Copy Raising and Perception

Ash Asudeh · **Ida Toivonen**

Abstract We examine copy raising in two closely related Germanic languages, English and Swedish, and offer a formal analysis of its syntax and semantics. We develop a new event semantics analysis of copy raising. In addition to augmenting the body of empirical data on copy raising, we show that copy raising yields novel insights into a number of key theoretical issues, in particular language and perception, the theory of arguments and thematic roles, and the broader semantics of control and raising.

1 Introduction

Copy raising, shown in (1), has received much less attention in theoretical linguistics than subject-to-subject raising, shown in (2), which has been a mainstay in the field since Rosenbaum (1967).

(1)   Chris seemed like he enjoyed the marathon.
(2)   Chris seemed to enjoy the marathon.

For example, a prominent book-length overview of control and raising specifically sets copy raising aside (Davies and Dubinsky 2004: ix), only mentioning the topic in passing a handful of times (Davies and Dubinsky 2004: 56, 246, 252).

I. Toivonen
Institute of Cognitive Science & School of Linguistics and Language Studies, Carleton University, Ottawa, ON K1S 5B6, Canada
e-mail: ida_toivonen@carleton.ca

A. Asudeh
Institute of Cognitive Science & School of Linguistics and Language Studies, Carleton University, Ottawa, ON K1S 5B6, Canada
e-mail: ash_asudeh@carleton.ca
&
Faculty of Linguistics, Philology & Phonetics, University of Oxford, OX1 2HG, U.K.
e-mail: ash.asudeh@ling-phil.ox.ac.uk

In this paper, we examine copy raising in two closely related Germanic languages, English and Swedish, and offer a formal analysis of its syntax and semantics. We concentrate particularly on the latter aspect and develop a new event semantics analysis of copy raising. In addition to augmenting the body of empirical data on copy raising, we show that, far from being a marginal or theoretically uninteresting phenomenon, copy raising yields novel insights into a number of key theoretical issues, in particular language and perception, the theory of arguments and thematic roles, and the broader semantics of control and raising.

Our primary concern is the linguistic encoding of perceptual reports, on which copy raising sheds new light. We investigate in detail the expression of the source of perception, which is what is perceived in a perceptual event or state. We also briefly examine the goal of perception, i.e. the perceiver. Our analysis of perceptual sources in copy raising in turn has consequences for the distinction between arguments/thematic roles and other participants in events and states. In particular, we argue that perceptual sources and goals are not linguistically encoded as arguments or as thematic roles. We examine the consequences of the semantics of copy raising, and of perceptual sources and goals in particular, for theories of thematic roles. We argue that certain finer-grained distinctions must be introduced to linguistic theory to properly deal with the semantics of copy raising. We demonstrate how our semantics for copy raising connects to the semantics of both control and standard raising. Copy raising and related perceptual constructions reveal a richer semantic space for control and raising than has hitherto been explored. The heart of the paper concerns two empirical puzzles, which we introduce and subsequently offer solutions to. The first puzzle concerns a contrast that holds in both Swedish and English between copy raising and subject-to-subject raising in certain contexts. The second concerns the distribution of an adjunct that encodes the source of perception in Swedish.

2　Copy raising in English and Swedish

In this section, we review the central characteristics of copy raising and illustrate the phenomenon with examples from English and Swedish. The key data are largely parallel in the two languages, but there are some differences, which will be pointed out below. There is also some interesting dialectal variation in each language, to which we devote section 2.2.

2.1　The central characteristics of copy raising

True copy raising is a phenomenon in which a raising verb takes a non-expletive subject and a complement containing an obligatory pronominal 'copy' of the subject:

(3)　　a.　Tina seems like she's found the chocolate.
　　　　b. *Tina seems like Fred's found the chocolate.
(4)　　a.　Tina verkar som om hon har hittat chokladen.
　　　　　　T.　　seems as　if　she has found chocolate.DEF

　　　　　　'Tina seems as if she has found the chocolate.'
　　　　b. * Tina verkar som om Fred har hittat chokladen.
　　　　　　T.　　seems as　if　F.　　has found chocolate.DEF

The grammatical (a) examples in (3–4) contain the pronouns *she* and *hon* which are coreferential with the main clause subjects. The (b) examples do not contain coreferential pronouns ('pronominal copies'), and the sentences are ungrammatical.

English copy raising was initially noticed by Postal (1974: 268, fn.1) and was also touched on by Rogers (1971, 1973) in work that principally concerned what he called *flip perception verbs* (Rogers 1971, 1972, 1973, 1974). The topic has recently received renewed attention in work by Gisborne (1996, 2010), Potsdam and Runner (2001), Asudeh (2002, 2004, 2012), Fujii (2005, 2007), and Landau (2009, 2011). The first detailed investigation of copy raising in its own right was Joseph's (1976) work on Modern Greek, which was subsequently brought to wider attention by Perlmutter and Soames (1979). Copy raising is in fact not typologically uncommon and has been attested in a number of unrelated languages, including Samoan (Chung 1978), Hebrew (Lappin 1984), Irish (McCloskey and Sells 1988), Haitian Creole (Déprez 1992), Igbo (Ura 1998), Persian (Darzi 1996), and Turkish (Moore 1998); Polinsky and Potsdam (2006) cite further examples.

Swedish copy raising has not previously been discussed in the literature, to our knowledge, but the following example is included in a major comprehensive reference grammar (Teleman et al. 1999: vol. 4, p.56):[1]

(5) Han verkar som om han är lugnare nu.
     he   seems as   if   he is calmer now

     'He seems like he is calmer now.'

Teleman et al. point out that the subjects must be coreferential, although they do not discuss the issue further.

Copy raising can be compared to 'canonical' raising, which has long been a central area of investigation in theoretical linguistics (Rosenbaum 1967; Postal 1974). An English raising example is given in (6a) and a Swedish example is given in (6b):

(6) a. Tina seems to have found the chocolate.
     b. Tina verkar ha   hittat chokladen.
         T.   seems have.INF found chocolate.DEF

         'Tina seems to have found the chocolate.'

Raising verbs can alternate with sentences that have an expletive subject and a finite complement:

(7) a. It seems that Tina has found the chocolate.
     b. Det verkar som om Tina har hittat chokladen.
         it   seems as   if T.   has found chocolate.DEF

         'It seems as if Tina has found the chocolate.'

The finite complementation pattern is a key piece of evidence that the raised subject in the infinitival alternant is not an argument of the raising predicate, since the subject can instead be realized as an expletive. We adopt the standard assumption that *seem* has a single propositional argument (setting aside any eventuality or situation argument), even when its subject is not an expletive (as in (6) or the copy raising examples).

For both Swedish and English, corpus searches reveal copy raising to be less frequently occurring than standard raising. Moreover, speakers often judge copy raising to be more colloquial than standard raising. In these respects, copy raising has a more 'marked' status than standard raising. Nevertheless, there is no shortage of copy raising examples in corpora, and native speakers judge copy raising examples to be grammatical.

Copy raising is similar to the finite complementation pattern for raising verbs, since copy raising also apparently involves a finite complement:

---

[1] The examples in Teleman et al. (1999) also include *se ut* 'look', which is a *perceptual resemblance verb* (see below).

(8)   Tina seems like/as if/as though she adores ice cream.

Asudeh (2002, 2004, 2012), building on previous work (Maling 1983; Heycock 1994; Potsdam and Runner 2001), argues that the complement to copy raising is in fact not a finite clause, but rather a prepositional phrase, headed by *like* or *as* (and we can now add *som* for Swedish), which in turn contains a finite complement. In canonical raising, it is of course possible to raise out of predicative prepositional phrases and other predicative phrases. Asudeh therefore assimilates the syntax of copy raising to the standard syntax of raising from a predicative or infinitival complement:

(9)   Kim seems crazy/out of control.
(10)   Kim seems to be crazy.

In Lexical Functional Grammar, the syntactic theory that is assumed both in Asudeh (2002, 2004, 2012) and here, infinitival and predicative complements are generalized as 'open', XCOMP complements (Bresnan 1982a). Copy raising is thus similar to standard raising in taking an open complement.

Copy raising also exhibits an alternation between a non-expletive and expletive subject, similar to the alternation between subject-to-subject raising and finite complementation in (6) and (7) above:

(11)   a. Tina seems like she adores ice cream.
        b. It seems like Tina adores ice cream.

(12)   a. Tina verkar som om hon gillar glass.
            T.   seems as   if   she likes ice cream

            'Tina seems like she likes ice cream.'
        b. Det verkar som om Tina gillar glass.
            it seems as   if   T.   likes ice cream

            'It seems as if Tina likes ice cream.'

We henceforth use the term *copy raising* for subcategorizations of the raising verbs *seem/appear/verka* with *like/as/som*-complements. We refer to cases of copy raising in its expletive-subject alternant, as in (11b) and (12b), as *expletive-subject alternants*. We refer to cases of copy raising with a non-expletive subject and a copy pronoun in the complement, as in (11a) and (12a), as *true copy raising* or *non-expletive-subject copy raising*.

In English, raising examples alternate with *that*-clauses and copy raising examples alternate with complements introduced by *like* or *as if/though* clauses.[2] In standard Swedish, however, the complement is most commonly introduced by *som om* 'as if' (a plain *som* is also common). Dialectally, one can also find examples introduced by *att* 'that' and *som att* 'as that'. However, Standard Swedish does not allow *att*-complements with *verka*, and such examples will not be discussed in detail in this paper.

Asudeh (2002, 2004, 2012) observes that the true copy raising verbs in English are *seem* and *appear* with a *like/as*-complement, since these are the verbs that require a copy pronoun in their complements. He contrasts these with *perceptual resemblance verbs* (Rogers's *flip perception verbs*; Rogers 1971, 1972, 1973, 1974): *look, sound, smell, feel,* and *taste*.[3] The latter are similar to copy raising verbs in that they alternate with an expletive variant:

---

[2] *As if* and *as though* seem to belong to a slightly higher register than *like*. The latter seems to be preferred in colloquial speech, although there are no doubt also subtle semantic and pragmatic differences between the three forms, which we set aside here. We will principally use only *like* in what follows.

[3] These verbs occur in various other usages, such as the propositional attitude use of *feel* (*I just feel that they're so uncaring*) or the intransitive use of *smells* (*This shoe smells*). Also, *look* and *sound* can be used

(13) a. Tina smells/looks/sounds/feels/tastes like/as if/as though she has been baking sticky buns.

   b. It smells/looks/sounds/feels/tastes like/as if/as though Tina has been baking sticky buns.

However, unlike copy raising verbs, perceptual resemblance verbs do not require a pronoun in their complement, as demonstrated by the contrast shown in (14):

(14) a. *Tina seems/appears like/as if/as though Chris has been baking sticky buns.

   b. Tina smells/looks/sounds/feels/tastes like/as if/as though Chris has been baking sticky buns.

Speakers sometimes find examples such as those in (13) and (14b) more difficult to get with the verb *smell*, and particularly with the verbs *feel* and *taste*. Rather than a linguistic constraint, we take this to be a problem of construal—i.e., finding an appropriate context—since we have found attested examples in both English and Swedish.[4]

   Asudeh (2002, 2004, 2012) provides an analysis of copy raising that assimilates the phenomenon to resumption, as centrally exemplified by resumptive pronouns in unbounded dependencies (McCloskey 1979, 1990, 2002, 2006; Sells 1984). On Asudeh's analysis, the copy raising subject is not licensed by the copy raising verb and must instead compose in place of the copy pronoun, which is removed from semantic composition by a *manager resource* that is lexically contributed by the copy raising verb. Manager resources are somewhat analogous to empty operators that have independently been proposed for resumption (McCloskey 2002), but their logical status is quite different and they can be lexically controlled to an arguably greater extent (Asudeh 2004, 2012). In particular, a copy raising verb contributes a manager resource, whereas a perceptual resemblance verb does not. The analysis of the difference between copy raising and perceptual resemblance with respect to the necessity of a pronoun is not a central concern in this paper, although we return to this difference briefly at a couple of points. We refer the reader to Asudeh's work for further details and to the appendix of this paper for an example of a manager resource in a semantic proof.

   There are three key aspects to Asudeh's analysis. First, the *like/as*-complement is treated as an open PP complement headed by the preposition *like* or *as*, which in turn takes a clausal complement. The copy raising subject is raised from the subject of the PP complement, thus assimilating the syntax of copy raising to subject-to-subject raising, as mentioned above. In other words, copy raising does involve standard raising on Asudeh's analysis, but it is raising from the subject of the open PP complement and crucially *not* from the position of the copy pronoun. The relationship between the copy raising subject and the copy pronoun is established by standard anaphoric binding, which is the second key property of the analysis. In particular, the copy raising subject binds a pronoun somewhere in the *like/as*-complement,

but there is no intrinsic limitation on where in the complement the pronoun can occur, unlike previous approaches which have incorrectly assumed that the copy pronoun must be the highest subject in the *like/as*-complement (see further discussion in sections 2.2 and 5.1). Anaphoric binding entails that copy raising is subject to the normal locality conditions on pronouns (i.e., binding-theoretic conditions), but is otherwise unbounded. The unbounded nature of copy raising thus stems from the general unbounded nature of anaphoric binding, but copy raising is not an unbounded dependency in the narrow sense of the term, unlike resumptive pronouns, which occur in standard unbounded dependencies such as relativization and constituent questions. The manager resource and the anaphoric binding relation are lexically controlled, which permits a natural account of dialectal variation (we return to this in section 2.2 below). The third key aspect is that the copy raising verb lexically contributes a manager resource that removes the pronoun from composition. The compositional semantics of the copy raising verb is such that the verb composes the copy raising subject with the predicate that results from removal of the copy pronoun; the copy pronoun would otherwise have saturated the predicate. The analysis is sketched in the following diagram:

(15)   Tina seems [$_{PP}$ like she adores ice cream]
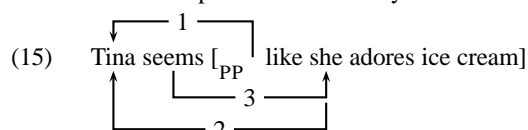
       1. Standard raising relation between subject of open PP complement and subject of copy raising verb
       2. Anaphoric binding: copy raising verb's subject binds a copy pronoun in the complement
       3. Manager resource: lexically contributed by copy raising verb; removes copy pronoun from composition and thus licenses it

In sum, our approach depends on standard aspects of raising and anaphoric binding to provide an analysis of copy raising that is ultimately grounded in semantic composition.

Swedish has only a single true copy raising verb, *verka* 'seem', illustrated in several examples above. The verb *verka* is also a subject-to-subject raising verb (see (6b) above). Swedish has other raising verbs that are very similar to *verka* in many respects, but they are not copy raising verbs. These verbs are *förefalla* 'seem', *tyckas* 'seem' and *se ut* 'look':

(16)   a. Det förefaller / tycks / ser   ut som om Maria är glad.
        it   seems   / seems / looks out as   if   M.   is happy

        'It seems / looks as if Maria is happy.'
     b. Maria förefaller / ser   ut att vara   glad.
        M.   seems   / looks out to be.INF happy

        'Maria seems / looks to be happy'
     c. Maria förefaller / tycks vara   glad.
        M.   seems   / seems be.INF happy

        'Maria seems to be happy.'

The verb *se ut* requires an infinitival complement introduced by *att* 'to', the verb *tyckas* cannot take *att*, and *förefalla* can take a complement with or without *att*. The verbs *tyckas* and *förefalla* can only take a finite complement if the matrix subject is an expletive. The verbs *förefalla* and *tyckas* are thus not copy raising verbs.[5]

---

[5] Some speakers do allow *tyckas* as a copy raising verb. However, most speakers do not, and no copy raising examples with *tyckas* were found in the Parole corpus of Swedish (http://spraakbanken.gu.se/parole).

	English (n = 110)	**Swedish** (n = 39)	**Description**
Dialect A	6.35%	7.7%	No copy raising subcategorization with non-expletive matrix subject
Dialect B	45.1%	28.2%	True copy raising I — copy pronoun must be highest subject
Dialect C	42.2%	25.6%	True copy raising II — copy pronoun not necessarily highest subject
Dialect D	6.35%	38.5%	Copy raising subcategorization with non-expletive matrix subject and no copy pronoun in complement

Table 1 Dialect variation for the non-expletive copy raising subcategorization in English and Swedish

The verb *se ut* also has a perceptual resemblance alternant with a finite complement. However, like in English, Swedish perceptual resemblance verbs are not true copy raising verbs, because they do not require a pronominal copy in their complement. The perceptual resemblance verbs in Swedish are thus parallel to their counterparts in English: although they can take an expletive subject, as in (17), they can also appear with a non-expletive subject, as in (18):

(17)　Det ser　ut　/ låter　/ luktar / känns / smakar som om Chris har bakat kladdkaka.
　　　 It　looks out / sounds / smells / feels / tastes　as　 if　C.　 has baked sticky cake
　　　　'It looks / sounds / smells / feels / tastes as if Chris has baked "sticky cake".'

(18)　Tina ser　ut　/ låter　/ luktar / känns / smakar som om Chris har bakat　kladdkaka.
　　　 T.　looks out / sounds / smells / feels / tastes　as　 if　C.　 has baked sticky cake
　　　　'Tina looks/sounds/smells/feels/tastes as if Chris has baked "sticky cake".'

The generalizations concerning copy raising verbs and perceptual resemblance verbs are thus largely parallel in English and Swedish.

2.2 Dialectal variation

We have conducted a wide-ranging questionnaire survey of copy raising and related constructions in four Germanic languages: Dutch, English, German and Swedish. The questionnaires included both experimental items and fillers (normally two fillers per one experimental item) and subjects were asked to rate sentences according to a forced-choice scale: + 'Sounds like a possible sentence of L', − 'Does not sound like a possible sentence of L', and ? 'Don't know'. Here we will provide an overview of just the copy raising and perceptual resemblance results for English and Swedish. We tested one hundred and ten subjects for English and thirty-nine subjects for Swedish.

The results reveal an interesting pattern of dialectal variation. Four dialects of particular interest are summarized in Table 1. The dialect divisions are based on patterns of grammaticality for the following types of sentences (using just English for illustrative purposes):

(19)　John seems like he defeated Mary.
(20)　a.　John seems like the judges ruled that he defeated Mary.
　　　 b.　John seems like Mary defeated him.
(21)　John seems like Mary won.

Sentence type (19) is true copy raising with the copy pronoun as the subject of the complement of *like* (i.e., the copy pronoun is the highest embedded subject). Sentence types (20a) and (20b) were binned together as instances of true copy raising with the copy pronoun as either an object or embedded subject (i.e., there is a copy pronoun, but it is not the highest embedded subject). Sentence type (21) is a copy raising subcategorization with a non-expletive matrix subject but no copy pronoun in the complement (i.e., not true copy raising).

Dialect A speakers have the most restrictive grammars for copy raising. These speakers rate as ungrammatical the copy raising subcategorization with a non-expletive subject, no matter where the copy pronoun appears. Dialect A speakers thus reject all of the sentence types (19–21). Dialect B rates copy raising with a non-expletive subject as grammatical, but only if the copy pronoun is the highest embedded subject, as in sentence type (19). Dialect C rates copy raising with a non-expletive subject as grammatical, but only if there is a copy pronoun in the complement, as in sentence types (19) and (20). Dialect D speakers have the least restrictive grammars for copy raising. These speakers rate as grammatical the copy raising subcategorization with a non-expletive subject, whether there is a copy pronoun in the complement or not, as in sentence type (21). These four dialects are defined such that they completely partition speakers with respect to sentence types (19–21). No speakers who accepted examples of type (20) and/or (21) rejected examples of type (19).

