x[\text{love}'(f(x))(x)])]$

The subject of (66) thus denotes the unique function with the range women such that every Englishman z-loves that function.

With functional interpretations of the pre- and post-copular phrases in place, we can turn to Jacobson's analysis of the copula. In so far as the bound variable connectivity effect observed in (66) is argued to follow from the equating of the two functions denoted by the elements flanking the copula, one might propose a type-suitable equative meaning for the specificational copula, as indeed Sharvit (1999:306) does (see (77) below). Jacobson, however, pursues a polymorphic 1-be analysis in the vein of Partee (1986) (see sections 3.3 and 3.4): the copula found in specificational clauses is the copula of predication, though its two arguments are reversed, such that the "predicative" (type $\langle \mathcal{X}, t \rangle$) element is to the left and the "referential" (type $\mathcal{X}$) element to the right. In the case of (66), $\mathcal{X} = \langle e,e \rangle$ and *be* has the denotation in (75b). In order for the copula to combine with the subject, the subject must shift to a "predicative" meaning, i.e. to a type $\langle \langle e,e \rangle, t \rangle$ meaning. This is done by a functional version of Partee's (1987) IDENT operator which maps a function to the (singleton) set containing that function:

(74) IDENT(f)=$\lambda g[g \equiv f]$ (where f and g are both type $\langle e,e \rangle$, and $\equiv$ means semantic equivalence)

Hence (66) composes as in (75):

(75) a. his-mother′ = (67)

b. is′ = λi[$\lambda\mathcal{P}$[$\mathcal{P}$(i)]]
(for i a variable of type ⟨e,e⟩ and $\mathcal{P}$ a variable of type ⟨⟨e,e⟩,t⟩)

c. is-his-mother′ = is′(his-mother′)
= λi[$\lambda\mathcal{P}$[$\mathcal{P}$(i)]](λx[ιy[mother′(x)(y)]])
= $\lambda\mathcal{P}$[$\mathcal{P}$(λx[ιy[mother′(x)(y)]])]

d. the-woman-who-every-Englishman-loves′
= IDENT(the-woman-who-every-Englishman-loves′)
= IDENT((73f))
= λg[g≡ιf[$\forall$x[woman′(f(x))] $\wedge$ every-Englishman′(λx[love′(f(x))(x)])]]

e. the-woman-who-every-Englishman-loves-is-his-mother′
= is-his-mother′(the-woman-who-every-Englishman-loves′)
= $\lambda\mathcal{P}$[$\mathcal{P}$(λx[ιy[mother′(x)(y)]])](λg[g≡ιf[$\forall$x[woman′(f(x))] $\wedge$
every-Englishman′(λx[love′(f(x))(x)])]])
= λg[g≡ιf[$\forall$x[woman′(f(x))] $\wedge$
every-Englishman′(λx[love′(f(x))(x)])]](λx[ιy[mother′(x)(y)]])
= λx[ιy[mother′(x)(y)]]≡ιf[$\forall$x[woman′(f(x))] $\wedge$
every-Englishman′(λx[love′(f(x))(x)])]]

To summarize: Jacobson analyzes bound variable connectivity as the result of equating two type ⟨e,e⟩ functions. In her system functional interpretations noun phrases arise in two ways: through the presence of a pronoun (as in *his mother*) or through A-bar extraction (as in the relative clause *who every Englishman loves*). Following Partee (1986), the equative relation is not the direct contribution of the copula, but rather introduced through type-shifting on the subject.

Sharvit (1999) extends the semantic approach to opacity connectivity, NPI connectivity, and Principle A connectivity. She offers tentative proposals for Principles B and C connectivity, which are substantiated by Cecchetto (2000).

Sharvit's account of opacity connectivity relies on Zimmermann's (1993) analysis of intensional predicates, according to which the opaque reading of *They are looking for a nanny* (=47b) arises from *look for* taking a property as its internal argument, here the nanny property. Hence the gap in the relative clause in (76a) (= (47a)) is of type ⟨s,⟨e,t⟩⟩ and the relative clause minus *what* denotes a set of properties, as shown in (76b), where T is a contextually determined variable over plural individuals. In (76c), relative *what* applies to this set and picks out the maximum member of the set, with the result that the meaning of the entire subject phrase is the maximum property in the set of properties that they are looking for, i.e. of type ⟨s,⟨e,t⟩⟩ (see Sharvit 1999: 306 for details).

