On the property analysis of opaque complements

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Abstract: In this paper, we regard Zimmermann's (1993) property analysis of verbs of absence as a special case of the independent ability of verbs to take property-type complements (see Ladusaw, 1994). By integrating into this analysis a Quinian decomposition of verbs of absence we can tease apart the distinction between opaque and transparent, nonspecific complements, as well as the distinction between de dicto and de re readings of nonspecific complements. This prevents us from overgeneralizing transparent readings of inherently opaque complements and inherently opaque verbs and it helps us to answer some criticisms that Moltmann (1997) raises against Zimmermann's proposal.

Keywords: intensionality, nonspecificity, opacity

1. Introduction

It is a well-known fact that if English verbs of absence like *look for* or *want* combine with an indefinite NP the latter can receive two readings. For example, on one reading of (1) Marta would be happy if she found just any toy to play with and, on the other reading, only if she found a particular toy:

(1) Marta is looking for a toy.
(2) Max wants a book for Christmas.

Similarly, (2) can be understood in such a way that Max would be satisfied with any book for Christmas, or in such a way that a particular book is the object of his desire. We call the former readings instances of the opaque reading, and the latter ones instances of the transparent reading of the respective indefinite complements. On the opaque readings there need not exist a toy, nor need there be a book. Hence, on these readings the indefinites give rise to what is often called a failure of existential quantification. Another major characteristic of verbs of absence is their failure to permit substitution, i.e., a sentence containing a verb of absence does not always preserve truth when we substitute its opaque complement with an extensionally equivalent NP. For example, suppose that in a world of evaluation *w* the denotation of *member of New Orleans' high society* and *participant in a Mardi Gras parade* is the same set of individuals.[1] Even if (3) is true in *w*, it does not necessarily follow that (4) is true in *w* as well:

(3) The FBI sought a member of New Orleans' high society.
(4) The FBI sought a participant in a Mardi Gras parade.

Referentially transparent verbs behave differently in this respect. For example, if (5) is true, (6) is true as well:

(5) The FBI caught a member of New Orleans high society.
(6) The FBI caught a participant in a Mardi Gras parade.

In this paper, we adopt Zimmermann's (1993) account of the opaque readings of (1) through (4) by maintaining that, on their opaque interpretation, the verbs *look for, want*, and *seek* express a relation towards a property. We emphasize that is not enough to propose that the opacity of a verbal complement is merely a matter of the verb expressing a relation towards a property, since, as we will show, there are cases of property-type complements which *do* carry existential entailments. The relevant facts will lead us to a definition of the opaque/transparent distinction which classifies verbs according to whether or not they supply an existential entailment to property-denoting complements (since property-type complements, we assume, do not contribute any existential entailment on their own). We will call those nonspecific property-type complements which are associated with existence entailments, transparent, and those which are not, opaque.

A problem with Zimmermann's implementation of a property analysis is that it does not account for Carlson's (1977b) observation that if the complement of *look for* or *want* is a bare plural we get *only* the opaque reading.[2] As on Montague's (1974) intensional quantifier analysis, it follows on Zimmermann's treatment that whenever a sentence receives an opaque, nonspecific reading it receives a transparent, specific reading as well. We will prevent such readings from being generated by making the derivation of opaque and transparent readings of verbs of absence depend both on specific lexical characteristics of those verbs and on the specific types of denotations available to various types of NPs. Our discussion will further show that opaque readings are attested even in some cases that at first glance seem to have only transparent readings (e.g. *John was*

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[1] Mardi Gras is New Orleans' version of Carneval. While the equivalence we are imagining here does not actually hold, the most important of the colorful Mardi Gras parades have traditionally been organized by exclusive clubs (though this is in no way obvious to the uninformed parade watcher), and it is easy enough to imagine a world in which the equivalence did hold.

[2] Kratzer (1980) disputes the correctness of Carlson's observation. We will return to this in section 3.4.

looking for a certain man). Empirical evidence from West Greenlandic, a language in which not every verb that admits opaque readings also admits transparent readings, will also support our proposed means of blocking unwanted readings.