Our data for English and Swedish show a very low proportion of Dialect A speakers for both languages. We therefore conclude that copy raising with a non-expletive subject is not a peripheral phenomenon. There is a striking difference between English and Swedish with respect to Dialect D. Dialect D in English captures as small a proportion of speakers as Dialect A. In contrast, Dialect D in Swedish has a large proportion of speakers. The data can be taken as indication that many Swedish speakers treat copy raising as a (perhaps very semantically bleached) version of perceptual resemblance.

Dialects B and C receive roughly equal proportions in each language. In both languages the largest proportion of speakers belongs to one of the true copy raising dialects, B or C, where Dialect B is a proper subset of Dialect C. For English, 87.3% of the speakers have a true copy raising dialect. For Swedish, 53.8% of speakers have a true copy raising dialect. Dialect B is the dialect that has been reported most widely in the literature (Potsdam and Runner 2001; Fujii 2005, 2007). The assumption in the relevant literature is that copy raising is licensed by a mechanism that can only target the highest subject in the complement. As discussed further in section 5, this literature essentially lumps Dialects C and D together. Our data does not support this move. In what follows, our analysis of true copy raising assumes that we are specifying a Dialect C grammar. The subset Dialect B grammar can nevertheless also be captured through a restriction of the relevant constraint on Dialect C grammars such that only the highest subject in the complement can be targeted. Our analysis is cast in a Lexical-Functional Grammar syntax (Kaplan and Bresnan 1982; Bresnan 2001; Dalrymple 2001), which straightforwardly supports reference to the highest instance of the grammatical function SUBJECT.

Our data also sheds light on whether copy raising and perceptual resemblance are the same phenomenon, as implicitly assumed in all of the literature that we are aware of other than Asudeh (2002, 2004, 2012), starting with Rogers (1973). The data indicates that this assumption is flawed and supports our contention that there is a difference between copy raising and perceptual resemblance with respect to whether a copy pronoun is obligatory in the complement or not. Contrast sentence type (21) above with (22):

(22)   John looked/sounded/smelled/felt/tasted like Bill had served asparagus.

As shown in Table 1, only 6.35% of our English speakers belong to Dialect D, which allows a copy raising subcategorization with no copy pronoun, as in sentence type (21). In contrast, 30% of English speakers allowed a perceptual resemblance verb with no copy pronoun in its complement, as in sentence type (22). Similarly, although 38.5% of Swedish speakers belong to Dialect D, which is a larger proportion compared to English, a yet much larger proportion of Swedish speakers have a grammar that generates sentence type (22): 64.1% of our Swedish speakers accepted perceptual resemblance verbs with a non-expletive subject and no copy pronoun, as in (22). We therefore conclude that there are strong reasons to separate the ability of a perceptual resemblance verb to take a non-expletive subject with no copy pronoun from the ability of a copy raising verb to do so, although speakers who allow both must also be accounted for.

2.3 Summary

Copy raising is a phenomenon where a raising verb that cannot take a thematic subject takes a non-expletive subject and a complement that contains an obligatory pronominal copy of the matrix subject. The copy raising verbs in English are *seem* and *appear* with *like/as*-complements. The copy raising verb in Swedish is *verka* 'seem' with a *som*-complement. Copy raising verbs must be distinguished from perceptual resemblance verbs, which may take a non-expletive subject even in the absence of a copy pronoun in their complement.

3 Two puzzles

This section introduces two empirical puzzles whose solutions do not follow immediately from what is already known about copy raising. The first generalization has to do with the interpretation of copy raising sentences and leads to what we call *the puzzle of the absent cook*. The second set of data concerns a PP adjunct that occurs in Swedish, but not in English. The PP is headed by the preposition *på* ('on') and it gives rise to a puzzle that we call *the på puzzle*: a *på*-PP cannot be used in a copy raising sentence.

In section 4, which presents our analysis informally, we show that the two puzzles are connected, both having to do with the source of perceptual information in perceptual reports. The subject of a copy raising sentence is interpreted as the source of perception and so is the NP complement of a *på*-PP. Perceptual sources are reminiscent of thematic roles, but we argue in section 5 that the two notions are ultimately different and that perceptual sources are not thematic roles. Our analysis is formalized in section 6.

3.1 The puzzle of the absent cook

There is a contrast between the true copy raising subcategorization of the verbs *seem/appear* and *verka* and their other subcategorizations. This contrast is surprising under the standard assumption that raising verbs have a non-thematic subject and a single, propositional argument and under the conservative auxiliary assumption that copy raising verbs are unexceptional raising verbs in this regard.

Consider the following context:

(23)   A and B walk into Tom's kitchen. Tom is at the stove doing something, but exactly what is unclear.

In this context, the following statements by A to B are all felicitous:

(24)   a.   It seems that Tom is cooking.
       b.   i.   Tom seems to be cooking.
            ii.   Tom verkar laga   mat.   'Tom seems to be cooking.'
                  T.   seems make.INF food

(25)   a.   i.   It seems like Tom's cooking.
            ii.   Det verkar som om Tom lagar   mat.
                  it   seems as   if T.   makes food

                  'It seems as if Tom's cooking.'
       b.   i.   Tom seems like he's cooking.
            ii.   Tom verkar som om han lagar   mat.
                  T.   seems as   if he makes food

                  'Tom seems as if he's cooking.'

Now consider the following alternative context:

(26)   A and B walk into Tom's kitchen. There's no sign of Tom, but there are various
       things bubbling away on the stove and there are several ingredients on the counter,
       apparently waiting to be used.

Given this context, the examples in (24) and (25a) are still felicitous. However, the copy rais-
ing examples in (25b) are now infelicitous. If *Tom* is not a thematic subject of *seem/appear/verka*,
why are these sentences not felicitous? We call this *the puzzle of the absent cook*.

3.2 The *på* puzzle

According to the data that has been presented so far, the Swedish verb *verka* is exactly
parallel to English *seem*. Example (27) is ungrammatical, as is its English equivalent.

(27)   * Tom verkar som om Kalle har vunnit.
         T.   seems as   if K.   has won

Example (27) and other examples shown in previous sections demonstrate the close similar-
ity between *seem* and *verka*. However, Swedish *verka* allows a type of expression that is not
available in English:

(28)   Det verkar på Tom som om han har vunnit.
       it   seems on T.   as if he has won

       ∼ 'Tom gives the impression that he has won.'

The *på*-PP specifies that the impression that the referent of the pronoun *han* has won orig-
inates with Tom; note that the pronoun is just a regular free pronoun that can refer to Tom
or some other entity in the discourse. It is not specified how Tom gives off this impression:
it could be the way he looks or acts, it could be something he said, or it could be something
else. The verb *verka* thus allows for a *på*-PP which specifies the *source* of perception, which
we will call the PSOURCE.[6] This PP is an adjunct and not an argument, as will be discussed
in more detail in section 5.

---

[6] Note that the PSOURCE *på*-PP is different from *from*-PPs in examples like the following: *It appears
from literature that the seriousness of the societal consequences of an incident is judged to increase with the
square of the number of people killed* (example from Biber et al. 1999: 733). The *from*-PP gives the source
of information and is similar to the *på*-PP. However, the two are nevertheless different, as the following is
unacceptable: **It appears from Tom as if he has won*. We leave a full analysis of the English *from*-PP to future
research.

Examples with *på*-PPs do not require pronouns in their complements; see the following variant of (28):

(29)   Det verkar på Tom som om Kalle har vunnit.
        it   seems on T.   as if K.   has won

        ∼ 'Tom gives the impression that Kalle has won.'

The *på*-PP contrasts with the English *to*-PP, which specifies the *goal* of perception (PGOAL; i.e., the perceiver):

(30)   It seemed to Tom as if Kalle had won.

The Swedish verbs *verka* and *tyckas* can take a plain NP object with a goal interpretation:

(31) % Det verkade mig som om Tom hade vunnit.
         it   seemed me as if T.   had won

       'It seemed to me as if Tom had won.'
(32)   Det tycktes mig som om Tom hade vunnit.
        it   seemed me as if T.   had won

        'It seemed to me as if Tom had won.'

The PP *to Tom* in (30) and the object NP in (31–32) do not have the same interpretation as *på Tom* in (28). In (28), there is something about Tom that makes it seem as if he has won. Examples (30–32), on the other hand, leave unspecified what gives off the impression that Tom has won, but rather express to whom the impression has been given.[7]

Let us now return to copy raising, which is surprisingly not compatible with *på*-PPs. Compare (33) to (34):

(33)   Tom verkar som om han har vunnit.
        T.   seems as if he has won

        'Tom seems as if he has won.'
(34)   * Tom verkar på Lisa som om han har vunnit.
         T.   seems on L.   as if he has won

The ungrammaticality of (34) is unexpected, as copy raising sentences like (33) are generally considered to be equivalent to expletive sentences like (35),[8] which are grammatical with *på*-PPs, as shown in (36):

(35)   Det verkar som om Tom har vunnit.
        it   seems as if T.   has won

        'It seems as if Tom has won.'
(36)   Det verkar på Lisa som om Tom har vunnit.
        it   seems on L.   as if T.   has won

        ∼ 'Lisa gives the impression that Tom has won.'

Why should the PP adjunct be excluded in (34), although it can be included in (36)? This is our second puzzle, which we call *the* på *puzzle*. It is easy to understand what the intended meaning of (34) is: it is the same as that of (36). Yet the example is ungrammatical. Example (34) can be contrasted with (37), which contains a *to*-PP, and Swedish examples (31–32), which contain plain NP objects comparable to the English *to*-NP.

---

[7] The Swedish object NP illustrated in (31–32) does not appear to be as commonly used as the English *to*-PP. Many speakers find (31) unacceptable. Example (32) is more generally accepted, though some find it quite formal. In contrast, the *på*-PP is not marginal or formal.

[8] See the literature on copy raising referred to above, and see also Teleman et al. (1999: vol. 4, p.56).

(37)   Tom seemed to me as if he had won.

The PP *to me* in (37) and the NP *mig* 'me' in (31–32) denote a perceptual goal (the perceiver), not a perceptual source. Comparing the examples (37) and (31)[9] to (34), we see that PGOALs are compatible with copy raising, but PSOURCE PPs are not.

   We propose that the *på* puzzle and the puzzle of the absent cook are connected. The essence of our proposal is as follows: both puzzles arise due to the linguistic expression of perceptual reports. The examples that led to the puzzle of the absent cook are odd because the subject of the copy raising verb is interpreted as the source of perception when it is unavailable to offer perceptual evidence. The examples that led to the *på* puzzle are ungrammatical because two distinct linguistic expressions simultaneously specify the source of perception.

4 Copy raising and perceptual reports: An outline of the analysis

We present our formal analysis in section 6, but we will first further spell out our proposal in general terms. In copy raising sentences, the subject of the copy raising verb is interpreted as the source of perception (PSOURCE). This is why (39) and its Swedish equivalent are both odd in a context where the speaker does not have perceptual evidence of Tom, as discussed in section 3.1:

(38)   A and B walk into Tom's kitchen. There's no sign of Tom, but there are various things bubbling away on the stove and there are several ingredients on the counter, apparently waiting to be used.

(39)   #Tom seems like he's cooking.

Example (39) can be paraphrased as follows: It seems like Tom is cooking and what gives this impression is Tom himself. The example is not felicitous in a situation where Tom is not available as the source of the report.

   A similar observation was originally made by Rogers (1973: 77), who noted that (40) 'presupposes' (41):

(40)   Charley looked to me like he goosed Francine.
(41)   I saw Charley.

Rogers gives corresponding examples for all the perceptual resemblance verbs, but does not discuss copy raising verbs.

   We build on Rogers's insight, but there are some differences. First, Rogers (1973) conflated copy raising verbs and perceptual resemblance verbs, whereas we argue that the two are related but distinct verb classes. Second, we capture the relationship between (40) and (41) as an entailment, not a presupposition. Our analysis of perceptual resemblance verbs in section 6.3 proposes that it is the visual aspect of *Charley* that is the PSOURCE. Third, it is also an entailment, not a presupposition, that the subject of true copy raising (e.g., (40) if *looked* is replaced by *seemed*) is the PSOURCE. The implication that the copy raised subject or the relevant sensory aspect of the perceptual resemblance subject is the PSOURCE fails the standard projection tests for presupposition (see Beaver 2001 for an overview). For example, (42a–c) do not imply (41) and (43) is a contradiction, not a valid cancellation of a presupposition.

---

[9] Example (32) above is a raising example instead of a copy raising example, since *tyckas* is not a copy raising verb (see section 2.1).

(42) a. If Charley looked to me like he goosed Francine, I would have told her so.
     b. It's not true that Charley looked to me like he goosed Francine.
     c. Maybe Charley looked to me like he goosed Francine, but it's none of your business.

(43) #Charley looked to me like he goosed Francine, but I didn't see Charley.

However, our analysis does treat absent cook scenarios as involving a kind of presupposition failure, due to an incompatibility between the actual PSOURCE and the asserted PSOURCE; see section 6.2.3. In sum, our analysis generally treats as an entailment the fact that the subject or an aspect of the subject is the PSOURCE, but in certain cases it is treated as a presupposition. This effect is achieved as an automatic consequence of our formalization, without positing an ambiguity in either the verbs' meanings or the PSOURCE function.

A consequence of the PSOURCE analysis is that copy raising is different from standard raising in that there is a crucial difference in interpretation between the expletive alternant and the non-expletive alternant. Compare the raising alternation in (44) to the copy raising alternation in (45):

(44) a. Tom seems to be the smartest guy in the world.
     b. It seems that Tom is the smartest guy in the world.
(45) a. Tom seems like he's the smartest guy in the world.
     b. It seems like Tom is the smartest guy in the world.

Whereas the two examples in (44) have the same interpretation (Rosenbaum 1967; Postal 1974), the two examples in (45) differ. In (45a), Tom is necessarily interpreted as the source of perception. In (45b), and also in the examples in (44), the source of perception is not overtly specified. We return to the status of the PSOURCE in examples like (44a–b) and (45b) in section 6.2.5.

We contend that the verbs *seem* and *appear* and their Swedish counterpart *verka* entail a source of perception, but that this source is not connected to an argument or thematic role. We analyze PSOURCEs (and PGOALs) as entailed participants in the states that these verbs denote and argue that this notion should not be conflated with the notions of semantic argument or thematic role. In other words, the subject *Henrika* is not a thematic argument of *seem* in (46):

(46) Henrika seems like she's had enough.

There are thus parallels between perceptual sources/goals and temporal and locative modifiers of eventualities, where we understand the term *eventuality* to be a cover term for events and states (Bach 1981): like times and locations, perceptual sources and goals are only sometimes realized linguistically. In sum, the solution to the puzzle of the absent cook is that a copy raising subject is interpreted as the PSOURCE—the source of perception—and ascribing the role of PSOURCE to the subject is infelicitous if the individual in question is not perceivable as the source of the report. We argue for the non-argument, non-thematic role status of PSOURCEs (and PGOALs) in section 5.

Since we treat the Swedish *på*-PP as contributing a PSOURCE, our analysis treats (48) as synonymous to (47), if *Tom* and *han* are understood co-referentially:

(47) Tom verkar som om han lagar mat.
     T.   seems as if he makes food

     'Tom seems as if he's cooking.'

(48) Det verkar på Tom som om han lagar mat.
     It seems on T.   as if he makes food

  $\sim$ 'Tom seems as if he's cooking.'

Given our solution to the puzzle of the absent cook, this predicts that (48) is infelicitous in the same contexts as (47). This prediction is correct. For example, in the scenario where Tom is absent but the kitchen shows signs of cooking, (48) cannot be felicitously uttered.

Let us now turn to puzzle number two, the *på* puzzle, which concerned examples like the following:

(49)   * Maria verkar på Per som om hon är glad.
      M.   seems on P.   as   if   she is happy

In (49), both Maria and Per are specified as the source of perception, and the example is ungrammatical.[10]

Now the question is: Why can't two PSOURCEs be specified? The restriction cannot be due to the state of the world or our knowledge of it. It is after all possible to report that Maria gives the impression that Per gives the impression that she is happy, or that Maria and Per together give the impression that she is happy. However, (49) cannot express either of these propositions. We therefore conclude that there is a linguistic constraint against expressing multiple perceptual sources. This constraint can be understood as a generalization of the notion that eventualities have at most one instance of each thematic role (Carlson 1984; Chierchia 1984, 1989; Dowty 1989; Parsons 1990; Landman 2000). Carlson (1984: 271) similarly argues that this is a linguistic restriction and cannot be simply due to "the nature of the world itself". It is conceivable to imagine events which involve multiple themes, for example, but no verbs denote such events. Just as a verb cannot have more than one theme, a verb cannot have more than one perceptual source. Landman (2000: 38) proposes the following principle for thematic roles:

(50)   **Unique Role Requirement**
      If a thematic role is specified for an event, it is uniquely specified.

Following Chierchia (1984, 1989), Landman (2000: 44) captures this requirement formally by defining thematic roles as partial functions from eventualities to individuals. PSOURCEs are not thematic roles on our analysis, but we can extend the uniqueness requirement to PSOURCEs by similarly defining them as partial functions on eventualities. The codomain of the PSOURCE function is, however, not the set of individuals, but rather the union of the set of individuals and the set of eventualities.[11] In this respect, the PSOURCE function is unlike most thematic roles, which can only be filled by individuals, but is like the thematic role STIMULUS, to which it bears a clear relationship. Eventualities can fill the stimulus role in event semantics analyses of bare infinitival complements to perception verbs (Parsons 1990: 140), as in (51):

(51)   Tina saw Fred laugh.

Although PSOURCE bears similarities to STIMULUS, we have chosen a different label to signal that a PSOURCE is not a thematic role assigned to a semantic argument. PGOAL is

---

[10] Example (49) is equally ungrammatical with a reflexive in the *på*-PP. The model-theoretic understanding of the Unique Role Requirement that we assume here (see discussion after (50) below), following previous work, does not predict this ungrammaticality, since the subject and the reflexive are not denotationally distinct. This indicates that the uniqueness requirement may need to be revised such that 'unique specification of a thematic role' is not understood purely model-theoretically (for example, by defining uniqueness proof-theoretically). We are exploring these consequences in separate work, but further consideration of this particular issue is beyond the scope of this paper. We set it aside here, but we note that the problem raised by reflexives is part of a more general set of problems with the standard semantic understanding of the uniqueness requirement for thematic roles.

[11] For example, the state of the kitchen could be a PSOURCE in our absent cook scenario; see (132) below.

similarly comparable to the thematic role EXPERIENCER, but is not necessarily tied to an argument either.

5 The status of PSOURCE and PGOAL

In the previous section, we claimed that PSOURCEs are not arguments or thematic roles, but are nevertheless participants in eventualities. We will use the term *semantic role* for such participants. This term is used variably in the literature (see, e.g., Pollard and Sag 1994 and Payne 1997), but we intend it as a generalized notion of thematic role which subsumes Parsons's thematic relations (Parsons 1990, 1995). We motivate our theory of semantic roles by considering copy raising subjects from the perspective of thematic theory. This literature is vast and rich, so we will particularly look at one prominent representative position on thematic roles: the Theta Criterion of Principles and Parameters Theory (P&P; Chomsky 1981, 1986, 1995), which posits a tight relationship between arguments and thematic roles.

We argue in section 5.1 that the semantic roles PSOURCE and PGOAL are not arguments and therefore cannot be thematic roles in the sense of the Theta Criterion. Section 5.2 presents our view of semantic roles, which avoids the problems in question while yielding a new perspective on thematic information. The theory is cast in event semantics, based on aspects of Chierchia (1984), Dowty (1989), and Parsons (1990, 1995).