(76) a. What they are looking for is a nanny.

b. they-are-looking-for′= λP$_{\langle s,\langle e,t\rangle\rangle}$[look-for′(T,P)]

c. what-they-are-looking-for′ = what′(they-are-looking-for′)
= Max(they-are-looking-for′)
= Max(λP$_{\langle s,\langle e,t\rangle\rangle}$[look-for′(T,P)])

The key to deriving an opaque, i.e. type ⟨s,⟨e,t⟩⟩, reading of the post-copular phrase is, again, that an identity relation is imposed on the pre- and post-copular elements. Instead of attributing the identity relation to type-shifting (by IDENT) of the pre-copular phrase, Sharvit locates the identity relation in the meaning of the copula itself:

(77) $\text{be}' = \lambda X \lambda Y[X = Y]$ (where type(X) = type(Y))

Since (77) requires that the two elements *be* composes with be of the same type, and the subject of (76a) denotes a property (the one given in (76c)), *a nanny* must be property type as well, and that type-requirement is what derives the opaque reading. In that sense, the availability of such a reading (which is the connectivity effect under investigation) is a by-product of the identity meaning of the copula. This copula-regulated type-matching between the gap in the pre-copular phrase and the post-copular element is also at work in Sharvit's (1999) account of NPI connectivity, but for reasons of space I omit the details of that analysis.

Finally Sharvit extends Jacobson's account of bound variable connectivity to binding theory connectivity (examples (42)–(44) above). For Principle A connectivity (*What Harvey$_i$ did next was wash himself$_i$ thoroughly*), the basic idea is that there is no real binding between the two NPs (*Harvey* and *himself*). Instead the reflexive is taken to be an argument-reducing operation on transitive verbs in the spirit of Reinhart and Reuland (1993). Rather than positing a separate rule for the reflexive, Sharvit exploits the tools used in Jacobson's account of bound variable connectivity. wash′ shifts by rule z to the meaning in (78) (cf. (68) and (69) above):

(78) $z(\text{wash}') = \lambda f[\lambda x[\text{wash}'(x, f(x))]]$

Following Jacobson, the reflexive denotes an identity function on individuals ($\lambda y[y]$) which combines with the shifted meaning of the verb to yield the property-meaning in (79):

(79) $\text{wash-himself}' = \lambda f[\lambda x[\text{wash}'(x, f(x))]](\lambda y[y])$
$= \lambda x[\text{wash}'(x, \lambda y[y](x))]$
$= \lambda x[\text{wash}'(x,x)]$

The VP-gap in the relative clause is also property-type, which results in a property denotation for the entire pre-copular expressions (through derivational steps analogous to (76b) and (76c) above). Thus (42a) composes as in (80), ignoring tense and the adverbials *next* and *thoroughly*, and letting Harvey′=h:

(80) $\text{what-Harvey-did-was-wash-himself}' = \text{be}'(\text{wash-himself}')(\text{what-Harvey-did}')$
$= \lambda O_{\langle s\langle e,t\rangle\rangle} \lambda P_{\langle s\langle e,t\rangle\rangle}[O = P](\lambda x[\text{wash}'(x,x)])(\text{Max}(\lambda N_{\langle s,\langle e,t\rangle\rangle}[N(h)]))$
$= \lambda P_{\langle s\langle e,t\rangle\rangle}[\lambda x[\text{wash}'(x,x)] = P](\text{Max}(\lambda N_{\langle s,\langle e,t\rangle\rangle}[N(h)]))$
$= \lambda x[\text{wash}'(x,x)] = \text{Max}(\lambda N_{\langle s,\langle e,t\rangle\rangle}[N(h)])$
= 1 iff self-washing is the greatest element in set of properties that hold of Harvey in the world of evaluation.

In this analysis, there is no syntactic licensing of the reflexive by its antecedent in (42a). Rather, the reflexive is possible because a property interpretation is possible (in fact required) for the post-copular phrase. This in turn is the result of two facts: the property-interpretation of the relative clause and the type-matching requirement imposed by the copula. Again, we see that the connectivity effect, here the appearance of a reflexive not c-commanded by its antecedent, is a by-product of the semantic composition of the specificational clause.

4.4 Further issues

Above I focussed on the dominant accounts of the core data associated with the connectivity question. The research cited above (and other research) has raised further issues that are currently under scrutiny. All I can do here is to mention a few of these. First, there is the empirical question of whether different connectivity effects have an equal distribution within a language as well as across languages (see e.g. Sharvit 1999: 321–323, 328–331, den Dikken et al. 2000, Heller 2002, and Heller 2005: 9). Secondly, there is evidence of connectivity effects outside the domain of copular clauses, including question–answer pairs and sentences with copula-like predicates like *consist in*. Strikingly, each of the three approaches to connectivity discussed above cites the existence of connectivity effects in question–answer pairs as evidence for their position, though the arguments they offer in support of these claims obviously differ. As far as I can tell, the existence of connectivity effects with copula-like predicates have received less attention. Third, various authors, including Sharvit (1999), den Dikken et al. (2000), and Cecchetto (2000), have pointed out the existence of ANTI-CONNECTIVITY EFFECTS, which are like connectivity effects in that the normal licensing conditions are not met in the specificational clause, but unlike the regular connectivity effects examined above, the licensing conditions are also not met in the simple clause paraphrase. This is illustrated for reflexive binding in (81), taken from Schlenker (2003:203).