One of the keys to our analysis will involve supplementing Zimmermann's analysis of verbs of absence with a semantic decomposition of these verbs which contains an attitude component. As a result, we will have to answer the objections both to a decompositional analysis of intensional verbs and to the property analysis. First, we counter Zimmermann's (1993) objection that since verbs of resemblance cannot be further lexically decomposed, an implicitly propositional analysis of verbs of absence cannot be on the right track. Second, like Larson et al. (1997), we reject Moltmann's (1997) objection that a decompositional analysis of opaque verbs in terms of attitude verbs cannot deal with the truth-conditional differences between overt and covert attitude reports. We will show that these differences are perfectly compatible with an account that makes use of covert attitudes in the analysis of verbs of absence; however, unlike Larson, et al., we argue that there are reasons not to posit that these attitudes are generally syntactically manifest. Third, we refute Moltmann's argument that from the behavior of *resemble* it follows that *look for* cannot denote a relation between an individual and a property. Fourth, we respond to her criticism that some crucial NPs that combine with verbs of absence cannot be analyzed as properties. Finally, we answer the objection that there exist counterexamples to Zimmermann's prediction that quantificational complements of *look for* and *want* are never opaque. Our analysis of these cases shows that, indeed as Zimmermann predicts, quantificational complements never are opaque — on our definition of opacity they cannot be — but that some putative quantifiers can receive an opaque interpretation and, in addition, can be understood *de dicto* or *de re*. These facts thus constitute evidence in favor of distinguishing transparency versus opacity from de dicto versus de re (see also Kratzer, 1998).

The paper is organized as follows. In the next section, we sketch Zimmermann's analysis and some of his motives for interpreting opaque complements as properties. We also turn to some shortcomings of the approach. In section 3, we present semantic incorporation (Van Geenhoven, 1998) as a general means by which verbs can or even must take property arguments. We show how semantic incorporation can be combined with a decompositional analysis of verbs of absence and, in particular, what this combination buys us. In section 4, we respond to Moltmann's critique of the property analysis of opacity. Section 5 concludes the paper.

2. A property analysis of opacity: its merits and drawbacks

In this section, we first present the major aspects of Zimmermann’s property analysis of opacity. Then we discuss its problems caused by failing to distinguish between nonspecificity in opaque vs. in transparent environments, on the one hand, and to account for obligatory opacity, on the other.

2.1. Zimmermann (1993)

Zimmermann presents his analysis both as an alternative to Quine’s decompositional analysis of verbs of absence, in which the complement to such verbs is interpreted as a proposition (see also Larson et al., 1997), and as an alternative to Montague’s (1974) treatment of this complement as an intensional quantifier which maintains decomposition only via a meaning postulate (see for an intensional quantifier analysis also Moltmann, 1997).

On Quine’s analysis, verbs of absence like *seek* are decomposed into a propositional attitude, e.g., *try*, and a relation between individuals, e.g., *find*, and are then interpreted as relations towards propositions. On their opaque reading, indefinite complements of *seek* take narrow scope with respect to *try*. On their transparent reading, they take wide scope. Zimmermann rejects the decompositional analysis on the following grounds. He observes — incorrectly, as we will show in section 3, below—that verbs of resemblance are “verbs whose logico-semantic behavior is pretty close to that of *seek*” (1993: 158). For example, (7) may say something about John resembling a particular unicorn or it may say something about the resemblance between the way John is dressed up for carneval and the shape of a unicorn:

(7) John resembles a unicorn.

Zimmermann argues that *resemble* can be called ‘referentially opaque’ because, like verbs of absence, it fails for substitutivity. That is, (8) does not entail (9) even though the members of New Orleans’ high society and the participants in the Mardi Gras parades are identical in the actual world:

(8) John resembles a member of New Orleans’ high society.
(9) John resembles a participant in a Mardi Gras parade.

In addition, *resemble*, like verbs of absence, lacks an existential entailment for its direct object, since for the truth of (7) no unicorn need exist in order for John to resemble one. Zimmermann then shows that despite the fact that *resemble* is referentially opaque, no suitable lexical decomposition can be found which analyzes it as an attitude relation towards a proposition of the *try to find* sort. From this he concludes that a decompositional analysis should not account for referential opacity in the case of *seek* either. Since the two verbs have similar intensional characteristics, any analysis which does not account for both of them will miss a generalization, he argues.

On Montague's analysis, verbs of absence denote relations between individuals and intensional quantifiers, that is, properties of properties of individuals. Zimmermann points out that this analysis overgeneralizes since we find cases such as (10) in which an opaque reading is predicted that does not, in fact, exist:

(10) Alain is seeking each comic book.

(10) entails the existence of a set of comic books, but since nothing prevents *each comic book* from being interpreted opaquely, Zimmermann concludes that this analysis of verbs of absence must be revised.