5.1 The Theta Criterion

The Theta Criterion of Principles and Parameters Theory has two parts (Chomsky 1981: 36):[12]

(52) **Theta Criterion**
     1. Each argument bears one and only one θ-role.
     2. Each θ-role is assigned to one and only one argument.

The Theta Criterion has been subsumed under the Principle of Full Interpretation (FI) in the more recent Minimalist Program tradition of P&P (Chomsky 1993: 32, Chomsky 1995: 200), but it is clear that it is still generally understood in the same way and it continues to be a topic of work in the Minimalist Program after its subsumption by FI. Some of this work argues for adjusting the first clause of the Theta Criterion such that each argument must have at least one θ-role, thus allowing multiple theta roles to be assigned to a single argument (Hornstein 1999; Brody 1993; Bošković 1994). It is in any case the second clause of the Criterion that is relevant here.

The second clause states that θ-roles are assigned to arguments. It is then possible to show that PSOURCE is not a thematic role in the sense of the Theta Criterion—a θ-role—by showing that bearers of the PSOURCE semantic role are not arguments. We first make the case for Swedish by showing that the *på*-PP that realizes the PSOURCE is an adjunct, not an argument. We then turn our attention to English. We argue that the fact that true copy raising requires a copy pronoun is best understood on the assumption that copy raising subjects are not arguments.

The Swedish *på*-PP in copy raising sentences is an adjunct, not an argument, according to evidence from deletion and extraction. Consider the following two examples, the first of which contains a PSOURCE *på*-PP and the second of which contains an oblique argument in a PP headed by *på*:

---

[12] Chomsky (1986: 135) subsequently revised the Theta Criterion to apply to chains, but we use the simpler original version, since the revision is not relevant to the point at hand.

(53)   Det verkade på Jenny som om hon var lite   tokig.
        it   seemed on J.   as   if she was little crazy

        'Jenny seemed as if she was a little crazy.'
(54)   Per såg   på Jenny som om hon var lite   tokig.
        P. looked on J.   as   if she was little crazy

        'Per looked at Jenny as if she was a little crazy.'

The PP in (53) can trivially be left out, as in (55). Example (55) does not specify the PSOURCE, but it is fully grammatical without the PP. In contrast, the PP in (54) is obligatory, and excluding it renders the example ungrammatical, as shown in (56).

(55)   Det verkade som om hon var lite   tokig.
        it   seemed as   if she was little crazy

        'It seemed as if she was a little crazy.'
(56) * Per såg   som om hon var lite   tokig.
        P. looked as   if she was little crazy

While arguments can be optional, optionality is a consistent characteristic of adjuncts. The contrast shown in (55–56) is easily explained under the assumption that the *på*-PP in (53) is an adjunct whereas the *på*-PP in (54) is an argument.

Further evidence for the adjunct status of the PSOURCE *på*-PP comes from extraction: the NP-complement of the PSOURCE PP in (53) cannot be extracted, but the NP-complement of the argument PP in (54) can:

(57) * Vem verkade det på som om hon var lite   tokig?
        who seemed it on as if she was little crazy

(58)   Vem såg   Per på som som hon var lite   tokig?
        who looked P. on as if she was little crazy

        'Who did Per look at as if she was a little crazy?'

It is generally possible to extract out of arguments but it is much harder to extract out of adjuncts (Ross 1967), so (57) provides another piece of evidence that the PSOURCE PP of *verka* is an adjunct.

In sum, evidence from deletion and extraction points to an adjunct status for the Swedish PSOURCE *på*-PP. Since the *på*-PP that realizes the PSOURCE semantic role in Swedish is not an argument, it follows that PSOURCE cannot be a θ-role according to the standard conception of the Theta Criterion.

The evidence for the status of PSOURCE in English is necessarily different, because the question crucially concerns the status of the subjects of copy raising verbs and these cannot be syntactic adjuncts. The question here is instead whether the copy raising subject is a thematic argument of the raising verb, which would be unusual given the normal analysis of raising verbs. Potsdam and Runner (2001) apply traditional argumenthood tests to the English copy raising verbs, and we review these tests here. First, copy raising examples alternate with expletive examples:

(59)   a.   Sarah appears as if she will win again.
        b.   It appears as if Sarah will win again.

The expletive alternant shows that copy raising verbs take a single argument, the *like/as*-complement.

Second, copy raising verbs can actually copy-raise expletives. This is shown in example (60), where it is clear that the expletive in (60) has raised from the lower clause, since *seems* cannot normally take *there* as an expletive subject, as shown in (61) and (62). Some speakers allow (60), while others don't.

(60) % There seems like there's a lot of garbage in the driveway.
(61) *There seems like a lot of garbage is in the driveway.
(62) It seems like a lot of garbage is in the driveway.

Since an expletive cannot be associated with a thematic role, the ability of a copy raising verb to take an expletive subject shows that the verb does not assign a thematic role to its subject. Moreover, the expletive subject can even be a *there* expletive (for some speakers), which must be licensed in the complement, as shown by the contrast between (60) and (61).

Third, idiom chunks can similarly be copy-raised:

(63) a.% The cat seems like it is out of the bag.
      b.% The shit seemed like it hit the fan.

Like expletives, idiom chunks are indicative of a verb not assigning a thematic role to the position or grammatical function in question.[13] Although we do not seek to explain the capacity of these verbs to copy-raise *there*-expletives and idiom chunks (but see Asudeh 2004, 2012 for one possible explanation), the data above provide strong evidence that copy raising verbs have non-thematic subjects.[14]

Perceptual resemblance verbs can also appear in examples with expletive subjects, raised expletives and idiom chunks (Rogers 1973: 82–83):

(66) It looks like Sarah might win again.
(67) % There looks like there's a lot of garbage in the driveway.
(68) % The cat looks like it is out of the bag.

Recall from above that we argue, following Asudeh (2002, 2004), that perceptual resemblance verbs are in fact not copy raising verbs because of the contrast illustrated in (69):

(69) a. John looks like the party ended early.
      b. *John seems like the party ended early.

Example (69a) shows that, unlike true copy raising, *look* does not obligatorily require a copy pronoun in its finite complement. In (69a), the subject of *look* is apparently a thematic argument; that is, *John* is apparently a semantic argument of *look*. This has been taken in much of the literature as evidence of an optionally thematic status for the subjects of perceptual resemblance verbs (and, by extension, the subjects of copy raising verbs, since

---

[13] Nunberg et al. (1994) argue convincingly that idioms can have identifiable, meaningful parts and we do not deny this. We are here making a standard generalization about verb classes, not about idioms: there are classes of verbs that do not make semantic requirements of their subjects and these can take expletives and idiom chunks freely. In contrast, other verbs cannot take even an otherwise meaningful idiom chunk and allow it to maintain its idiomatic meaning. Consider, for example, *The cat ran, because John let it out of the bag*.

[14] In Asudeh's analysis, the relation between the copy-raised expletive subjects or idiom chunks and their base position in the complement involves two local applications of functional control, LFG's standard syntactic mechanism for raising (Bresnan 1982a). This correctly precludes examples like the following:

(64) *There seems like John said there was garbage all over the road.
(65) *The cat seems like John says it's out of the bag.

Further discussion of this issue are beyond the scope of this paper; see (Asudeh 2004, 2012) for further details.

the two classes are typically not properly distinguished). In contrast we maintain that there is a distinction between perceptual resemblance verbs and copy raising verbs with respect to the status of the subject, such that the copy raising subject is never a thematic subject of the verb, for speakers with true copy raising. This distinction is captured in our formal analyses of the copy raising and perceptual resemblance, in section 6, based on how the two verb classes compose with their complements.

This separation of perceptual resemblance and copy raising verbs and our position that true copy raising does not have an alternant with a thematic subject contrasts with the position taken in other recent literature on copy raising, where it is claimed that both perceptual resemblance verbs and copy raising verbs can have optionally thematic subjects. When the subject is thematic, it has a θ-role. Potsdam and Runner (2001) and Fujii (2005, 2007) propose that a non-expletive copy raising subject is sometimes thematic. Gisborne (1996, 2010) and Matushansky (2002: 221) propose that such subjects are always thematic.

However, the position that non-expletive copy raising subjects are thematic subjects, whether always or sometimes, erroneously predicts the possibility of copy raising with no copy pronoun whatsoever. The data from our systematic questionnaire studies, reviewed in section 2.2, reveal that there are robust dialects of both English and Swedish that instantiate grammars that generate non-expletive subject copy raising with a copy pronoun that is not the subject of the complement of *like/as* (Dialect C). Nevertheless, speakers of these dialects do not in any sense treat the subject of copy raising as thematic in the sense of Potsdam and Runner (2001) or Fujii (2007), because they reject sentences in which there is no copy pronoun. We have encountered certain speakers who accept some instances of copy raising without any copy pronoun (speakers of Dialect D). For these speakers, copy raising *seem* likely means something more like a semantically bleached perceptual resemblance verb. However, a clear majority of our subjects—93.2% of English speakers and 58.3% of Swedish speakers[15]—reject copy raising without a copy pronoun. This pattern of data would be completely unexpected if these speakers had a thematic use of copy raising verbs. We therefore conclude, following Asudeh (2002, 2004), that copy raising subjects are non-thematic and our formal analysis reflects this.

To sum up, neither the PSOURCE *på*-PP nor the copy raising subject are thematic arguments in the sense of the Theta Criterion. The *på*-PP is an adjunct, not an argument. The copy raising subject is non-thematic: the sole argument of *seem* and *appear* is its predicative, infinitival or clausal complement. Predicative and infinitival complements may be grouped together as 'open' complements that share a subject of predication with the raising verb and clausal complements may be called 'closed' in contrast (Bresnan 1982a). Whether closed or open, the complement denotes a proposition (in the latter case, the open complement is saturated by the raised argument).

We now turn to a much briefer discussion of the PGOAL. The PGOAL-PP in English and the PGOAL-NP in Swedish are optional,[16] which is consistent with the view that they are not arguments. Extraction out of the Swedish PGOAL-NP seems to be impossible, but this could

---

[15] It is important not to include in the total Dialect A, which rejects the copy raising subcategorization with a non-expletive matrix subject (e.g., *John seems like . . .*); see section 2.2. Thus, the ratios are obtained by dividing the proportion of speakers in the language who required a copy pronoun (Dialects B and C) by the total proportion of speakers who accepted the copy raising subcategorization (Dialects B, C, and D). The English ratio is thus derived by adding the proportions for Dialects B and C, which is 87.3% of all speakers surveyed, and dividing it by the proportion total proportion for Dialects B, C and D, which together account for 93.65% of all speakers. Similarly, the Swedish ratio is derived by dividing 53.8% (Dialects B and C) by 92.3% (Dialects B, C, and D).

[16] In fact, the PGOAL is usually left out in Swedish, and many speakers don't allow it at all with the verb *verka*; see the examples in (31).

be attributed to the fact that extraction out of NPs is independently ruled out. Extraction out of the English PGOAL-PP is ungrammatical:

(70)   a.   It seemed to John that Martha had changed.
        b. *Who did it seem to that Martha had changed?

The ungrammaticality of (70b) is expected, if the PGOAL-PP is not an argument. The Swedish PGOAL is difficult to evaluate – it is not very widely used, and it is usually a pronominal. However, there are clear indications that the English PGOAL-PP is not a thematic argument in the Theta Criterion sense: it is optional and extraction is impossible.

5.2 Semantic arguments, thematic roles, and semantic roles

We have argued that PSOURCE and PGOAL are not thematic roles in the sense of the Theta Criterion, but are rather a generalized kind of thematic relation that we have called a *semantic role*. We have also argued that a copy raising subject is not an argument of the verb and we will see in section 6.3 that neither is the subject of a perceptual resemblance verb, in the strict sense. In this section, we propose a semantic representation that incorporates aspects of the event semantics of Chierchia (1984), Dowty (1989), Kratzer (1996, 2003), and Parsons (1990, 1995).

   We treat a verb as a relation with an eventuality argument and places for its arguments, as in Davidson (1967) and Dowty (1989), instead of treating verbs as one-place predicates on eventualities, as in some neo-Davidsonian treatments (e.g., Parsons 1990, 1995). We treat thematic roles as further restrictions on these arguments, where the thematic role statement is conjoined with the core verbal relation (Chierchia 1984). We remain agnostic about whether this mixed sort of representation is appropriate for all verbs or only for certain subclasses, including the raising and perceptual resemblance verbs of interest here. However, we make the simplifying general assumption that the same semantics holds for all verbs, since it does not affect our analysis, although we acknowledge that things are substantially more complex than this (see, e.g., Kratzer 1996, 2003). We thus adopt a mix of the neo-Davidsonian "independent conjunct analysis" analysis (thematic roles are conjoined functions) and the classic Davidsonian "incorporation analysis" (predicates have places for all arguments, not just an eventuality), to use the terminology of Parsons (1990: 94).

   This allows us to maintain a distinction between arguments, thematic roles, and semantic roles, such as PSOURCE and PGOAL, as follows:

(71)   **Semantic argument**
        A is a semantic argument of E iff the denotation of A is in the domain of the denotation of E. Given a linguistic expression E with denotation $f(e, \alpha_1, \ldots, \alpha_n)$, the semantic arguments of E are $e, \alpha_1, \ldots, \alpha_n$.

(72)   **Thematic role**
        A thematic role specifies the role played in an eventuality by a semantic argument (an individual or eventuality). That is, given a linguistic expression with denotation $f(e, \alpha_1, \ldots, \alpha_n)$, where e is f's eventuality argument and $\alpha_1, \ldots, \alpha_n$ are its other semantic arguments, a thematic role is a function on e that returns one of $\alpha_1, \ldots, \alpha_n$ as its value.

(73)   **Semantic role**
        A semantic role specifies the role played in an eventuality by an individual or eventuality. The individual or eventuality in question is not necessarily a semantic argument. That is, given a linguistic expression with denotation $f(e, \alpha_1, \ldots, \alpha_n)$, where

e is f's eventuality argument and $\alpha_1, \ldots, \alpha_n$ are its other semantic arguments, a semantic role is a function on e that does not necessarily return one of $\alpha_1, \ldots, \alpha_n$ as its value.

We thus get three distinct but overlapping categories. The semantic arguments of a property are the arguments that the property requires for saturation, including an eventuality. For example, an intransitive verb denotes a property with two semantic arguments: an eventuality and an entity. When the property is saturated with all of its arguments, a proposition results.

Thematic roles and semantic roles provide a classification of the arguments, although not all arguments are necessarily further classified in this way. Thematic roles are a proper subset of the semantic roles. Thematic roles are necessarily filled by semantic arguments, so we maintain a version of the second clause of the Theta Criterion, which states that theta roles are assigned to arguments (see section 5.1). However, we explicitly mean for thematic roles to restrict semantic arguments, whereas the Theta Criterion concerns syntactic arguments. We do not maintain the first clause of the Theta Criterion, since not all semantic arguments bear a thematic role. Lastly, it is possible for a semantic argument to bear neither a thematic role nor a semantic role. Thus, we do not have to make up an ad hoc semantic role function to host the propositional complement of a raising verb, such as the somewhat strained 'In' function that Parsons (1995: 644) proposes in his analysis of the propositional complement of *believe*.

Turning to a specific example, consider the interpretation in (76) for the sentence in (74). The lexical entry for the main predicate in (74) is given in (75):

(74)   Kim kissed Robin in Helsinki yesterday.

(75) $\lambda y.\lambda x.\lambda e.[kiss(e, x, y) \wedge \text{AGENT}(e) = x \wedge \text{THEME}(e) = y]$

(76) $\exists e.[kiss(e, kim, robin) \wedge \text{AGENT}(e) = kim \wedge \text{THEME}(e) = robin \wedge$
$\text{PLACE}(e) = helsinki \wedge \text{TIME}(e) = yesterday]$

We assume standard existential closure of the event variable. The terms e, kim and $robin$ are the arguments of $kiss$. The thematic roles AGENT and THEME specify the roles in e played by kim and $robin$. Lastly, PLACE and TIME are semantic roles that reflect the semantic contributions of the adjuncts *in Helsinki* and *yesterday*.

Example (74) has already illustrated two paradigmatic instances of what we consider to be semantic roles that are not thematic roles: the time and place of an event. Eventualities are grounded in space/time, but languages in general do not treat these coordinates as arguments—they are typically left implicit. PSOURCE and PGOAL are similarly semantic roles. We do not make a principled distinction here between time, place and manner adjuncts on the one hand, and PSOURCE and PGOAL on the other. However, there is perhaps good motivation for such a distinction. Time, place and manner adjuncts can be freely added to any eventuality, whereas PSOURCE and PGOAL are restricted to eventualities with a perceptual dimension. Furthermore, there are specific lexical restrictions on PSOURCE and PGOAL. The verb *verka* in Swedish does not allow the overt expression of a PGOAL in many dialects (see (31) above). Also, the PSOURCE of the verb *tyckas* cannot be expressed as a copy raising subject, only as a *på*-PP:

(77) a. Det tycks på Tom som om han har givit upp.
          it   seems on T.   as   if   he   has given up

          'Tom seems as if he has given up.'
     b. * Tom tycks som om han har givit upp.
          T.   seems as   if   he   has given up.

PSOURCEs and PGOALs thus differ from time, place and manner adjuncts in that their distribution and form may be lexically restricted. This distinction is not directly relevant here, and so we will not try to invent any new terminology to reflect the two types of semantic role. We also observe that the PSOURCE and PGOAL roles can be classified together with the role INSTRUMENT, as exemplified by the English instrumental *with*-phrase, such as *with a knife*. An instrumental *with*-phrase is a syntactic adjunct, which does not correspond to a semantic argument, but which bears the semantic role INSTRUMENT. In this respect it is similar to time, place and manner expressions, but like PSOURCE and PGOAL, INSTRUMENT is restricted in that it cannot appear freely with just any eventuality: instrumental *with*-phrases only appear with agentive verbs (Reinhart 2002).

Abstracting away from certain complications that we explore in subsequent sections, we derive the meaning in (78b) for the copy raising example in (78a) and the meaning in (79b) for the related perceptual resemblance example in (79a) (the function *aural* in (79b) is discussed in section 6.3):

(78) a. John seems to me like he's upset.
     b. $\exists s.seem(s, upset(john)) \land \text{PSOURCE}(s) = john \land \text{PGOAL}(s) = speaker$
(79) a. John sounds to me like he's upset.
     b. $\exists s.sound(s, aural(john), upset(john)) \land$
          $\text{PSOURCE}(s) = john \ \land \ \text{PGOAL}(s) = speaker$

The relevant parts of the lexical entries for the copy raising verb and perceptual resemblance verb are shown in (109) and (148) below.

This further illustrates the distinctions that we have argued for. The *like/as*-complements of the raising verb and the perceptual resemblance verb are treated as semantic arguments of the verb, as defined in (71), but they are not restricted by a semantic role. The semantic role PSOURCE in the copy raising example (78) is filled by the subject's denotation, $john$, but the subject is not a semantic argument of the copy raising verb, since its denotation does not occupy a slot in the verbal relation. Copy raising *seem* is therefore just like standard *seem*: a function that takes a state argument and a propositional argument. This points to a subtler understanding of the semantics of raising and control, which we develop in section 6. The semantic role PSOURCE in the perceptual resemblance example (79) is filled by a sensory aspect of the subject's denotation, $aural(john)$. Therefore, the denotation of the subject is not directly a semantic argument of the perceptual resemblance verb either, although its denotation does serve as an argument to an argument of the perceptual resemblance verb. Note that in both cases, though, $john$ is occupying a syntactic argument position of subject. *John* is therefore a syntactic argument to both the copy raising verb and the perceptual resemblance verb, but is not a semantic argument to either. The other semantic role, PGOAL, picks out the speaker, where this information is contributed by the modifier *to me*, which is a syntactic adjunct and not a semantic argument.