(81) a. What John thinks that Mary likes is himself.

b. *John thinks that Mary likes himself.

Anticonnectivity effects are potentially problematic for the ellipsis approach and the logical form approach, in so far as their account of connectivity relies on the simple paraphrase being part of the derivation of the connectivity sentence and the normal licensing conditions being met in that part of the derivation. See Schlenker (2003:§5) for further data, references, and relevant discussion.

5. Conclusion

In the introduction, I distinguished three questions regarding copular clauses: the taxonomy question (how many types of copular clauses are there and what are their defining properties), the copula question (how many copulas are there and what is their semantic contribution), and the connectivity question (how are connectivity

effects best accounted for and what do they tell us about the structure of the clauses they occur in and about the phenomena involved, i.e. binding, NPI licensing, etc.). As the body of the article made clear, there is no consensus on the answers to these questions. That is not to say, of course, that the last three decades of research has not deepened our understanding of copular clauses. I strongly believe that it has. For each question, there is a set of well-articulated and competing proposals, which have led to new questions being asked and old ones being asked in a more precise way. General theoretical tools, such as semantic type theory, have been applied to the study of copular clauses, and, though not reflected in this article, data from a wider range of languages are now part of the debate.

References

Adger, David, and Gillian Ramchand. 2003. Predication and equation. *Linguistic Inquiry* 34(3):325–359.

Akmajian, Adrian. 1979. *Aspects of the Grammar of Focus in English.* New York: Garland.

Alexiadou, Artemis, and Anastasia Giannakidou. 1999. Specificational pseudoclefts as lists. In K. Shahin, S. Blake, and E.-S. Kim (Eds.), *Proceedings of WCCFL 17*, 1–15, Vancouver, BC. CSLI.

Aloni, Maria. 2001. *Quantification under Conceptual Covers.* PhD thesis, University of Amsterdam.

Berg, Jonathan. 1988. The pragmatics of substitutivity. *Linguistics and Philosophy* 11(3):355–370.

Birner, Betty J., Jeffrey P. Kaplan, and Gregory Ward. 2007. Functional compositionality and the interaction of discourse constraints. *Language* 83(2):323–349.

Büring, Daniel. 1998. Identity, modality and the candidate behind the wall. In D. Strolovitch and A. Lawson (Eds.), *Proceedings of SALT VIII*, 36–54. Ithaca, NY: Cornell University.

Caponigro, Ivano, and Daphna Heller. 2007. The non-concealed nature of free relatives: Implications for connectivity crosslinguistically. In C. Barker and P. Jacobson (Eds.), *Direct Compositionality*, 237–263. Oxford: Oxford University Press.

Cecchetto, Carlo. 2000. Connectivity and anti-connectivity in pseudoclefts. In M. Hirotani, A. Coetzee, N. Hall, and J. yung Kim (Eds.), *Proceedings of NELS 30*, 137–151. Amherst, MA: GLSA.

Comorovski, Ileana. 2007. Constituent questions and the copula of specification. In I. Comorovski and K. von Heusinger (Eds.), *Existence: Semantics and Syntax*, 49–77. Dordrecht: Springer.

Declerck, Renaat. 1988. *Studies on copular sentences, clefts and pseudoclefts.* Dordrecht: Leuven University Press and Foris.

den Dikken, Marcel. 2006. *Relators and Linkers. The Syntax of Predication, Predicate Inversion, and Copulas.* Cambridge, MA: MIT Press.

den Dikken, Marcel, André Meinunger, and Chris Wilder. 2000. Pseudoclefts and ellipsis. *Studia Linguistica* 54(1):41–89.

Geach, Peter Thomas. 1962. *Reference and Generality: An Examination of Some Medieval and Modern Theories.* Ithaca, NY: Cornell University Press.

Geist, Ljudmila. 2007. Predication and equation in copular sentences: Russian vs. English. In I. Comorovski and K. von Heusinger (Eds.), *Existence: Syntax and Semantics*, 79–105. Dordrecht: Springer.

Groenendijk, Jeroen, and Martin Stokhof. 1997. Questions. In J. van Benthem and A. ter Meulen (Eds.), *Handbook of Logic and Language*, 1055–1124. Cambridge, MA: MIT Press.

Groenendijk, Jeroen, Martin Stokhof, and Frank Veltman. 1996. Coreference and modality. In S. Lappin (Ed.), *The Handbook of Contemporary Semantic Theory*, 179–213. Oxford: Blackwell.