As an alternative, Zimmermann proposes that verbs of absence denote relations towards a property *P* (type <s,<e,t>>). The verb *seek*, for example, is translated as follows:

(11) seek $\Rightarrow \lambda P\ \lambda w\ \lambda x\ (\boldsymbol{seek}_w(x,P))$

The absence in (11) of an individual-type argument corresponding to the sought object is what is supposed to guarantee the lack of existential entailment and failure of substitutivity. Zimmermann's proposal seems to have at least two advantages. One is that opaque verbs do not have to be decomposed into an attitude verb and a relation between two individuals. Consequently, both verbs of absence and verbs of resemblance can be analyzed in the same way, namely, as relations towards a property. The other advantage is that the property analysis predicts that quantificational complements cannot be opaque: The type of a quantifier clashes with the required property type of the complement of *seek*, forcing an alternative mode of composition that entails scoping out the quantifier.[3] Nevertheless, Zimmermann's analysis leaves some facts unexplained, as we will discuss in the remainder of this section.

[3] This clash crucially depends on natural language not making use of any type-shifting mechanisms to generate property-type readings for certain quantificational NPs. See Partee (1987) for relevant data and McNally (1998) for explicit support for such as view.

2.2. Nonspecific complements of referentially transparent verbs

First, simply assigning a verb a property-type argument is not enough to ensure that there will be no existential entailment associated with that argument or that substitutivity will fail. As noted above, some nonspecific complements of extensional verbs, do carry existential entailments. A crucial example is the English bare plural, which, since Carlson (1977b), is well known to be nonspecific:

(12) Bill caught rabbits behind the house.

Even though the truth of this sentence does not require determining exactly which rabbits he caught, he definitely caught something which exists. In other words, the NP *rabbits* receives a nonspecific interpretation in a transparent context. Even though Zimmermann does not explicitly say this in his paper, we of course interpret his analysis in such a way that among the relations between individuals and properties there are some that correspond to ordinary transparent relations. Furthermore, the relations to properties expressed by opaque verbs are implicitly intended to not be among them. It is this implicit intention of Zimmermann's that we want to give an explicit treatment of in the present paper. In our previous work (e.g. McNally, 1992, 1995; Van Geenhoven 1995, 1998, 2000, 2002), we have argued that, alongside entity- and quantifier-type complements, verbs can also quite systematically combine with property-type complements, and that when they do so, a nonspecific reading always results (see also e.g. Ladusaw, 1994; Dobrovie-Sorin, 1997). As mentioned in the introduction, we will propose in section 3 that what distinguishes *look for* and *want* from strictly extensional verbs like *catch* is the fact that the former are lexically decomposed in terms of an attitude report, e.g., *look for* as *try to find* or *want* as *want to have*, while the latter verbs are not. It is this extra modal embedding of the individuals that are described by the complements of *look for* and *want*, crucially in combination with the property-type semantics of these complements, which will be responsible for their opaqueness, i.e., for their lack of an existential entailment.

The exact nature of the combinatorics which permit verbs to take property-type complements will be discussed in section 3 below, but at this point we can conclude that the opacity of a verbal complement cannot simply be a matter of the verb bearing a relation towards a property, given that referentially transparent verbs can be interpreted as such relations as well.

2.3. Inherent opacity of NPs

Second, Zimmermann's analysis fails to account for the fact that certain types of NPs yield only nonspecific readings. For example, Carlson (1977b) pointed out that in existential contexts the English bare plural always receives such an interpretation, regardless of whether this bare plural is the complement of an extensional or an intensional verb. This is illustrated in (13) and (14), respectively:

(13) Bill noticed actors in every scene of the film. (Carlson, 1977b: 21)
   i. 'In every scene of the film, there were actors such that Bill noticed them.'
   ii. # 'There were actors such that in every scene of the film Bill noticed them.'

(14) Max is looking for books on Danish cooking. (Carlson, 1977b: 17)
   i. 'Max tries to find books on Danish cooking.'
   ii. # 'There are books on Danish cooking such that Max tries to find them.'

Zimmermann's analysis incorrectly predicts that (14) can have the transparent reading in (14ii) because the technique he uses to derive transparent readings for the complements of verbs like *look for* appears to be completely productive. Although he is not entirely explicit about the details, the referential interpretation of an indefinite complement (for instance) is basically derived from its property interpretation by simply extensionalizing the latter. Technically, the opaque verb absorbs the property denoted by its direct object, but, in addition, through some sort of freely available operation it ends up with its second argument position occupied by a different property, that of being the individual identical to the intended referent of that direct object (indicated in what follows by the variable *y*), that is, $\lambda w \lambda z[z = y]$. The representation for the transparent reading of *seek a unicorn* is thus (15) (adapted with trivial changes from Zimmermann's (40dr), where *i* stands for the world of evaluation):

(15) seek a unicorn $\Rightarrow \lambda i\ \lambda y\ \lambda x\ [\mathbf{\textit{unicorn}}_i(y)\ \&\ \mathbf{\textit{seek}}_i\ (x, \lambda j\ \lambda z[z =_j y]))]$

It is not clear how to prevent a translation like (15) from being an option in cases like (14), where the transparent reading is not available, because the verb takes a property-type complement just as it does on the opaque reading, and, moreover, no explicit connection is made between the specific semantics of possible direct object NPs and the extensionalization operation. Note, by the way, that a similar criticism can be made of Montague's quantificational analysis of verbs of absence.