A reviewer points out that the distinction we have motivated between semantic roles and thematic roles may shed new light on the notion of systematically optional arguments, such as implicit arguments of transitives like *eat*, locative arguments, and passive *by*-phrases, to

name a few (Bresnan 1978, 1982c; Grimshaw 1990). The original claim was that the arguments in question are represented thematically (in argument structure), but not necessarily syntactically. A reanalysis of such arguments as semantic roles, in the sense developed here, may therefore be a fruitful direction for future work.

5.3 Summary

We have argued in previous sections that the notion of perceptual source is crucial for solving the puzzle of the absent cook and the *på* puzzle. The present section has concerned the status of the PSOURCE role and also the status of the PGOAL role. The copy raising PSOURCE is not an argument in the sense of the Theta Criterion. It is more similar to a thematic relation in the sense of Dowty (1989) or Parsons (1990, 1995), but by separating the notion of thematic role from the notion of semantic argument, we achieve a more satisfactory semantics for copy raising and perceptual resemblance, in which the non-expletive subject is not forced to be thematic and the propositional complement does not have to be assigned an otherwise unmotivated thematic function. In this context, PSOURCE and PGOAL are two instances of a more generalized notion of thematic roles, which we call semantic roles.

All of this points to a potentially interesting conclusion. The copy raising verbs *seem/appear/verka* and the perceptual resemblance verbs all crucially involve perception. Perception in turn must involve a perceiver (PGOAL) and something that is perceived (PSOURCE). However, these perceptual participants are not necessarily encoded as thematic arguments, despite their central role in the semantics of perception. In the case of copy raising verbs, neither the perceiver nor the source of perception is an argument. In the case of perceptual resemblance verbs, the source of perception can be an argument,[17] but the perceiver is still realized as an adjunct. It might, at first blush, be surprising that such core aspects of eventualities are not more tightly integrated into the semantics of the predicates that denote the eventualities. However, it is perhaps much less surprising when we think of temporal and locational aspects of eventualities. The semantics of the vast majority of predicates is such that they involve a time and place, but this information is typically purely implicit and is only realized explicitly in modifiers. The perceiver and the source of perception are similarly integral to these kinds of events. Therefore, the perceiver and the source of perception are likewise not necessarily tied to arguments and can instead be realized as modifiers. Thus, PSOURCEs and PGOALs are entailed participants in perceptual states and there are parallels between perceptual sources/goals and temporal and locative modifiers of eventualities. However, it was pointed out above that there are also differences between time and place adjuncts on the one hand and PSOURCE and PGOAL on the other. Specific verbs and classes of verbs can specify whether and how they express their perceptual sources and goals. This is captured in our analysis by reference to PSOURCE and PGOAL in the lexical entries of the verbs. We make the standard assumption that modifying expressions of time, place and manner are added by some more general mechanism and are not specified lexically.

6 Formal analysis

We hope that we have been sufficiently clear in our informal presentation, and that the empirical generalizations and the solutions to the two puzzles are already apparent. We now

---

[17] More precisely, the source of perception can be a sensory aspect of an argument; see section 6.3.

present a formal analysis that captures the key points, but which leaves certain details aside. Our analysis builds on the work of Asudeh (2002, 2004) and some further details can be found therein, although the present analysis makes considerable innovations. A particular factor that we leave aside, and that Asudeh discusses in some depth, is the syntactic and semantic contributions of the prepositions *like* and *as*, and by extension Swedish *som*, in copy raising and expletive examples, although we will present aspects of their syntax that cannot be avoided. Our analysis is formalized in Lexical Functional Grammar (LFG; Kaplan and Bresnan 1982; Bresnan 2001; Dalrymple 2001) with Glue Semantics (Glue; Dalrymple 1999, 2001).

The section is organized as follows. We first present the syntax of raising and copy raising, with particular reference to functional structures in LFG. We then turn to an event semantics analysis of the facts discussed in sections 2–5. We first discuss the core semantics of copy raising verbs, setting PSOURCEs and PGOALs aside. We show that the semantics of copy raising reveals a finer-grained semantic space for control and raising. We then investigate the semantics of PSOURCE and PGOAL in some detail and show how our analysis solves the *på* puzzle and the puzzle of the absent cook. Lastly, we present an analysis of the semantics of perceptual resemblance verbs and consider its further implications.
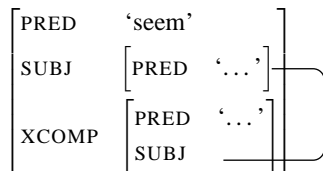
6.1 Syntax

We do not show c(onstituent)-structure trees for raising and copy raising, as these are rather straightforward (see Asudeh 2004). English finite *that*-complements are analyzed as closed CP complements, with the subject of the raising verb realized as an expletive *it*. Building on work by Maling (1983); Heycock (1994) and Potsdam and Runner (2001), Asudeh (2002, 2004, 2012) argues that the complement phrases in copy raising are open PP complements, headed by *like* or *as*. We make standard assumptions about the syntax of raising in f(unctional)-structures (Bresnan 1982a): raising involves functional control of an open complement's subject by the raised subject. Following Asudeh, we similarly treat copy raising verbs as functionally controlling the *like/as*-complement's subject. Thus, quite apart from the relationship between the copy raising subject and the copy pronoun, copy raising verbs involve raising of the subject of the *like/as*-complement. Perceptual resemblance verbs similarly raise the subject of their *like/as*-complement. The distinction between copy raising verbs and perceptual resemblance verbs rests on the fact that the latter do not require a copy pronoun, which is further related to the distinct compositional roles played by subjects of the two verb classes. This is captured through lexical differences in semantic composition to which we return in section 6.3.

The following sentences are assigned the f-structures indicated (leaving various irrelevant details aside), where more than one sentence type may correspond to a single f-structure type (at this level of detail):

(80) Subject-to-subject raising
    a. Infinitival complement
        i.   Kim seems to have left.
        ii. Kim verkar ha   åkt.
             K.   seems have.INF left
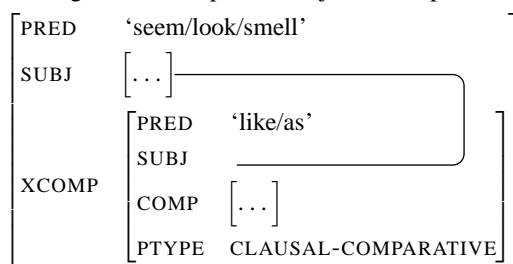
             'Kim seems to have left.'

    b. Predicative complement
- i. Kim seems crazy.
- ii. Kim verkar tokig.
  - K.   seems crazy

    c. F-structure (underspecified) for subject-to-subject raising:

$$\begin{bmatrix} \text{PRED} & \text{`seem'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`}\ldots\text{'} \end{bmatrix} \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{`}\ldots\text{'} \\ \text{SUBJ} & \end{bmatrix} \end{bmatrix}$$

(81)   Copy raising and perceptual resemblance
    a. True copy raising
- i. Tom seems like he is cooking.
- ii. Tom verkar som om han lagar   mat.
  - T.   seems as if he makes food

  'Tom seems as if he's cooking.'

    b. Perceptual resemblance
- i. Tom looks like Fred is late again.
- ii. Tina smells as if Fred must have brought his smelly dog around.
- iii. Tom ser   ut   som om Fred är sen igen.
  - T.   looks out as if F.   is late again.

  'Tom looks as if Fred is late again.'
- iv. Tina luktar som om Fred har varit här med sin illaluktande hund nu
  - T.   smells as   if F.   has been here with his bad.smelling dog   now

  igen.
  again.

  'Tina smells as if Fred has been here with his smelly dog again.'

    c. Expletive alternants of copy raising and perceptual resemblance
- i. It seems like Tom is cooking.
- ii. Det verkar som om Tom lagar   mat.
  - It   seems as if T.   makes food

  'It seems as if Tom is cooking.'
- iii. It smells like Tom is cooking.
- iv. Det luktar som om Tom lagar   mat.
  - It   smells as   if T.   makes food

  'It smells as if Tom is cooking.'

d. F-structure (underspecified) for copy raising and perceptual resemblance, including both non-expletive-subject and expletive-subject alternants:

$$
\begin{bmatrix}
\text{PRED} & \text{`seem/look/smell'} \\
\text{SUBJ} & \begin{bmatrix} \ldots \end{bmatrix} \\
\text{XCOMP} & \begin{bmatrix}
\text{PRED} & \text{`like/as'} \\
\text{SUBJ} & \\
\text{COMP} & \begin{bmatrix} \ldots \end{bmatrix} \\
\text{PTYPE} & \text{CLAUSAL-COMPARATIVE}
\end{bmatrix}
\end{bmatrix}
$$

(82) *That*-complement
   a. It seems that Tom has left.
   b. F-structure (underspecified):

$$
\begin{bmatrix}
\text{PRED} & \text{`seem'} \\
\text{SUBJ} & \begin{bmatrix} \text{PRONTYPE} & \text{EXPLETIVE} \\ \text{FORM} & \text{IT} \end{bmatrix} \\
\text{COMP} & \begin{bmatrix} \ldots \end{bmatrix}
\end{bmatrix}
$$
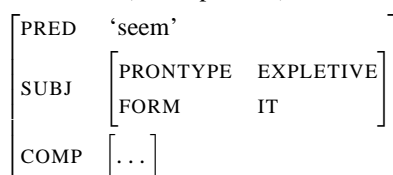
The f-structure in (80) shows the standard LFG treatment of subject-to-subject raising as equality between the raised SUBJ and the SUBJ of an open complement XCOMP (Bresnan 1982a). We assume that this is the syntax for raising from an open (infinitival or predicative) complement in both English and Swedish. Detailed f-structures for three examples are presented in appendix B.

In (81), we show the f-structure for copy raising and perceptual resemblance, including expletive variants, in both English and Swedish. As far as the outermost f-structure corresponding to the matrix clause is concerned, f-structure (81) is identical to (80); that is, there is a functional equality between the SUBJ of the raising verb and the SUBJ of its *like/as*-complement COMP. This has two immediate consequences. First, the syntax of copy raising and perceptual resemblance is, on this analysis, just the syntax of standard raising from an open complement. In both cases there is a functional control equality between the matrix subject and the complement's subject. Second, copy raising and perceptual resemblance are treated as syntactically identical, which accounts for their identical subcategorization capabilities, as explored in section 2. The key differences between these two verb types are 1) whether a copy pronoun is necessary in the complement, 2) the interpretation of the subject and 3) subtle differences in the semantics of the perceptual source. These are captured as lexical differences in the semantics of copy raising and perceptual resemblance; the lexical distinctions are discussed further in section 6.3.

The XCOMP complement in (81) contains the further information that its PREPOSITION-TYPE (PTYPE) is CLAUSAL-COMPARATIVE; we assume that this PTYPE is contributed by the prepositions *like*, *as*, and *som* when they take full clausal complements. Two further comments are in order about (81). First, it is important to realize that we treat the expletive and non-expletive alternants as equally involving raising of the subject of the *like*/*as*/*som*-complement. In particular, expletive subjects of copy raising and perceptual resemblance verbs are raised from the complement and not generated in matrix subject position (see Horn 1981: 353–356 for evidence of expletive raising in copy raising). Second, we group Swedish *som* with *like* and *as* and treat Swedish expletive examples as having the

same syntax as English ones. However, since the *som om* complement is for most speakers of Swedish the only way for a raising verb to combine with an expletive subject and a finite clause, it might be that the syntax of Swedish expletive examples is more like that of (82), the *that*-complement case. This would be somewhat surprising, though, given the general similarity of meaning and complementation possibilities between English *like/as* and Swedish *som*. Furthermore, some Swedish speakers do produce complements to *verka* 'seem' headed by the complementizer *att* 'that', which is the complementizer used with propositional attitudes. It is a reasonable assumption that these *att*-complements have the syntax in (82) and that *som*-complements have the syntax in (81).

The *på*-PP and *to*-PP adjuncts, in Swedish and English respectively, contribute to the ADJ(UNCT) grammatical function of the verb they modify:

(83)   It seems to me like Kim has left.
(84)   Det verkar på Kim som om Tom har åkt.
       It   seems on K.   as   if   T.   has left

   ~ 'Kim gives the impression that Tom has left.'

(85) $$\begin{bmatrix} \text{PRED} & \text{'seem'} \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{'to/on'} \\ \text{OBJ} & [\ldots] \end{bmatrix} \right\} \end{bmatrix}$$

The value of ADJ is a set containing all of an item's adjuncts (Kaplan and Bresnan 1982).

Lastly, it is important to avert a potential misunderstanding here. According to this syntactic analysis, there is a standard syntactic raising relationship between the copy raising verb and its *like/as*-complement. This is captured in LFG through a functional equality between the matrix copy raising verb's SUBJ and the SUBJ of the *like/as*-complement XCOMP. It is what allows *like/as*-complements to be subsumed, from a syntactic perspective, by the general class of open complements. However, this does not have the consequence that only subjects can be copy pronouns, a position which we have argued against explicitly. The copy pronoun is *not* the raised SUBJ of the *like/as*-complement. Rather, the copy pronoun is embedded somewhere inside the COMP of the *like/as*-complement. Following Asudeh's analysis, there is no syntactic raising relationship between the copy raising subject and the copy pronoun: it is an anaphoric relationship. The anaphoric relationship is enforced by the manager resource, which licenses the copy pronoun and which is lexically contributed by the copy raising verb. For example, consider (86) and (87):

(86)   Tom seems like he hurt Bill again.
(87)   Tom seems like Bill hurt him again.

In both (86) and (87), *Tom* is the raised subject that is simultaneously the SUBJ of the matrix verb and the SUBJ of the verb's *like*-complement XCOMP. In neither case is *Tom* the copy pronoun. In (86), the copy pronoun is the subject of the complement of the *like*-complement (i.e., the raising verb's XCOMP's COMP's SUBJ), but in (87) the copy pronoun is the object of the complement of the *like*-complement (i.e., the raising verb's XCOMP's COMP's OBJ). The copy pronoun could be yet more deeply embedded, which is predicted by the anaphoric binding relationship between the copy-raised subject and the copy pronoun. As mentioned in section 2.2, the less permissive dialect that requires the copy pronoun to be the subject of the complement of *like/as* can be captured lexically by restricting the anaphoric constraint contributed by the copy raising verb such that it targets only the XCOMP COMP SUBJ of the copy raising verb.

6.2 Semantics

6.2.1 Types

We adopt an event semantics (Davidson 1967; Higginbotham 1983, 1985; Parsons 1990; Kratzer 1995, 1996, 2003; Landman 2000) in which verbs have an implicit eventuality argument, where the set of eventualities is the union of the set of events and states, following Bach (1981). We will not spell out our entire logic, but the basic type theory and the denotations of the types are given in appendix A.

6.2.2 The core semantics of copy raising verbs and its implications

We show in this section that, for control and canonical raising, there is a tight match between the arity of the function that expresses the core verbal meaning and the number of arguments taken by the lambda term that controls composition. The lambda term for the canonical subject raising verb *seem* composes with two arguments—a state and a proposition—and the function $seem$ is a two-place function. The subject control verb *try* composes with three arguments—an event, the denotation of the subject (the 'tryer'), and a property—and the function try is a three-place function. The lambda term for true copy raising, however, introduces a mismatch between the number of arguments taken by the lambda term for composition and the number of arguments taken by the function *seem*. Like a subject control verb, true copy raising composes with three things, corresponding to its state argument, its subject, and its open complement. However, like a canonical raising verb it denotes a two-place function, where the propositional argument is built up out of the entity denoted by the copy raising subject and the property with which the term for true copy raising has composed. The term for true, non-expletive-subject copy raising thus constitutes a kind of hybrid meaning, sharing an underlying meaning with canonical raising but having the mode of composition of subject control.

   The basic meaning term that we assign copy raising verbs in their non-expletive subject subcategorization (i.e., true copy raising)—leaving aside PSOURCE and PGOAL for the moment and using *seem* to also stand for *appear* and Swedish *verka* 'seem'—is as follows:

(88) $\lambda P.\lambda x.\lambda s.seem(s, P(x))$

The lambda term's first argument, P, is the property contributed by the *like/as/som*-complement, the second argument, x, is the copy raising verb's subject and the s argument is the verb's state argument. The copy pronoun in the *like/as/som*-complement is removed by a manager resource (Asudeh 2004, 2012), which allows the copy raising subject to compose in place of the pronoun. For further details, see Asudeh (2004, 2012).

   The core lexical meaning of the copy raising verb is the function $seem$, which is a two-place function of type $\langle t, \langle \psi, t \rangle \rangle$; in other words, the copy raising verb denotes a function from a state and proposition into a proposition. Around this core meaning is built a lambda term that specifies how the $seem$ function finds its arguments compositionally. The lambda term is of type $\langle \langle e, t \rangle, \langle e, \langle \psi, t \rangle \rangle \rangle$ and captures the behaviour of the copy raising verb at the syntax–semantics interface. Another perspective on this is that the function $seem$ is not obtainable from the lambda term (88) by η-reduction. The copy raising verb is thus exceptional in that its behaviour at the syntax–semantics interface does not transparently reflect its semantics.

   The propositional argument to the copy raising verb is constructed in composition from application of the *like/as/som*-complement's function to the denotation of the copy raising

subject. Thus, again leaving aside PSOURCE and PGOAL for now and abstracting away from a fuller analysis of the *like/as/som*-complement (see Asudeh 2004: 383–386 for one possible analysis), the meaning for the examples in (89) is (90):[18]

(89)   a.   John seems/appears like/as if/as though he is upset.
         b.   John verkar som om han är upprörd.
             J.   seems as   if   he is upset

(90) $\exists s.seem(s, upset(john))$

The result of semantic composition is that, other than the eventuality argument, copy raising has a single, propositional argument, although this arises in composition through the application of the property contributed by the copy raising verb's complement to the copy raising subject. However, the subject is not a semantic argument of the function *seem* inside the lambda term, because this function is evaluated with respect to only two arguments, the state argument s and the propositional argument $upset(john)$; neither of these arguments is the individual-type denotation of the subject.

    Subject-to-subject raising *seem/appear/verka*, which are exemplified in (92) below, are assigned the basic lexical meaning term in (91), in this case leaving aside the PSOURCE that is also lexically associated with the verb's entry (we return to the issue of PSOURCE for this subcategorization in section 6.2.5).

(91) $\lambda p.\lambda s.seem(s, p)$
(92)   Subject-to-subject raising (infinitival or predicative complement)
         a.   John seems/appears to be upset.
         b.   John seems/appears upset.
         c.   John verkar vara   upprörd.
             J.   seems be.INF upset

             'John seems to be upset.'
         d.   John verkar upprörd.
             J.   seems upset

The function for *seem/appear/verka* 'seem' in (91) composes with a state argument s and a propositional argument p. It does not compose with an argument corresponding to its subject, contrasting with the compositional semantics of copy raising in (88). However, like copy raising *seem*, this *seem* function is a type $\langle t, \langle \psi, t \rangle \rangle$ function. Copy raising and standard subject raising thus have equivalent denotational semantics, but distinct compositional semantics.