Halliday, Michael Alexander Kirkwood. 1967. Notes on transitivity and theme in English (Part 2). *Journal of Linguistics* 3(2):199–244.

Hedberg, Nancy. 2000. The referential status of clefts. *Language* 76(4):891–920.

Heggie, Lorie. 1988. *The Syntax of Copular Structures.* PhD thesis, USC.

Heller, Daphna. 2002. On the relation of connectivity and specificational pseudoclefts. *Natural Language Semantics* 10(4):243–284.

Heller, Daphna. 2005. *Identity and Information: Semantic and Pragmatic Aspects of Specificational Sentences.* PhD thesis, Rutgers, The State University of New Jersey.

Heller, Daphna, and Lindsey Wolter. 2008. *That is Rosa*: Identificational sentences as intensional predication. In A. Grønn (Ed.), *Proceedings of SuB12*, 226–240. Oslo: ILOS 2008.

Heycock, Caroline, and Anthony Kroch. 1999. Pseudocleft connectedness: Implications for the LF interface level. *Linguistic Inquiry* 30(3):365–397.

Heycock, Caroline, and Anthony Kroch. 2002. Topic, focus, and syntactic representations. In L. Mikkelsen and C. Potts (Eds.), *Proceedings of WCCFL 21*, 101–125. Somerville, MA: Cascadilla Press.

Higgins, Roger Francis. 1979. *The Pseudo-cleft Construction in English.* New York: Garland.

Jacobson, Pauline. 1994. Binding connectivity in copular sentences. In M. Harvey and L. Santelmann (Eds.), *Proceedings of SALT IV*, 161–178. Ithaca, NY: Cornell University.

Kay, Paul, and Charles J. Fillmore. 1999. Grammatical constructions and linguistic generalizations: The *What's X doing Y?* construction. *Language* 75(1):1–33.

Merchant, Jason. 2004. Fragments and ellipsis. *Linguistics and Phisolophy* 27(6):661–738.

Mikkelsen, Line. 2005. *Copular Clauses: Specification, Predication and Equation.* Amsterdam: John Benjamins.

Mikkelsen, Line. 2007. On so-called truncated clefts. In L. Geist and B. Rothstein (Eds.), *Kopulaverben und Kopulasätze: Intersprachliche und Intrasprachliche Aspekte*, 47–68. Tübingen: Niemeyer Verlag.

Moro, Andrea. 1997. *The Raising of Predicates: Predicative Noun Phrases and the Theory of Clause Structure.* Cambridge: Cambridge University Press.

Mueller-Reichau, Olav. 2007. Das Subjekt eines spezifizierenden Satses als Artterm. In L. Geist and B. Rothstein (Eds.), *Kopulaverben und Kopulasätze: Intersprachliche und Intrasprachliche Aspekte*, 69–90. Tübingen: Niemeyer Verlag.

Partee, Barbara. 1986. Ambiguous pseudoclefts with unambiguous *be*. In S. Berman, J. Choe, and J.McDonough (Eds.), *Proceedings of NELS 16*, 354–366. Amherst, MA: GLSA.

Partee, Barbara. 1987. Noun phrase interpretation and type-shifting principles. In J. Groenendijk, D. de Jong, and M. Stokhof (Eds.), *Studies in discourse representation theory and the theory of generalized quantifiers*, 115–143. Dordrect: Foris.

Reinhart, Tanya, and Eric Reuland. 1993. Reflexivity. *Linguistic Inquiry* 24:657–720.

Romero, Maribel. 2005. Concealed questions and specificational subjects. *Linguistics and Philosophy* 28(6):687–737.

Ross, John Robert. 1972. Act. In D. Davidson and G. Harman (Eds.), *Semantics of Natural Language*, 70–126. Dordrecht: Reidel.

Rothstein, Susan. 1995. Small clauses and copula constructions. In A. Cardinaletti and M. T. Guasti (Eds.), *Small Clauses*, 27–48. San Diego, CA: Academic Press.

Rothstein, Susan. 2001. *Predicates and their Subjects.* Dordrecht: Kluwer.

Russell, Bertrand. 1919. *Introduction to Mathematical Philosophy.* London: George Allen and Unwin.

Schlenker, Philippe. 2003. Clausal equations (a note on the connectivity problem). *Natural Language and Linguistic Theory* 21(1):157–214.

Sharvit, Yael. 1999. Connectivity in specificational sentences. *Natural Language Semantics* 7(3):299–339.

Sharvit, Yael. 2003. Tense and identity in copular constructions. *Natural Language Semantics* 11(4):363–393.

Williams, Edwin. 1983. Semantic vs. syntactic categories. *Linguistics and Philosophy* 6(3):423–446.

Zimmermann, Thomas Ede. 1993. On the proper treatment of opacity in certain verbs. *Natural Language Semantics* 1:149–79.