    We next turn to subcategorizations of *seem/appear/verka* with expletive or idiom chunk subjects. Glue Semantics is based on an architectural assumption of a separated (though tightly related) syntax and semantics, as in the Correspondence Architecture of LFG (Kaplan 1987, 1989; Asudeh 2006; Asudeh and Toivonen 2009). String well-formedness is handled by an independent syntax (an LFG syntax in this case). A commutative logic, linear logic (Girard 1987), handles semantic composition. This means that the lack of semantic content of the expletive can be represented directly: the expletive does not contribute a Glue meaning constructor. The distribution of expletives is handled by the syntax and the expletive is not interpreted. A proof for example (93) is shown in (94):

---

[18] We make the standard assumption that the eventuality argument is by default existentially closed. The most straightforward way to formalize this in Glue Semantics is perhaps to allow verbs to optionally contribute a meaning constructor of the form $\lambda R.\exists v_\varepsilon [R(v_\varepsilon)] : ((\uparrow_\sigma \text{EVAR}) \multimap \uparrow_\sigma) \multimap \uparrow_\sigma$, where EVAR is the verb's event argument resource. Alternatively a new structural rule could be introduced for event closure.

(93)   John said it rained.

(94)

$$\dfrac{john : j \quad \dfrac{\lambda p \lambda x \lambda e.say(e, x, p) : r_t \multimap j_e \multimap event_\varepsilon \multimap s_t \quad \exists e'[rain(e')] : r_t}{\dfrac{\lambda x \lambda e.say(e, x, \exists e'[rain(e')]) : j_e \multimap event_\varepsilon \multimap s_t}{\dfrac{\lambda e.say(e, john, \exists e'[rain(e')]) : event_\varepsilon \multimap s_t}{\exists e[say(e, john, \exists e'[rain(e')])] : s_t} \text{ Event } \exists\text{-clos.}}} \multimap_\circ \mathcal{E}}} \multimap_\circ \mathcal{E}$$

There is no expletive term in this proof.

Subcategorizations of *seem/appear/verka* with expletive or idiom chunk subjects, as in (95), therefore also have the meaning in (91):

(95)   a. Subject-to-subject raising alternant with expletive/idiom chunk subject
          i.   It seemed to be raining.
          ii.   There seemed to be a problem.
          iii. The cat seemed to be out of the bag.
          iv.   Det verkade regna.
                It   seemed rain.INF

                'It seemed to rain.'
          v.   Tärningen verkar som om den är kastad.
                die.DEF   seems as   if   it   is cast

                'The die seems as if it is cast.'
        b. *That*-complement
          i.   It seems that John is upset.
        c. Expletive-subject alternants
          i.   It seem/appears like/as if/as though John is upset.
          ii.   Det verkar som om John är upprörd. 'It seems as if John is upset.'
                It   seems as   if   J.   is upset
          iii. It seems/appears like/as if/as though there is a problem.
          iv.   There seems/appears like/as if/as though there is a problem.
          v.   The cat seems/appears like/as if/as though it is out of the bag.

In other words, all subcategorizations of *seem/appear/verka* other than non-expletive-subject copy raising share the meaning in (91), whether their subjects are raised or realized as expletives.

Therefore, all of the examples in (92)—and also their expletive alternants in (95b) and (95c)—receive the following interpretation:

(96) $\exists s.seem(s, upset(john))$

The proposition in (96) is precisely the same, again leaving PSOURCE and PGOAL aside, as the one in (90) for the related English and Swedish copy raising sentences in (89). In sum, there is no ambiguity postulated in the core lexical meaning of the various raising subcategorizations. There is just a single function *seem* of type $\langle t, \langle \psi, t \rangle \rangle$. However, the identical propositions in (90) and (96) arise through different modes of composition. The non-expletive-subject copy raising subcategorization of *seem/appear/verka* builds its propositional argument up during composition, whereas other subcategorizations compose directly with their propositional argument.

Asudeh (2004: 388-391) shows that this difference in composition correctly predicts Lappin's (1984) observation (also see Potsdam and Runner 2001) that copy raising verbs cannot take scope over their subjects, unlike other raising verbs, which allow a wide/narrow-scope ambiguity:

(97)   No runner seemed like she was exhausted.

        For no runner x, x seemed like x was exhausted.   *no > seem, * seem > no*

(98)   No runner seemed to be exhausted.

        For no runner x, x seemed to be exhausted.   *no > seem*

        It seemed to be the case that for no runner x, x was exhausted.   *seem > no*

There is a valid linear logic proof for the wide scope quantifier reading of (97), as shown in Figure 1. There is no valid proof for the narrow scope quantifier readings, as shown in Figure 2. In contrast, there is both a valid proof for the wide scope quantifier reading of (98), as shown in Figure 3, and for its narrow scope quantifier reading, as shown in Figure 4.[19] The difference in composition between non-expletive-subject copy raising subcategorizations and other subcategorizations of the raising verbs in question is thus motivated by scope differences.

Fig. 1 Valid proof for copy raising with wide-scope subject

Fig. 2 No valid proof for copy raising with narrow-scope subject

---

[19] The lambda term for the copy raising verb has been curried in Figures 1 and 2.

$$\cfrac{\lambda p\lambda s.seem(s,p):\atop e_t \multimap event_\varepsilon \multimap s_t \quad \cfrac{\cfrac{[x:r_e]^1 \quad \cfrac{\lambda y.\exists s'[exhausted(s',y)]:}{r_e \multimap e_t}}{\exists s'[exhausted(s',x)]:e_t}\; {\scriptstyle \multimap\mathcal{E}}}{} }{}$$

$$\cfrac{\cfrac{\cfrac{\cfrac{\lambda s.seem(s,\exists s'[exhausted(s',x)]):event_\varepsilon \multimap s_t}{\exists s[seem(s,\exists s'[exhausted(s',x)])]:s_t}\;{\scriptstyle {\rm Event}\atop \exists{\rm -clos.}}}{\lambda x.\exists s[seem(s,\exists s'[exhausted(s',x)])]:r_e \multimap s_t}\;{\scriptstyle \multimap\mathcal{I},1}\qquad \cfrac{no(runner):}{\forall X.(r_e \multimap X_t)\multimap X_t}}{no(runner,\lambda x.\exists s[seem(s,\exists s'[exhausted(s',x)])]):s_t}\;{\scriptstyle \multimap\mathcal{E},\atop \forall\mathcal{E}[s/X]}}{}$$

Fig. 3 Valid proof for subject-to-subject raising with wide-scope subject

$$\cfrac{\lambda p\lambda s.seem(s,p):\atop e_t \multimap event_\varepsilon \multimap s_t \quad \cfrac{\cfrac{\lambda x.\exists s'[exhausted(s',x)]:\atop r_e \multimap e_t \qquad \cfrac{no(runner):}{\forall X.(r_e \multimap X_t)\multimap X_t}}{no(runner,\lambda x.\exists s'[exhausted(s',x)]):e_t}\;{\scriptstyle \multimap\mathcal{E},\atop \forall\mathcal{E}[e/X]}}{}}{\cfrac{\lambda s.seem(s,no(runner,\lambda x.\exists s'[exhausted(s',x)])):event_\varepsilon \multimap s_t}{\exists s[seem(s,no(runner,\lambda x.\exists s'[exhausted(s',x)]))]:s_t}\;{\scriptstyle {\rm Event}\atop \exists{\rm -clos.}}}\;{\scriptstyle \multimap\mathcal{E}}$$

Fig. 4 Valid proof for subject-to-subject raising with narrow-scope subject

The compositional difference in scope possibilities for true copy raising versus other subcategorizations can be understood more generally. A quantifier in Glue Semantics has the standard generalized quantifier type $\langle\langle e,t\rangle,\langle\langle e,t\rangle,t\rangle\rangle$, as shown in the following meaning constructor:[20]

(99) $\lambda P\lambda Q.no(P,Q):(v_e \multimap r_t)\multimap \forall X.(\alpha_e \multimap X_t)\multimap X_t$

The linear logic term $(v_e \multimap r_t)$ is the quantifier's restriction, corresponding to P in the meaning language. The linear logic term $(\alpha_e \multimap X_t)$ is the quantifier's scope, corresponding to Q in the meaning language. A simple derivation for (100) is shown in (101).

(100)   No child frowned.

(101)
$$\cfrac{\cfrac{\lambda P\lambda Q.no(P,Q):\atop (v_e \multimap r_t)\multimap \forall X.(c_e \multimap X_t)\multimap X_t \quad \cfrac{child:}{v_e \multimap r_t}}{\lambda Q.no(child,Q):\forall X.(c_e \multimap X_t)\multimap X_t}\;{\scriptstyle \multimap\mathcal{E}}\qquad \cfrac{frown:}{c_e \multimap f_t}}{no(child,frown):f_t}\;{\scriptstyle \multimap\mathcal{E},\forall\mathcal{E}[f/X]}$$

In (101), the quantifier composes with its restriction and then composes with its scope. In composing with the scope, the variable X is instantiated to the scope's resource. This variable instantiation allows for scope underspecification and compact representation of scope ambiguity (Dalrymple et al. 1999; Crouch and van Genabith 1999; van Genabith and Crouch 1999; Dalrymple 2001).

Any $\langle e,t\rangle$ linear logic term of the form $\beta_e \multimap \phi_t$ can serve as the quantifier's scope, $\alpha_e \multimap X_t$, so long as β_e and α_e are the same linear logic term and ϕ_t substitutes for X_t. Thus, in Figures 1 and 2, either the term $r_e \multimap s_t$ (which can be constructed from the term for the copy raising verb and a discharged assumption, as in Figure 1) or the term $r_e \multimap e_t$

---

[20] The universal quantifier, $\forall$, in the linear logic side is used only for scope underspecification. The denotation of the quantifier in the meaning language does not depend on the linear logic universal.

(which is the term for the copy raising verb's complement) could in principle serve as the scope of the quantifier. However, if the complement term $r_e \multimap e_t$ serves as the scope, then both the copy raising verb and the quantifier are seeking to consume the single resource that corresponds to this term. This leads to proof failure, given the resource sensitivity of linear logic (Girard 1987; Dalrymple 1999), as shown in Figure 2. Thus, linear logic composition entails that the only possibility is for the quantifier to scope wide, consuming $r_e \multimap s_t$ as its scope. In contrast, the term for the other subcategorizations of raising, as seen in Figures 3 and 4, does not contain the term $r_e \multimap e_t$. Therefore, the quantifier can either consume $r_e \multimap e_t$, taking narrow scope with respect to the raising verb (as in Figure 4), or it can consume $r_e \multimap s_t$, taking wide scope with respect to the raising verb (as in Figure 3).

We can state the following theorem with respect to scope in Glue Semantics:

(102)   Glue Scope Theorem:
          If a functor takes a type $\alpha_e \multimap \phi_t$ argument, then that argument cannot also serve as the scope of a quantifier associated with α_e.

This theorem entails that the subject of a true copy raising verb must take wide scope with respect to the verb.

The compositional scheme for copy raising, repeated below as (103), is analogous to Asudeh's (2005) treatment of control verbs with a propositional argument, shown in (104):[21]

(103) $\lambda P.\lambda x.\lambda s.seem(s, P(x))$
(104) $\lambda P.\lambda x.\lambda e.try(e, x, P(x))$

In control, as in copy raising, the resulting propositional argument is built out of a property and an individual variable: the control verb applies the property's function to the individual in composition. One of the consequences of this composition scheme is that the wide scope of controllers relative to control verbs (Montague 1973; Dowty et al. 1981) is similarly predicted (Asudeh 2005: 489–491). Asudeh (2005) shows that the very same composition scheme can yield a property denotation by not applying the property to the controller. The scope results still hold, though, because they are based solely on the verb composing separately with an individual and a property, which holds true whether or not application is taking place inside the verbal term. The compositional treatment of wide-scope subjects is thus very general.

True copy raising categorizations of raising verbs thus share commonalities with both control verbs and 'canonical raising' (i.e., raising verbs in subcategorizations other than true copy raising):

(105) $\lambda p.\lambda s.seem(s, p)$ canonical raising
(106) $\lambda P.\lambda x.\lambda s.seem(s, P(x))$ true copy raising
(107) $\lambda P.\lambda x.\lambda e.try(e, x, P(x))$ control

In the term for canonical raising, the body of the verbal function contains two slots for semantic arguments. One slot is occupied by the verb's eventuality (state) argument, s, and the other by the verb's propositional argument, p. In the term for true copy raising in (106), the body of the verbal function also contains two slots for semantic arguments. Both canonical raising and true copy raising therefore share the core meaning that is the two-place function *seem*, despite their differences with respect to mode of composition.

In contrast, the control verb meaning in (107) is a three-place function *try*. The three arguments to *try* are the eventuality (event) argument, e, the controller argument, x, and

---

[21] Asudeh (2005) does not adopt event semantics and his meaning for *try* therefore has no event variable. We have inserted one here for parity with the rest of our semantics.

the propositional argument corresponding to the controlled complement, where this argument arises in composition through application of P to x. Thus, with respect to their core meanings, true copy raising and control are distinct: the former denotes a two-place function, whereas the latter denotes a three-place function (for subject control). However, they are similar in how they compose with their arguments. In both cases, the lambda term built around the core meaning, which specifies the verb's mode of composition with its arguments, takes the denotation of the subject as an argument. Thus, although copy raising and control express functions of different arities in terms of their core lexical meanings, they are united in applying to their subjects in composition.

The overall picture is summarized in Figure 5. This figure shows that if we look at the semantics of control and raising in two dimensions, according to core meaning versus mode of composition, there is generally a tight correspondence between the two dimensions. However, copy raising constitutes a hybrid semantic category, having the compositional semantics of control, but the denotational semantics of raising.
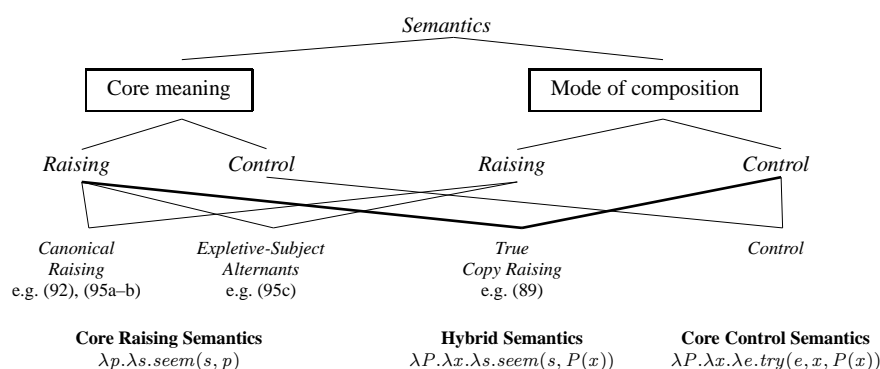

Fig. 5 Semantics of control and raising

Let us summarize the main points of this section. We have situated the semantics of the true copy raising subcategorization of English *seem/appear* and Swedish *verka* within the semantics of control and canonical raising. We showed that copy raising shares aspects of both classic control and raising. True copy raising is like control in how it composes with its clausal complement: the verb applies the functor corresponding to its complement to an individual-type variable that corresponds to one of its syntactic arguments—the non-expletive copy raising subject or the controller. Copy raising is like canonical raising in that the result of the composition is a proposition and this proposition is the sole denotational argument other than the eventuality argument. This also sheds further light on what is meant by the claim that a copy raising subject is not a semantic argument of the copy raising verb. The denotation of the subject is not an argument of the function *seem*. But, in the case of true copy raising, the propositional argument of *seem* is built up in composition using the denotation of the subject. The semantics of true copy raising thus leads to a subtler understanding of the general semantics of control and raising in which issues of composition must be teased apart from issues of denotation.

The mismatch between core meaning and mode of composition in true copy raising itself deserves further study. One research question that arises is whether this mismatch could form the basis for an account of why it is that certain speakers acquire grammars of copy

raising in which copy pronouns are not necessary, which we called Dialect D in section 2.2. Perhaps these speakers have resolved the mismatch by assuming an alternative denotation *seem′* that is a three-place function that takes the subject as an argument. For these Dialect D speakers, the semantics of copy raising would be more like the semantics of control. It would then also be interesting to see if there are other speakers who have resolved the mismatch in the opposite way, by not allowing the subject in true copy raising as a compositional argument, thus having a single mode of composition for both copy raising and canonical raising. Given Asudeh's analysis of copy raising based on semantic composition, which we have adopted, the prediction is that for such speakers true copy raising per se would be entirely ungrammatical, since the licensing of the copy raising subject rests on its composition in the place of the copy pronoun and this in turn rests on the subject being a compositional argument of the lambda term for true copy raising. These are the Dialect A speakers, according to our classification in section 2.2. These speakers would then be predicted to lack copy raising but to allow expletive-subject alternants (*It seems like . . .*). Such speakers could possibly also allow alternants with idiom chunk subjects and *there*-expletive subjects (*There seems like . . .*), depending on other lexical facts about their grammars (Asudeh 2004: 377–383).

6.2.3 The semantics of PSOURCE and PGOAL

We define the semantic role PSOURCE as follows:

(108)   PSOURCE is a partial function from eventualities into eventualities or individuals.
$$\text{PSOURCE} : D_\varepsilon \rightharpoonup (D_\varepsilon \cup D_e)$$

The uniqueness requirement on PSOURCE follows from its definition as a function: if an eventuality has a PSOURCE, then it has only one PSOURCE denotation.

We can now add the PSOURCE information to the partial semantics for copy raising developed in section 6.2.2. A copy raising verb has the following interpretation (using English as the meta-language for both English and Swedish):

(109) $\lambda P.\lambda x.\lambda s.[seem(s, P(x)) \wedge \text{PSOURCE}(s) =_\tau x]$

The copy raising verb composes its subject with the property corresponding to the *like/as/som*-complement. The copy raising verb also contributes a PSOURCE and requires that its subject is the PSOURCE. We curry this term whenever convenient in proofs.

PSOURCE attribution involves a particular kind of equality, which we define as follows:

(110)   If α and β have the same type, then $[\![\alpha =_\tau \beta]\!] = [\![\alpha = \beta]\!]$. Otherwise, $[\![\alpha =_\tau \beta]\!]$ is undefined.

Thus, $=_\tau$ is a standard typed equality (Martin-Löf 1984; Turner 1996, 1997), which yields a kind of partial equality. In particular, unlike standard equality, $=_\tau$ is undefined if two disjoint types are equated, rather than false. This typed equality will play a role in our treatment of *på*-PPs and the puzzle of the absent cook.

English and Swedish copy raising sentences like that in (111) receive the interpretation in (112), leaving aside a number of details, including tense, the interpretation of *like/as/som*, and the composition of the copy raising verb's complement. We leave aside the corresponding linear logic terms in our semantics for simplicity's sake. These can be reconstructed from the meaning terms below, given the Curry-Howard isomorphism. Full Glue Semantics proofs for three examples are provided in appendix B.

(111)   Tom seems like he is laughing.

(112)
$$\frac{\frac{\lambda P \lambda x \lambda s.seem(s, P(x)) \wedge \text{PSOURCE}(s) =_\tau x \qquad \lambda y.\exists e[laugh(e, y) \wedge \text{AGENT}(e) = y]}{\lambda x \lambda s.seem(s, \exists e[laugh(e, x) \wedge \text{AGENT}(e) = x]) \wedge \text{PSOURCE}(s) =_\tau x}}{\frac{\lambda s[seem(s, \exists e[laugh(e, tom) \wedge \text{AGENT}(e) = tom]) \wedge \text{PSOURCE}(s) =_\tau tom]}{\exists s[seem(s, \exists e[laugh(e, tom) \wedge \text{AGENT}(e) = tom]) \wedge \text{PSOURCE}(s) =_\tau tom]}}$$

We make the standard assumption of existential closure of the eventuality variable in the absence of other quantification.

PSOURCE was defined in (108) as a partial function from eventualities, since not all eventualities have a PSOURCE. However, all *perceptual* eventualities—eventualities involved in perceptual reports—must have a source of perception, i.e. something that is perceived. To capture this, we make PSOURCE a total function on perceptual eventualities:

(113)   PSOURCE is a total function from perceptual eventualities into eventualities or individuals:

   PSOURCE : $P \rightarrow (D_\varepsilon \cup D_e)$, where P is the set of perceptual eventualities and $P \subseteq D_\varepsilon$.

Perceptual eventualities must equally have a perceiver; a PGOAL. We define PGOAL similarly to PSOURCE, as a partial function on eventualities in general and as a total function on perceptual eventualities:

(114)   PGOAL is a partial function from eventualities into individuals.
   PGOAL : $D_\varepsilon \rightharpoonup D_e$
   PGOAL is a total function from perceptual eventualities into individuals:
   PGOAL : $P \rightarrow D_e$, where P is the set of perceptual eventualities and $P \subseteq D_\varepsilon$.

The PGOAL function returns only individuals, since only individuals can be perceivers.

PGOALs now have to be added to our semantics for *seem/appear* and *verka*. English can express the PGOAL as a *to*-PP adjunct and this can occur in all of the alternations we have looked at. The interpretation of *to* in this usage is shown in (115). A proof for example (116) is shown in (117):

(115) $\lambda x.\lambda S.\lambda s.[S(s) \wedge \text{PGOAL}(s) = x]$
(116)   Tom seems to Mary like he is laughing.
(117)

$$\frac{\frac{tom \quad \lambda x \lambda P \lambda s'.seem(s', P(x)) \wedge \text{PSOURCE}(s') =_\tau x}{\lambda P \lambda s'.seem(s', P(tom)) \wedge \text{PSOURCE}(s') =_\tau tom} \quad \lambda y.\exists e[laugh(e, y) \wedge \text{AGENT}(e) = y] \quad \frac{mary \quad \lambda x \lambda S \lambda s.S(s) \wedge \text{PGOAL}(s) = x}{\lambda S \lambda s.S(s) \wedge \text{PGOAL}(s) = mary}}{\frac{\lambda s'.seem(s', \exists e[laugh(e, tom) \wedge \text{AGENT}(e) = tom]) \wedge \text{PSOURCE}(s') =_\tau tom}{\frac{\lambda s.seem(s, \exists e[laugh(e, tom) \wedge \text{AGENT}(e) = tom]) \wedge \text{PSOURCE}(s) =_\tau tom \wedge \text{PGOAL}(s) = mary}{\exists s[seem(s, \exists e[laugh(e, tom) \wedge \text{AGENT}(e) = tom]) \wedge \text{PSOURCE}(s) =_\tau tom \wedge \text{PGOAL}(s) = mary]}}}$$

Proof (117) is just proof (112) with the addition of PGOAL composition (modulo currying of the copy raising term). Since PGOAL is a function, we correctly predict the impossibility of having two denotationally distinct PGOAL PP adjuncts:

(118) *Tom seemed tired to me to you.

Since PGOAL only returns individuals, we use simple equality in (115), rather than typed equality.

Swedish can express PGOAL as an object, in certain circumstances. It is standardly possible with the infinitival raising verb *tyckas* (32) and it is also possible for some speakers with the verb *verka* (31). The Swedish PGOAL is syntactically an object, and it is therefore

inappropriate to extend the adjunct analysis of the English *to*-PP to Swedish *mig* in (31–32). Instead, these could be added to the lexically contributed meanings of the Swedish verbs themselves, equivalently to how the PSOURCE contributed by a non-expletive copy-raised subject was treated in (109). The meanings for Swedish copy raising *verka* (for speakers who allow the object PGOAL) would be (119) and the meaning for standard raising *tyckas* and *verka* would be (120):

(119) $\lambda y.\lambda P.\lambda x.\lambda s.[seem(s, P(x)) \wedge \text{PSOURCE}(s) =_\tau x \wedge \text{PGOAL}(s) = y]$

(120) $\lambda x.\lambda p.\lambda s.[seem(s, p) \wedge \text{PGOAL}(s) = x]$

Notice that these meanings reflect the differing modes of composition for copy raising and infinitival raising that were motivated in section 6.2.2 and the fact that *tyckas*, which is not a copy raising verb, does not lexically contribute a PSOURCE.

The meaning postulate (121) captures the requirement that all perceptual eventualities have a PSOURCE and a PGOAL:

(121) $\forall v_\varepsilon \exists v' \exists x \square [v_\varepsilon \in P \rightarrow \text{PSOURCE}(v_\varepsilon) =_\tau v' \wedge v' \in (D_\varepsilon \cup D_e) \wedge \text{PGOAL}(v_\varepsilon) = x]$

This meaning postulate has consequences for the analysis of non-true-copy-raising alternants of the raising verbs concerned. In particular, the question arises as to whether those alternants also denote perceptual eventualities. This would be a welcome result, since it would mean that the raising verbs *seem/appear/verka* denote perceptual eventualities in general, rather than the true copy raising alternant doing so exceptionally. As such, this meaning postulate should apply to the verbs generally. In section 6.2.5, we present evidence from Swedish that impinges upon this question. First, we present a solution to the *på* puzzle.

6.2.4 A solution to the *på* puzzle

The Swedish *på*-PP adjunct contributes a PSOURCE to the eventuality that it modifies. We assigned the preposition *på* in this use the following meaning:

(122) $\lambda x.\lambda S.\lambda s.[S(s) \wedge \text{PSOURCE}(s) =_\tau x]$

Swedish *på*-PPs are thus similar to English *to*-PPs, except that they contribute a PSOURCE instead of a PGOAL.

The ungrammaticality of Swedish copy raising with a *på*-PP adjunct (the *på* puzzle) follows from the presence of two PSOURCEs, one contributed by the copy raising verb and one contributed by the *på*-PP. The relevant part of the semantic derivation for (123) is shown in (124):

(123) * Tom verkar på Robin som om han skrattar.
         T.   seems on R.   as if he laughs

(124)

$$\frac{\lambda s'\lambda P.seem(s', P(tom)) \wedge \text{PSOURCE}(s) =_\tau tom \qquad \lambda S\lambda s.S(s) \wedge \text{PSOURCE}(s) =_\tau robin}{\lambda s\lambda P.seem(s, P(tom)) \wedge \text{PSOURCE}(s) =_\tau tom \wedge \text{PSOURCE}(s) =_\tau robin}$$

The uniqueness requirement for PSOURCEs blocks such cases: the specification of two denotationally distinct PSOURCEs cannot be satisfied, due to PSOURCE denoting a function.

6.2.5 Existential closure of PSOURCE

We now return to the matter of whether the raising verbs that occur in copy raising always denote perceptual eventualities or whether they do so only in their non-expletive-subject copy raising alternants.

Evidence from Swedish suggests that the copy raising verb *verka* also denotes a perceptual eventuality in its subject-to-subject raising alternant, i.e. when it functions as a canonical raising verb. The evidence concerns cases of subject-to-subject raising *verka* with a *på*-PP, which speakers find quite odd:

(125) # Maria verkar på Jonas ha skrattat.
          M.   seems on J.   be happy.

Here, the subject of the raising verb is not tied to the perceptual source interpretation, since such sentences can be felicitous in the absence of the individual in question; subject-to-subject raising does not give rise to the puzzle of the absent cook. Example (125) is thus not ruled out because of a PSOURCE clash between *Maria* and *Jonas*. This otherwise puzzling fact is explained if the verb has an existentially bound PSOURCE. The meaning for (125) would then be (126):

(126) $\exists s \exists v_\varepsilon [seem(s, \exists e[laugh(e, jonas) \wedge \text{AGENT}(e) = jonas]) \wedge$
          $\text{PSOURCE}(s) =_\tau v_\varepsilon \wedge \text{PSOURCE}(s) =_\tau jonas]$

The subject-to-subject raising verb contributes the existential closure of PSOURCE and the *på*-PP contributes the PSOURCE *jonas*. The existential closure is over an eventuality variable of type ε. Thus, in contrast to copy raising and the *på*-PP, which respectively require their individual-denoting subject or complement to be the PSOURCE, this existential closure treats the source of perception as an eventuality. Eventualities and individuals belong to distinct domains in our theory. Therefore instantiation of the existential quantification over v_ε must return an eventuality, which is clearly denotationally distinct from the individual denotation for $jonas$. Examples like (125) with an existentially closed PSOURCE as well as a *på*-PP PSOURCE are therefore also blocked by the uniqueness requirement on PSOURCE.

The typed equality, $=_\tau$, has another interesting consequence. By substitution in the equality for PSOURCE in (126), we get:

(127) $v_\varepsilon =_\tau jonas$

As noted above, the existentially bound variable v_ε has type ε while $jonas$ has type e. The typed equality is defined such that if it evaluates distinct types the result is undefined. Therefore, the relevant sub-proposition of (126), shown in (128), has no truth value:

(128) $\ldots \text{PSOURCE}(s) =_\tau v_\varepsilon \wedge \text{PSOURCE}(s) =_\tau jonas$

As a result, the interpretation (126) for sentence (125) as a whole lacks a truth value. The infelicity of (125) is thus modelled as presupposition failure, which reflects speakers' intuitions that the sentence is quite odd, although not precisely false. In sum, although there is no PSOURCE clash between *Maria* and *Jonas* in (125), there is a PSOURCE clash between the existentially bound PSOURCE and the *på*-PP PSOURCE, *Jonas*.

The Swedish data thus indicates that *verka* in general contributes a PSOURCE and denotes a perceptual eventuality, not just in its true copy raising alternant. We do not have direct evidence that English subject-to-subject raising involves an existentially bound PSOURCE, but it is reasonable to assume parity with Swedish, given the lack of evidence to the contrary and given the general similarities between English and Swedish raising. This leaves the

matter of English *seem/appear* with *that*-complements. It has been argued that this sort of *seem/appear* is purely epistemic and does not involve a perceptual report (see Matushansky 2002 and references therein). If these arguments are correct, then the *that*-complement cases lack PSOURCEs (and PGOALs) entirely.

We think that a more tenable position is that this use of the verb *seem* also involves both an epistemic and a perceptual aspect. It is otherwise unexplained why a PP expressing a PGOAL (perceiver) can be used with a *that*-complement subcategorization of a raising verb:

(129)   It seemed to her that they did not pose a threat.

Furthermore, Swedish speakers who allow *that*-complements with raising verbs (recall that this is dialectal) allow them to occur with *på*-PPs expressing PSOURCE:

(130) % Det verkar på Tom att   han har gjort det.
             it   seems on T.   that he   has done it

        ∼ 'Tom gives the impression that he has done it.'

However, neither English nor Swedish allows a PGOAL or PSOURCE to occur in related examples with the epistemic verb *know*:

(131)   a. *Tom knows to me that it is raining.
        b. * Tom vet   på Robin att   det regnar.
               T.   knows on R.   that it   rains

The verb *know* is surely as good a candidate for a purely epistemic verb as there is. The fact that PGOAL and PSOURCE adjuncts cannot freely occur with *know* but can occur with *seem* in its *that*-complement guise is therefore a strong indication that even this use of *seem* is not purely epistemic and involves a perceptual component.

Existential closure is further supported by felicitous expletive-subject sentences in the absent cook scenario:

(132)   A and B walk into Tom's kitchen. There's no sign of Tom, but there are various
        things bubbling away on the stove and there are several ingredients on the counter,
        apparently waiting to be used.
        a. It seems that Tom is cooking.
        b. It seems like Tom is cooking.
        c. Det verkar som om Tom lagar   mat.
            It   seems as   if T.   makes food

            'It seems as if Tom's cooking.'

In this case, the PSOURCE is the state of the kitchen. Expletive-subject alternants to copy raising are felicitous in this scenario, even though true copy raising is not.

If we treat such expletive examples as having an existentially bound PSOURCE, then we can maintain a general perceptual semantics for *seem* in all alternations. We must, however, make the further assumption that the existential closure is obligatory in English expletive examples, but only optional in Swedish, since Swedish allows a *på*-PP expression of the PSOURCE to co-occur with an expletive subject, as in (48) and the following example:

(133)   Det verkar på Per som om Maria är glad.
            it   seems on P.   as   if M.   is happy

        ∼ 'Per gives the impression that Maria is happy.'

However, when the *på*-PP is absent the existential closure is obligatory. Our analysis therefore assigns the Swedish sentence in (132c) above the same broad interpretation as English (132b). Thus, expletive examples involve existential closure of the PSOURCE; this operation is obligatory in English and optional in Swedish.

In sum, the pattern of PSOURCE expression in English and Swedish is as follows:

1. English and Swedish true copy raising: The non-expletive copy-raised subject is the PSOURCE.
2. English and Swedish subject-to-subject raising: The PSOURCE is obligatorily existentially closed.
3. Expletive subjects (including expletive-subject alternants):
   (a) English: The PSOURCE is obligatorily existentially closed.
   (b) Swedish: The PSOURCE is optionally existentially closed.

One principal typological difference between the two languages with respect to PSOURCE realization lies in whether existential closure of the PSOURCE is obligatory or only optional in expletive examples. The evidence for this difference came from another typological difference, which is the capacity of Swedish to alternatively express the PSOURCE in a *på*-PP adjunct.

Some avenues for further research suggest themselves at this point. The first concerns optional existential closure of PSOURCE in Swedish expletive examples. This is currently a stipulation that is descriptively accurate, but not yet an explanation. In particular, why is it that the existential closure is obligatory in subject-to-subject raising but only optional in the expletive subject case? The second issue for further research concerns the status of PGOAL. In the absence of other information (e.g., a *to*-PP in English), the speaker seems to fill the role of PGOAL. However, it is a legitimate question whether this is an entailment, with the PGOAL being equated in the semantics with the speaker index. Alternatively, the information that the speaker is the PGOAL could be a presupposition or conventional implicature, with the PGOAL being existentially closed in the semantics on a par with PSOURCE.

We now turn to a formal analysis of the existential closure cases, turning first to subject-to-subject raising, which involves existential closure of the PSOURCE in both English and Swedish; the interpretation is shown in (134). We represent the core verbal semantics and the existential closure separately, as this will facilitate discussion of subcategorizations with expletive examples below.

(134) 1. $\lambda p.\lambda s'.seem(s', p)$
       2. $\lambda S.\lambda s.\exists v_\varepsilon[S(s) \land \text{PSOURCE}(s) =_\tau v_\varepsilon]$

Recall that, in contrast to copy raising, subject-to-subject raising takes a propositional complement that has already combined with the raised subject. This again has to do with the copy pronoun, but also underlies how Asudeh (2004, 2012) derives the differing scopal behaviour of copy raising and subject-to-subject raising (Lappin 1984), as discussed in section 6.2.2.

The English subject-to-subject raising sentence in (135) and its Swedish equivalent receive the interpretation in (136):

(135) Tom seemed to laugh.

(136)
$$\frac{\dfrac{\lambda p\lambda s'.seem(s', p) \qquad \exists e[laugh(e, tom) \land \text{AGENT}(e) = tom]}{\lambda s'.seem(s', \exists e[laugh(e, tom) \land \text{AGENT}(e) = tom]) \qquad \lambda S\lambda s.\exists v_\varepsilon[S(s) \land \text{PSOURCE}(s) =_\tau v_\varepsilon]}}{\dfrac{\lambda s.\exists v_\varepsilon[seem(s, \exists e[laugh(e, tom) \land \text{AGENT}(e) = tom]) \land \text{PSOURCE}(s) =_\tau v_\varepsilon]}{\exists s\exists v_\varepsilon[seem(s, \exists e[laugh(e, tom) \land \text{AGENT}(e) = tom]) \land \text{PSOURCE}(s) =_\tau v_\varepsilon]}}$$

There is a perceptual source contributed in these sentences, but its precise identity is left unspecified beyond that it is an eventuality: something is the source of perception and that something is an eventuality. In this case, for example, it could be an event of Tom making some oral noise. Although the exact nature of the PSOURCE is left underspecified in subject-to-subject raising, there is nonetheless a PSOURCE contributed by the verb. Thus, we correctly capture that Swedish subject-to-subject raising cannot occur with a *på*-PP due to the type conflict between v_ε and the individual-type object of the *på*-PP, as discussed above in relation to example (125).

The last case to consider is that of occurrences of *seem/appear/verka* with expletive subjects, whether expletive-subject alternant subcategorizations or other subcategorizations. In English, this involves obligatory existential closure and it is therefore equivalent to the subject-to-subject raising case. In Swedish, the existential closure is only optional, since expletive examples can occur with or without a *på*-PP. Example (137) demonstrates English expletive examples and Swedish expletive examples and their shared interpretation. Example (138) demonstrates a Swedish expletive example with a *på*-PP and its interpretation on the reading where *Tom* and *han* are co-referential.

(137)   a.   It seems that Tom is laughing.
        b.   It seems like Tom is laughing.
        c.   Det verkar som om Tom skrattar.
        $\exists s \exists v_\varepsilon [seem(s, \exists e[laugh(e, tom) \wedge \text{AGENT}(e) = tom]) \wedge \text{PSOURCE}(s) =_\tau v_\varepsilon]$
(138)   Det verkar på Tom som om han skrattar.
    $\sim$ 'Tom gives the impression that he is laughing.'
    $\exists s[seem(s, \exists e[laugh(e, tom) \wedge \text{AGENT}(e) = tom]) \wedge \text{PSOURCE}(s) =_\tau tom]$

The interpretation of (137) is the same as the subject-to-subject raising case in (135–136). In particular, the PSOURCE in both cases is existentially closed and is an eventuality. The interpretation of (138) is the same as the interpretation of (111), shown in (112).

6.2.6 A solution to the puzzle of the absent cook

Let us now return to the puzzle of the absent cook to see how our semantics for PSOURCE solves it. First, consider the scenario in which Tom is present and any of the utterances in (139a–c) by A to B is felicitous:

(139)   A and B walk into Tom's kitchen. Tom is at the stove doing something, but exactly what is unclear.
        a.   Tom seems to be cooking.
        b.   It seems like Tom's cooking.
        c.   Tom seems like he's cooking.

Our semantics assigns (139a–b) a PSOURCE that is filled by an existentially bound eventuality. The impression is conveyed by some eventuality, presumably the state of the kitchen. In (139c), the speaker is making the more specific claim that it is Tom who is the source of the perception. The PSOURCE function in this case returns the individual Tom and since the subject denotes the individual Tom, the sentence is true.

Now consider the scenario where Tom is absent, in which the copy raising sentence is no longer felicitous:

(140)   A and B walk into Tom's kitchen. There's no sign of Tom, but there are various
        things bubbling away on the stove and there are several ingredients on the counter,
        apparently waiting to be used.
        a.   Tom seems to be cooking.
        b.   It seems like Tom's cooking.
        c. #Tom seems like he's cooking.

In this scenario, the PSOURCE function cannot return Tom, because Tom is not present in
the state that it applies to. The likeliest actual PSOURCE in this scenario is the state of the
kitchen, a type ψ state, and the expression $\text{PSOURCE}(s) =_\tau tom$ must be evaluated with the
first argument of type ψ and the second of type e. Given our definition of $=_\tau$ in (110), the
result of evaluating $\text{PSOURCE}(s) =_\tau tom$ with arguments of different types is undefined.
Therefore, the conjunction $seem(s, \ldots) \wedge \text{PSOURCE}(s) =_\tau tom$ cannot be assigned a truth
value, and the presupposition that Tom is the PSOURCE fails. This correctly predicts that the
negation of (140c) is equally infelicitous in this scenario, if the PSOURCE is the state of the
kitchen or any other non-individual type:

(141) #Tom doesn't seem like he's cooking.

Our account thus solves the puzzle of the absent cook and treats the infelicity of copy raising
in the absence of perceptual evidence of the subject as presupposition failure, according to
a simple Strawsonian notion of presupposition failure as meaninglessness through lack of a
truth value (Strawson 1950, 1964).[22]

    This contrasts with a scenario that we have not so far considered in which there is an
individual present to serve as a PSOURCE, but it is not the individual named in the sentence
(and both A and B know that the two individuals are not the same):

(142)   A and B walk into Tom's kitchen. Robin is at the stove doing something, but exactly
        what is unclear. A and B recognize Robin and know that Robin is not Tom.
(143)   Tom seems like he's cooking.

In this scenario, our analysis treats an assertion of sentence (143) as simply false. The
PSOURCE is Robin, not Tom, and since Robin and Tom are both of the same type (e),
then $\text{PSOURCE}(s) =_\tau tom$ is defined as $robin = tom$, which does not include the world of
the scenario.

    Finally, our semantics also explains another puzzling contrast between subject-to-subject
raising and copy raising: the classic equivalence between (144a) and (144b) in subject-to-
subject raising (Rosenbaum 1967) does not hold for copy raising, as shown in (145):[23]

(144)   a.   Bush seemed to control Congress.
        b. ≡ Congress seemed to be controlled by Bush.
(145)   a.   Bush seemed as if he controlled Congress.
        b. ≢ Congress seemed as if Bush controlled them.

In (144a) and (144b), the PSOURCE is an existentially bound eventuality in both cases. This
captures the synonymy of the two cases, given that any event in which the doctor examines
John is one in which John is examined by the doctor. In contrast, (145a) and (145b) have
distinct PSOURCEs: the PSOURCE of (145a) is $bush$, whereas the PSOURCE of (145b) is
$congress$.

---

[22] This notion of presupposition is ultimately too simplistic (Beaver 1997, 2001), but situating our treatment
in a more adequate theory of presupposition would take us too far afield from the central facts of the paper.

[23] We thank Pauline Jacobson (p.c.) for discussion of these cases and for the examples in (145).

6.2.7 Summary

We have presented a semantics for the semantic roles PSOURCE and PGOAL which treats both as partial functions on eventualities (total functions on perceptual eventualities). The non-expletive-subject copy raising subcategorization of *seem/appear/verka* lexically specifies that the copy raising subject is the PSOURCE. The adjunct *på*-PP in Swedish also contributes a PSOURCE. English *to*-PP adjuncts contribute a PGOAL. We showed that our analysis provides solutions to the *på*-puzzle and the puzzle of the absent cook.

6.3 Perceptual resemblance verbs

Perceptual resemblance verbs pattern similarly to copy raising, but recall that a key difference is that the perceptual resemblance verbs do not require a copy pronoun in their complements:

(146)   a.   Tina looks/sounds/smells/feels/tastes like/as if/as though Chris has baked sticky buns.
        b.   Tina ser   ut / låter   / luktar / känns / smakar som om Chris har bakat
             T.   looks out / sounds / smells / feels / tastes as   if C.   has baked
             kladdkaka.
             sticky cake

             'Tina looks/sounds/smells/feels/tastes as if Chris has baked "sticky cake".'

The difference with respect to copy pronouns is reflected lexically: perceptual resemblance verbs, unlike true copy raising, do not contribute a manager resource (Asudeh 2004, 2012); they therefore do not need to consume a pronoun in their complement for successful composition. In terms of the semantics we have been developing here, this basically boils down to mode of composition. A perceptual resemblance verb states that its subject is the PSOURCE and composes with its complement without the requirement that the subject compose in place of a copy pronoun.

 Unlike copy raising verbs, perceptual resemblance verbs restrict the nature of the PSOURCE to an appropriate perceptual dimension as follows (see also Jackendoff 2007: sect. 6.5):

(147)   ***look***: *visual* is a partial function, $(D_\varepsilon \cup D_e) \rightharpoonup D_e$, that returns the visual aspect of its argument (i.e., the argument's look).
        sound: *aural* is a partial function, $(D_\varepsilon \cup D_e) \rightharpoonup D_e$, that returns the aural aspect of its argument (i.e., the argument's sound).
        smell: *olfactory* is a partial function, $(D_\varepsilon \cup D_e) \rightharpoonup D_e$, that returns the olfactory aspect of its argument (i.e., the argument's smell).
        feel: *tactile* is a partial function, $(D_\varepsilon \cup D_e) \rightharpoonup D_e$, that returns the tactile aspect of its argument (i.e., the argument's feel).
        taste: *gustatory* is a partial function, $(D_\varepsilon \cup D_e) \rightharpoonup D_e$, that returns the gustatory aspect of its argument (i.e., the argument's taste).

The interpretation of the verb *sound*, for example, is:

(148) $\lambda p.\lambda x.\lambda s.[sound(s, aural(\text{PSOURCE}(s)), p) \wedge \text{PSOURCE}(s) =_\tau x]$

The verb *sound* denotes a function on the aural aspect of its PSOURCE (i.e., the PSOURCE's sound) and the verb's complement. This was anticipated by Rogers (1973: 77), as discussed in section 4. The subject of the perceptual verb is not a direct semantic argument of the

verb and is therefore not a true thematic argument. Instead, a link is established between the relevant sensory aspect of the subject and the PSOURCE semantic role that is filled by the subject. This may explain why perceptual resemblance verbs can have expletive subjects: the subject of these verbs is not a true thematic grammatical function.

Example (146) with the verb *sound* or *låta* has the following interpretation (setting aside the details of the perception verb's complement):

(149) $\exists s.sound(s, aural(\text{PSOURCE}(s)), \ldots) \wedge \text{PSOURCE}(s) =_\tau tina$

Perceptual resemblance verbs in both English and Swedish can also occur with expletive subjects:

(150)   a.   It smells/looks/sounds/feels/tastes like Chris has been baking sticky buns.
        b.   Det ser   ut / låter   / luktar / känns / smakar som om Chris har bakat
             It looks out / sounds / smells / feels / tastes as if C.   has baked
             kladdkaka.
             sticky cake

             'It looks/sounds/smells/feels/tastes as if Chris has baked "sticky cake".'

The interpretation for the case with a non-expletive subject is the one given in (148) above. In the case with an expletive subject, the PSOURCE is existentially closed and the interpretation is as in (151) once again using *sound* as the exemplar. We continue to represent the core verbal function and the existential closure separately, but they could be combined in one meaning term instead.

(151)   1. $\lambda p \lambda s'.sound(s', aural(\text{PSOURCE}(s')), p)$
        2. $\lambda S \lambda s.\exists v_\varepsilon[S(s) \wedge \text{PSOURCE}(s) =_\tau v_\varepsilon]$

Example (150) with the verb *sound* or *låta* has the following interpretation:

(152) $\exists s \exists v_\varepsilon[sound(s, aural(\text{PSOURCE}(s)), \ldots) \wedge \text{PSOURCE}(s) =_\tau v_\varepsilon]$

A perceptual resemblance verb thus consistently denotes a relation between a perceptual aspect of its PSOURCE and the verb's complement, whether the PSOURCE is a sensory aspect of the verb's subject, as in (148), or is an existentially bound eventuality, as in (151).

The existential closure is once again obligatory in English but only optional in Swedish, since the latter allows a *på*-PP expressing the PSOURCE to occur with expletive-subject perceptual-resemblance verbs:[24]

(153)   Det låter   på Tina som om Chris har bakat kladdkaka.
        It sounds on T.   as if C.   has baked sticky cake

        ∼ 'Tina sounds as if Chris has baked "sticky cake".'

The interpretation of (153) is the same as (149), but this time the PSOURCE is contributed by the *på*-PP rather than the perceptual resemblance verb's subject. In all cases, the verb takes a function on its PSOURCE as an argument, whether the PSOURCE itself is contributed by the verb (from its subject or through existential closure) or is contributed by an adjunct. Even when the subject is an expletive, the perceptual resemblance verb still takes the PSOURCE's sensory aspect as an argument, although the PSOURCE itself is either existentially closed or contributed by a *på*-PP adjunct.

---

[24] The verbs *lukta* 'smell' and *smaka* 'taste' occur less frequently with a *på*-PP than the other perceptual resemblance verbs. Some speakers seem not to like them at all, although many speakers find such examples unproblematic. We think this is the same problem of construal as was discussed in connection with examples (13–14) in section 2.

7 Conclusion and discussion

We have carried out a comparative study of copy raising in two Germanic languages, English and Swedish. We showed that there were strong similarities between the two languages, but also important differences. English and Swedish both have adjuncts that encode different participants in a perceptual eventuality. English allows expression of the goal of perception (PGOAL) in a *to*-PP and Swedish allows the expression of the source of perception (PSOURCE) in a PP adjunct headed by the preposition *på* 'on'. We argued that PSOURCE and PGOAL are not theta roles in the sense of the Theta Criterion. We proposed a thematic theory in which thematic roles are tied to semantic arguments, but in which not all semantic arguments necessarily bear a thematic role. In particular, the propositional complement to raising does not bear a thematic role, thus avoiding the problem of positing an unmotivated relation for this complement that arises in a neo-Davidsonian theory like that of Parsons (1990, 1995). We also argued for a generalized notion of thematic role, which we called a *semantic role* and proposed that PSOURCE and PGOAL are semantic roles. Copy raising thus motivates a somewhat finer-grained distinction between semantic arguments and thematic relations than is commonly assumed.

Our formal analysis concentrated on the semantics of copy raising and other instances of the verbs *seem* and *verka*, but we also extended the analysis to related perceptual resemblance verbs (*sound*, *look*, *smell*, *feel*, and *taste*). With respect to the adjuncts, the formal analysis concentrated on the Swedish PSOURCE adjunct, but also extended the analysis to the English PGOAL adjunct. We showed that, in terms of composition, copy raising is related to control, but that in terms of the meaning of the core verbal relation, copy raising is indeed a form of raising. No ambiguity is postulated for the function $seem$, which is a two-place type $\langle t, \langle \psi, t \rangle \rangle$ function in all subcategorizations of raising. Copy raising has a kind of hybrid meaning term with commonalities with control in its mode of composition and with raising in its core meaning. This in turn reveals a subtler understanding of the general semantics of control and raising and a subtler understanding of the notion of semantic argument.

A puzzle, which we called the *på* puzzle, arose concerning why the Swedish *på*-PP cannot occur in a true copy raising sentence. We argued that this is because both the non-expletive copy raising subject and the *på*-PP are contributing the source of perception, PSOURCE. Although the PSOURCE is not an argument, it must be uniquely specified, because PSOURCE is a function. Another puzzle, which we called the puzzle of the absent cook, also concerned PSOURCEs and was likewise explained by the fact that a non-expletive copy-raised subject encodes the source of perception. Our analysis treats as presupposition failure a copy raising sentence uttered in a situation where the source of perception indicated by the subject is absent and the PSOURCE is existentially bound. In contrast, the analysis predicts that a copy raising sentence is false if uttered in a situation where the PSOURCE is an individual that is not the one denoted by the non-expletive copy raising subject.

The analysis of PSOURCEs bears a potential relationship to other evidentiary phenomena. For example, Gunlogson (2003) observes that rising declarative questions, as in (154), have stricter felicity conditions than simple interrogatives, as in (155):[25]

(154)   It's raining?

(155)   Is it raining?

Consider a scenario where the issue of whether it is raining is unresolved. A is in a room that does not allow observation of the weather (e.g., it has no windows) and B enters wearing

---

[25]   We thank Line Mikkelsen (p.c.) for pointing out the relevance of these cases.

a raincoat. In such a scenario, both of these utterances by A are felicitous. However, if B enters without a raincoat on and does not give any other indication that it may be raining, the rising declarative is infelicitous, although the simple interrogative is not. Perhaps the rising declarative entails a source of perception, whereas the simple interrogative does not.

Linguistic encoding of evidentials, as found in languages such as Quechua (Faller 2002) and Tibetan (Garrett 2002), is another potential point of connection with the present work. In terms of Willet's (1988) taxonomy of sources of information, PSOURCEs would seem to belong to the *attested* subcategory of *direct* sources. It would be interesting to see if data from a language with both grammaticized evidentiality and Germanic-type copy raising bore this out, if such a language can be identified. Copy raising is especially relevant to the relationship between evidentiality/perception on the one hand and epistemic modality on the other (Garrett 2002), because it constitutes a case in which the speaker is asserting direct perception of something about which s/he nevertheless remains epistemically uncertain.

This paper has examined just a small corner of the grammars of English and Swedish, but we have nevertheless encountered many intricate empirical details. There are subtle but important differences between related types of expressions both within and between the languages. Although we have presented a detailed formal analysis of English and Swedish copy raising, many questions remain. Van Egmond (2004) shows that copy raising also exists in Dutch, and a preliminary investigation indicates that copy raising is generally common in the Germanic languages. In section 2.1, we noted that copy raising is a relatively common typological phenomenon, having also been observed for languages as diverse as Greek, Haitian Creole, Hebrew, Igbo, Irish, Persian, and Turkish, among others. The extent to which the analysis can be extended to other languages is a question for future research.

A Types

(156)   1. e, t, ϱ, ε, and ψ are types.
         2. If σ and τ are types, then $\langle \sigma, \tau \rangle$ is a type.
         3. Nothing else is a type.

(157)   1. The domain D_e of e is the set of individuals, D.
         2. The domain D_t of t is the set of propositions, $\mathcal{P}(W)$ (the power set of the set of worlds).
         3. The domain D_ϱ of ϱ is the set of events, Σ.
         4. The domain D_ψ of ψ is the set of states, Ψ.
         5. The domain D_ε of ε is the set of eventualites, $\Sigma \cup \Psi$.
         6. The domain of a functional type $\langle \sigma, \tau \rangle$ is the set of all functions from D_σ into D_τ.

We adopt the following conventions for variables:

(158)   1. For any type a, v_a, v_a', v_a'', ... are type a variables.
         2. x, y, z are type e variables over individuals.
         3. P, Q are type $\langle e, t \rangle$ variables over properties.
         4. p, q are type t variables over propositions.
         5. e, e', e'', ... are type ϱ variables over events.
         6. s, s', s'', ... are type ψ variables over states.
         7. S, S', S'', ... are type $\langle \psi, t \rangle$ variables over state properties.

Note that we assume an intensional type theory without the intensional type s of, e.g., Montague (1973). The base type t stands for propositions rather than truth values (van Benthem 1988, 1991).

As discussed in section 5.2, we treat a verb as a relation with an eventuality argument and places for its arguments, as in Davidson (1967) and Dowty (1989). We treat thematic roles as further restrictions on the nature of these arguments. The verb *kiss* serves as an example:

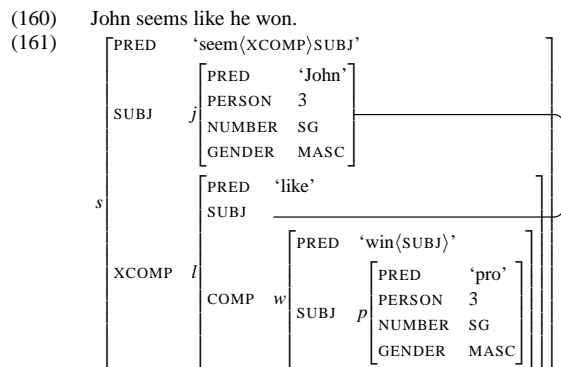(159) $\lambda y.\lambda x.\lambda e.[kiss(e, x, y) \wedge \text{AGENT}(e) = x \wedge \text{THEME}(e) = y]$

The verb takes two individual-type arguments, x and y, and one event argument, e. The AGENT of e is restricted to be x and the THEME of e is restricted to be y. We have defined the domain of type t as the power set of the set of worlds. We therefore define $\wedge$ and $=$ in set-theoretic terms as follows (note that '$=$' in the meta-language is standard equality):

1. For expressions α, β such that $[\![\alpha]\!]$, $[\![\beta]\!] \in D_t$, $[\![\alpha \wedge \beta]\!] = [\![\alpha]\!] \cap [\![\beta]\!]$.
2. Where α, β are of any type, $[\![\alpha = \beta]\!]$ is the set of worlds w such that $[\![\alpha]\!]^w = [\![\beta]\!]^w$.
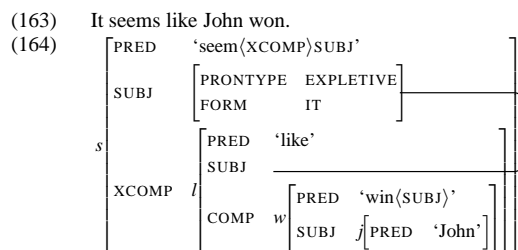
B Examples

1. We have not treated the syntax or semantics of the *like*, *as* or *som* head of the *like/as/som*-complement in any detail. We follow Asudeh (2012) in treating the complement syntactically as an open complement. The semantics of the *like/as/som*-complement is interesting in its own right, but here we simply treat it as a function on its sentential complement; for further details, see Asudeh (2012: chap. 12).
2. The proof rule used in the Glue proofs below is implication elimination, unless otherwise indicated.
3. The lines in bold in the Glue proofs are there for exposition only and are not a formal part of the proof. They specify which lexical item contributes the premise and, where appropriate, the role of the premise.
4. We adopt the standard practice of using English as the meta-language for the Swedish structures below.

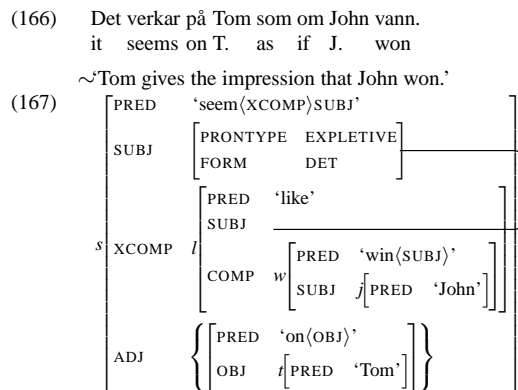## B.1 Example: True Copy Raising (English)

(160)   John seems like he won.

(161)

$$
\begin{bmatrix}
\text{PRED} & \text{`seem}\langle\text{XCOMP}\rangle\text{SUBJ'} \\
\text{SUBJ} & j\begin{bmatrix} \text{PRED} & \text{`John'} \\ \text{PERSON} & 3 \\ \text{NUMBER} & \text{SG} \\ \text{GENDER} & \text{MASC} \end{bmatrix} \\
s \\
\text{XCOMP} & l\begin{bmatrix} \text{PRED} & \text{`like'} \\ \text{SUBJ} & \underline{\hspace{1cm}} \\ \text{COMP} & w\begin{bmatrix} \text{PRED} & \text{`win}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & p\begin{bmatrix} \text{PRED} & \text{`pro'} \\ \text{PERSON} & 3 \\ \text{NUMBER} & \text{SG} \\ \text{GENDER} & \text{MASC} \end{bmatrix} \end{bmatrix} \end{bmatrix}
\end{bmatrix}
$$

(162)   Interpretation: see Figure 6

B.2 Example: Expletive-Subject Alternant (English)

(163)   It seems like John won.

(164)

$$
\begin{bmatrix}
\text{PRED} & \text{`seem}\langle\text{XCOMP}\rangle\text{SUBJ'} \\
\text{SUBJ} & \begin{bmatrix} \text{PRONTYPE} & \text{EXPLETIVE} \\ \text{FORM} & \text{IT} \end{bmatrix} \\
s \\
\text{XCOMP} & l\begin{bmatrix} \text{PRED} & \text{`like'} \\ \text{SUBJ} & \underline{\hspace{1cm}} \\ \text{COMP} & w\begin{bmatrix} \text{PRED} & \text{`win}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & j\begin{bmatrix} \text{PRED} & \text{`John'} \end{bmatrix} \end{bmatrix} \end{bmatrix}
\end{bmatrix}
$$

(165)   Interpretation: see Figure 7

B.3 Example: *På*-PP (Swedish)

(166)   Det verkar på Tom som om John vann.
         it   seems on T.   as if   J.   won

         ~'Tom gives the impression that John won.'

(167)

$$
\begin{bmatrix}
\text{PRED} & \text{`seem}\langle\text{XCOMP}\rangle\text{SUBJ'} \\
\text{SUBJ} & \begin{bmatrix} \text{PRONTYPE} & \text{EXPLETIVE} \\ \text{FORM} & \text{DET} \end{bmatrix} \\
s & \text{XCOMP} & l\begin{bmatrix} \text{PRED} & \text{`like'} \\ \text{SUBJ} & \underline{\hspace{1cm}} \\ \text{COMP} & w\begin{bmatrix} \text{PRED} & \text{`win}\langle\text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & j\begin{bmatrix} \text{PRED} & \text{`John'} \end{bmatrix} \end{bmatrix} \end{bmatrix} \\
\text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{`on}\langle\text{OBJ}\rangle\text{'} \\ \text{OBJ} & t\begin{bmatrix} \text{PRED} & \text{`Tom'} \end{bmatrix} \end{bmatrix} \right\}
\end{bmatrix}
$$

(168)   Interpretation: see Figure 8

Fig. 6 Glue Semantics proof for *John seems like he won*.

Fig. 7 Glue Semantics proof for *It seems like John won*.

vann
$\lambda x.\exists e[win(e,x)]$:

som **John** $j \multimap w$

$\lambda p.f(p)$: $john : j$ —————————————

$w \multimap l$ $\exists e[win(e,john)] : w$ **på**

verkar ————————————————— $\lambda x.\lambda S.\lambda s.S(s) \land \mathrm{PSOURCE}(s)=_\tau x$: **Tom**

$\lambda p.\lambda s'.seem(s',p)$: $f(\exists e[win(e,john)]) : l$ $t \multimap (event \multimap s) \multimap (event \multimap s)$ $tom : t$

$l \multimap event \multimap s$ ————————————————————— ——

————————————————————————————————————— $\lambda S.\lambda s.S(s) \land \mathrm{PSOURCE}(s)=_\tau tom : (event \multimap s) \multimap (event \multimap s)$

$\lambda s'.seem(s',f(\exists e[win(e,john)])) : event \multimap s$ ———

——

$\lambda s.seem(s,f(\exists e[win(e,john)])) \land \mathrm{PSOURCE}(s) =_\tau tom : event \multimap s$

——— Event ∃-clos.

$\exists s[seem(s,f(\exists e[win(e,john)])) \land \mathrm{PSOURCE}(s) =_\tau tom] : s$

Fig. 8 Glue Semantics proof for *Det verkar på Tom som om John vann.* (∼'Tom gives the impression that John won.')

References

Asudeh, Ash. 2002. Richard III. In *CLS 38: The main session*, eds. Mary Andronis, Erin Debenport, Anne Pycha, and Keiko Yoshimura, Vol. 1, 31–46. Chicago, IL: Chicago Linguistic Society.

Asudeh, Ash. 2004. Resumption as resource management. PhD dissertation, Stanford University.

Asudeh, Ash. 2005. Control and semantic resource sensitivity. *Journal of Linguistics* 41 (3): 465–511.

Asudeh, Ash. 2006. Direct compositionality and the architecture of LFG. In *Intelligent linguistic architectures: Variations on themes by Ronald M. Kaplan*, eds. Miriam Butt, Mary Dalrymple, and Tracy Holloway Kings, 363–387. Stanford, CA: CSLI Publications.

Asudeh, Ash. 2012. *The logic of pronominal resumption*. Oxford: Oxford University Press.

Asudeh, Ash, and Ida Toivonen. 2007. Copy raising and its consequences for perception reports. In *Architectures, rules, and preferences: Variations on themes by Joan W. Bresnan*, eds. Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling, and Christopher Manning. Stanford, CA: CSLI Publications.

Asudeh, Ash, and Ida Toivonen. 2009. Lexical-Functional Grammar. In *The Oxford handbook of linguistic analysis*, eds. Bernd Heine and Heiko Narrog, 425–458. Oxford: Oxford University Press.

Bach, Emmon. 1981. On time, tense and aspect: An essay on English metaphysics. In *Radical pragmatics*, ed. Peter Cole, 62–81. New York: Academic Press.

Beaver, David I. 1997. Presupposition. In *Handbook of logic and language*, eds. Johan van Benthem and Alice ter Meulen, 939–1008. Cambridge, MA: MIT Press.

Beaver, David I. 2001. *Presupposition and assertion in dynamic semantics*. Stanford, CA: CSLI Publications.

Biber, Douglas, Stig Johansson, Geoffrey Leech, Susan Conrad, and Edward Finegan. 1999. *Longman grammar of spoken and written English*. Harlow, UK: Pearson Education Ltd.

Boškovič, Željko. 1994. D-structure, theta-criterion, and movement into theta-positions. *Linguistic Analysis* 24 (3–4): 247–286.

Bresnan, Joan. 1978. A realistic transformational grammar. In *Linguistic theory and psychological reality*, eds. Morris Halle, Joan Bresnan, and George A. Miller, 1–59. Cambridge, MA: MIT Press.

Bresnan, Joan. 1982a. Control and complementation. *Linguistic Inquiry* 13: 343–434.

Bresnan, Joan, ed. 1982b. *The mental representation of grammatical relations*. Cambridge, MA: MIT Press.

Bresnan, Joan. 1982c. Polyadicity. In *The mental representation of grammatical relations*, ed. Joan Bresnan, 149–172. Cambridge, MA: MIT Press.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford: Blackwell.

Brody, Michael. 1993. θ-theory and arguments. *Linguistic Inquiry* 24 (1): 1–23.

Carlson, Gregory N. 1984. Thematic roles and their role in semantic interpretation. *Linguistics* 22: 259–279.

Chierchia, Gennaro. 1984. Topics in the syntax and semantics of infinitives and gerunds. PhD dissertation, University of Massachusetts, Amherst.

Chierchia, Gennaro. 1989. Structured meanings, thematic roles and control. In *Properties, types and meaning. volume II: Semantic issues*, eds. Gennaro Chierchia, Barbara H. Partee, and Raymond Turner, 131–166. Dordrecht: Kluwer.

Chierchia, Gennaro, Barbara H. Partee, and Raymond Turner, eds. 1989. *Properties, types and meaning. volume II: Semantic issues*. Dordrecht: Kluwer.

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.

Chomsky, Noam. 1986. *Knowledge of language: Its nature, origin, and use*. New York, NY: Praeger.

Chomsky, Noam. 1993. A Minimalist Program for linguistic theory. In *The view from building 20*, eds. Kenneth Hale and Samuel Jay Keyser, 1–52. Cambridge, MA: MIT Press.

Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.

Chung, Sandra. 1978. *Case marking and grammatical relations in Polynesian*. Austin, TX: University of Texas Press.

Crouch, Richard, and Josef van Genabith. 1999. Context change, underspecification, and the structure of Glue Language derivations. In *Semantics and syntax in Lexical Functional Grammar: The resource logic approach*, ed. Mary Dalrymple, 117–189. Cambridge, MA: MIT Press.

Dalrymple, Mary, ed. 1999. *Semantics and syntax in Lexical Functional Grammar: The resource logic approach*. Cambridge, MA: MIT Press.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*. San Diego, CA: Academic Press.

Dalrymple, Mary, Ronald M. Kaplan, John T. Maxwell, and Annie Zaenen, eds. 1995. *Formal issues in Lexical-Functional Grammar*. Stanford, CA: CSLI Publications.

Dalrymple, Mary, John Lamping, Fernando Pereira, and Vijay Saraswat. 1999. Quantification, anaphora, and intensionality. In *Semantics and syntax in Lexical Functional Grammar*, ed. Mary Dalrymple, 39–89. Cambridge, MA: MIT Press.

Darzi, Ali. 1996. Word order, NP-movements, and opacity conditions in Persian. PhD dissertation, University of Illinois at Urbana-Champaign.

Davidson, Donald. 1967. The logical form of action sentences. In *The logic of decision and action*, ed. Nicholas Rescher, 81–95. Pittsburgh, PA: University of Pittsburgh Press. Reprinted in Davidson (1980: 105-122).

Davidson, Donald. 1980. *Essays on actions and events*. Oxford: Clarendon Press.

Davies, William D., and Stanley Dubinsky. 2004. *The grammar of raising and control: A course in syntactic argumentation*. Oxford: Blackwell.

Déprez, Viviane. 1992. Raising constructions in Haitian Creole. *Natural Language and Linguistic Theory* 10: 191–231.

Dowty, David. 1989. On the semantic content of the notion of 'thematic role'. In *Properties, types and meaning. volume II: Semantic issues*, eds. Gennaro Chierchia, Barbara H. Partee, and Raymond Turner, 69–129. Dordrecht: Kluwer.

Dowty, David R., Robert E. Wall, and Stanley Peters. 1981. *Introduction to Montague Semantics*. Dordrecht: Kluwer.

Faller, Martina. 2002. Semantics and pragmatics of evidentials in Cuzco Quechua. PhD dissertation, Stanford University.

Fujii, Tomohiro. 2005. Cycle, linearization of chains, and multiple case checking. In *Proceedings of Console XIII*, eds. Sylvia Blaho, Luis Vicente, and Erik Schoorlemmer, 39–65. Student Organization of Linguistics in Europe, University of Leiden.

Fujii, Tomohiro. 2007. Cyclic chain reduction. In *The copy theory of movement*, eds. Norbert Corver and Jairo Nunes, 291–326. Amsterdam: John Benjamins.

Garrett, Edward. 2002. Evidentiality and assertion in Tibetan. PhD dissertation, UCLA.

Girard, Jean-Yves. 1987. Linear logic. *Theoretical Computer Science* 50: 1–102.

Gisborne, Nikolas. 1996. English perception verbs. PhD dissertation, University College London.

Gisborne, Nikolas. 2010. *The event structure of perception verbs*. Oxford: Oxford University Press.

Grimshaw, Jane. 1990. *Argument structure*. Cambridge, MA: MIT Press.

Gunlogson, Christine. 2003. *True to form: Rising and falling declaratives as questions in English*. New York: Routledge.

Heycock, Caroline. 1994. *Layers of predication*. New York: Garland.

Higginbotham, James. 1983. The logic of perceptual reports: An extensional alternative to situation semantics. *Journal of Philosophy* 80 (2): 100–127.

Higginbotham, James. 1985. On semantics. *Linguistic Inquiry* 16: 547–594.

Horn, Laurence R. 1981. A pragmatic approach to certain ambiguities. *Linguistics and Philosophy* 4: 321–358.

Hornstein, Norbert. 1999. Movement and control. *Linguistic Inquiry* 30 (1): 69–96.

Jackendoff, Ray. 2007. *Language, consciousness, culture: Essays on mental structure*. Cambridge, MA: MIT Press.

Joseph, Brian D. 1976. Raising in Modern Greek: A copying process. In *Harvard studies in syntax and semantics*, eds. Jorge Hankamer and Judith Aissen, Vol. 2, 241–281. Cambridge, MA: Harvard University, Department of Linguistics.

Kaplan, Ronald M. 1987. Three seductions of computational psycholinguistics. In *Linguistic theory and computer applications*, eds. Peter Whitelock, Mary McGee Wood, Harold L. Somers, Rod Johnson, and Paul Bennett, 149–181. London: Academic Press. Reprinted in Dalrymple et al. (1995: 339–367).

Kaplan, Ronald M. 1989. The formal architecture of Lexical-Functional Grammar. In *Proceedings of RO-CLING II*, eds. Chu-Ren Huang and Keh-Jiann Chen, 3–18. Reprinted in Dalrymple et al. (1995: 7–27).

Kaplan, Ronald M., and Joan Bresnan. 1982. Lexical-Functional Grammar: A formal system for grammat-

ical representation. In *The mental representation of grammatical relations*, ed. Joan Bresnan, 173–281. Cambridge, MA: MIT Press.

Kratzer, Angelika. 1995. Stage-level and individual-level predicates. In *The generic book*, eds. Gregory N. Carlson and Francis Jeffry Pelletier, 125–175. Chicago: University of Chicago Press.

Kratzer, Angelika. 1996. Severing the external argument from its verb. In *Phrase structure and the lexicon*, eds. Johan Rooryck and Laurie Zaring, 109–137. Dordrecht: Kluwer Academic Publishers.

Kratzer, Angelika. 2003. The event argument and the semantics of verbs. Ms., University of Massachusetts, Amherst.

Landau, Idan. 2009. This construction looks like a copy is optional. *Linguistic Inquiry* 40 (2): 343–346.

Landau, Idan. 2011. Predication vs. aboutness in copy raising. *Natural Language and Linguistic Theory* 29 (3): 779–813.

Landman, Fred. 2000. *Events and plurality: The Jerusalem lectures*. Dordrecht: Kluwer.

Lappin, Shalom. 1984. Predication and raising. In *Proceedings of NELS 14*, eds. Charles Jones and Peter Sells, 236–252. Amherst, MA: GLSA.

Maling, Joan. 1983. Transitive adjectives: A case of categorial reanalysis. In *Linguistic categories: Auxiliaries and related puzzles*, eds. Frank Heny and Barry Richards, 253–289. Dordrecht: Foris.

Martin-Löf, Per. 1984. *Intuitionistic type theory*. Napoli: Bibliopolis.

Matushansky, Ora. 2002. Tipping the scales: The syntax of scalarity in the complement of *seem*. *Syntax* 5 (3): 219–276.

McCloskey, James. 1979. *Transformational syntax and model theoretic semantics: A case-study in Modern Irish*. Dordrecht: Reidel.

McCloskey, James. 1990. Resumptive pronouns, $\overline{\text{A}}$-binding and levels of representation in Irish. In *Syntax of the Modern Celtic languages*, ed. Randall Hendrick. Vol. 23 of *Syntax and semantics*, 199–248. San Diego, CA: Academic Press.

McCloskey, James. 2002. Resumption, successive cyclicity, and the locality of operations. In *Derivation and explanation in the Minimalist Program*, eds. Samuel David Epstein and T. Daniel Seeley, 184–226. Oxford: Blackwell.

McCloskey, James. 2006. Resumption. In *The Blackwell companion to syntax*, eds. Martin Everaert and Henk van Riemsdijk, 94–117. Oxford: Blackwell.

McCloskey, James, and Peter Sells. 1988. Control and A-chains in Modern Irish. *Natural Language and Linguistic Theory* 6: 143–189.

Montague, Richard. 1973. The proper treatment of quantification in ordinary English. In *Approaches to language*, eds. Jaakko Hintikka, Julian Moravcsik, and Patrick Suppes, 221–242. Dordrecht: Reidel. Reprinted in Montague (1974: 247–270).

Montague, Richard. 1974. *Formal philosophy: Selected papers of Richard Montague*. New Haven, CT: Yale University Press. Edited and with an introduction by Richmond H. Thomason.

Moore, John. 1998. Turkish copy-raising and A-chain locality. *Natural Language and Linguistic Theory* 16: 149–189.

Nunberg, Geoffrey, Ivan A. Sag, and Thomas Wasow. 1994. Idioms. *Language* 70 (3): 491–538.

Parsons, Terence. 1990. *Events in the semantics of English: A study in subatomic semantics*. Cambridge, MA: MIT Press.

Parsons, Terence. 1995. Thematic relations and arguments. *Linguistic Inquiry* 26 (4): 635–662.

Payne, Thomas E. 1997. *Describing morphosyntax: A guide for field linguists*. Cambridge: Cambridge University Press.

Perlmutter, David M., and Scott Soames. 1979. *Syntactic argumentation and the structure of English*. Berkeley, CA: University of California Press.

Polinsky, Maria, and Eric Potsdam. 2006. Expanding the scope of control and raising. *Syntax* 9 (2): 171–192.

Pollard, Carl, and Ivan A. Sag. 1994. *Head-driven Phrase Structure Grammar*. Chicago, IL and Stanford, CA: University of Chicago Press and CSLI Publications.

Postal, Paul. 1974. *On raising*. Cambridge, MA: MIT Press.

Potsdam, Eric, and Jeffrey T. Runner. 2001. Richard returns: Copy Raising and its implications. In *CLS 37: The main session*, eds. Mary Andronis, Chris Ball, Heidi Elston, and Sylvain Neuvel, Vol. 1, 453–468. Chicago, IL: Chicago Linguistic Society.

Reinhart, Tanya. 2002. The theta system – an overview. *Theoretical Linguistics* 28: 229–290.

Rogers, Andy. 1971. Three kinds of physical perception verbs. In *Papers from the seventh regional meeting of the Chicago Linguistic Society*, eds. Douglas Adams, Mary Ann Campbell, Victor Cohen, Julie Lovins, Edward Maxwell, Carolyn Nygren, and John Reighard, 206–222.

Rogers, Andy. 1972. Another look at flip perception verbs. In *Papers from the eighth regional meeting of the Chicago Linguistic Society*, eds. Judith N. Levi, Paul M. Peranteau, and Gloria C. Phares, 303–315.

Rogers, Andy. 1973. Physical perception verbs in English: A study in lexical relatedness. PhD dissertation,

UCLA.

Rogers, Andy. 1974. A transderivational constraint on Richard? In *Papers from the tenth regional meeting of the Chicago Linguistic Society*, eds. Michael W La Galy, Robert Allen Fox, and Anthony Bruck, 551–558.

Rosenbaum, Peter S. 1967. *The grammar of English predicate complement constructions*. Cambridge, MA: MIT Press.

Ross, John R. 1967. Constraints on variables in syntax. PhD dissertation, Massachusetts Institute of Technology.

Sells, Peter. 1984. Syntax and semantics of resumptive pronouns. PhD dissertation, University of Massachusetts, Amherst.

Strawson, Peter. 1950. Referring. *Mind* 59: 320–344.

Strawson, Peter. 1964. Identifying reference and truth values. *Theoria* 30: 96–118.

Teleman, Ulf, Staffan Hellberg, and Erik Andersson. 1999. *Svenska Akademiens grammatik*. Stockholm: Norstedts.

Turner, Raymond. 1996. Weak theories of operations and types. *Journal of Logic and Computation* 6 (1): 5–31.

Turner, Raymond. 1997. Types. In *Handbook of logic and language*, eds. Johan van Benthem and Alice ter Meulen, 535–586. Cambridge, MA: MIT Press.

Ura, Hiroyuki. 1998. Checking, economy, and copy-raising in Igbo. *Linguistic Analysis* 28: 67–88.

van Benthem, Johan. 1988. Strategies of intensionalization. In *Intensional logic, history of philosophy, and methodology: To Imre Ruzsa on the occasion of his 65th birthday*, eds. István Bodnár, András Máté, and László Pólos, 41–59. Budapest: Department of Symbolic Logic, Eötvös University.

van Benthem, Johan. 1991. *Language in action: Categories, lambdas, and dynamic logic*. Amsterdam: North-Holland. Reprinted in 1995 by the MIT Press, Cambridge, MA.

van Benthem, Johan, and Alice ter Meulen, eds. 1997. *Handbook of logic and language*. Cambridge, MA: MIT Press. Co-published with Elsevier Science B.V., Amsterdam.

van Egmond, Marie-Elaine. 2004. Copy raising in Dutch. Honours thesis, University of Canterbury.

van Genabith, Josef, and Richard Crouch. 1999. Dynamic and underspecified semantics for LFG. In *Semantics and syntax in Lexical Functional Grammar: The resource logic approach*, ed. Mary Dalrymple, 209–260. Cambridge, MA: MIT Press.

Willet, Thomas. 1988. A cross-linguistic survey of the grammaticalization of evidentiality. *Studies in Language* 12 (1): 57–91.