2.4. Inherent opacity of verbs

Third, another fact that Zimmermann's analysis leaves unexplained is that certain verbs yield only opaque readings, no matter what kind of complement they happen to have. The prediction that transparent readings are derived from opaque ones is directly related to Zimmermann's assumption that verbs of absence are not ambiguous and that the opaque and the transparent readings are "so closely related…that neither native speakers' intuitions nor lexicographers' work can find an ambiguity" (1993: 151). Note, however, that in West Greenlandic, as pointed out in Van Geenhoven (1998), the incorporated complements of intensional verbal affixes are always opaquely interpreted, irrespective of whether or not the incorporated noun is accompanied by an external modifier which would intuitively favor a transparent reading. This is shown in (16) and (17), respectively:[4]

(16) Vittu cykili-ssar-siur-p-u-q.
V.ABS bike-FUT-look.for-IND-[-tr]-3SG
i. 'Vittus is looking for just any bike.'
ii. # 'There is/are bike(s) such that Vittus is looking for it/them.'

(17) Vittu marlun-nik cykili-ssar-siur-p-u-q.
V.ABS two-INS.PL bike-FUT-look.for-IND-[-tr]-3SG
i. 'Vittus is looking for any two bikes.'
ii. # 'There are two bikes such that Vittus is looking for them.'

Like the English bare plural in (14), the incorporated noun *cykili-* 'bike(s)' in (16) and (17) receives only an opaque interpretation, even when modified by *marlunnik* 'two' as in the latter example.[5] To describe a situation in which someone is looking for a specific object, another, nonincorporating verb must be used, namely *ujar-*, instead of *-siur-*. This is illustrated in (18):

(18) Juuna-p atuagaq ujar-p-a-a. (Bittner, p.c.)
J.-ERG book.ABS.SG look.for-IND-[+tr]-3SG.3SG

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[4] The abbreviations used in the text are: ABL, for ablative case; ABS, for absolutive case; AP, for antipassive; ERG, for ergative case; FUT, for future; IND, for indicative; INS, for instrumental case; LOC, for locative case; NEG, for negation; PL, for plural; SG, for singular; [±tr], for (in)transitive.

[5] Van Geenhoven (1998) also gives examples showing that not even a relative clause-like modifier can trigger a transparent reading of a noun that is incorporated by an opaque verb. Note in this respect that, unlike Carlson (1977b) and Chierchia (1998), we are not convinced that a relative clause can trigger a wide scope reading for an otherwise nonspecific nominal. See also Van Geenhoven (2000) and footnote 7 on this issue.

i. ‘Juuna is looking for the book.’ (preferred reading)
ii. ‘Juuna is looking for a specific book.’ (OK with context)

What is interesting about (18) is that *ujar-* expresses extensional *look for* because it is transitively inflected. Intransitivizing *ujar-*, for example as a result of antipassivization as shown in (19), gives rise to the opaque reading:

(19) Juuna atuakka-mik ujar-lir-p-u-q. (Bittner, p.c.)
J.ABS book-INST.SG look.for-AP-IND-[-tr]-3SG
‘Juuna is looking for any book.’ (preferred reading)

These West Greenlandic facts show that inherent opacity is not due exclusively to the semantics of the nominal complements (e.g., the English bare plural) or to the semantics of a particular construction such as noun incorporation. Rather, the verb itself can also be responsible for obligatory opaque readings. Moreover, (19) suggests that, if anything, the opaque reading is derived from the transparent one, and not viceversa, given that it is associated with a morphologically complex construction (see the morpheme -*lir*-). We therefore regard it as empirically inadequate to derive extensional, transparent readings from intensional, opaque ones via an operation which does not take into account the peculiarities of individual verbs and nominal expressions.

2.5. Summary

To sum up, we have observed that the mere idea that a referentially opaque verb denotes a relation to a property cannot account for the semantic characteristics of referentially opaque verbs and their nonspecific complements. In the next section, we will propose that if we enrich the property analysis with decomposition of the lexical semantics of the verbs under study, we can distinguish nonspecificity in opaque context from nonspecificity in transparent contexts. In other words, a property analysis cannot do the job alone: only in combination with the right lexical semantics will it yield a complete understanding of opacity. Additional problems for Zimmermann’s analysis which were pointed out in Moltmann (1997) will be addressed in section 4.

3. Opaque verbs and semantic incorporation

In this section, we treat Zimmermann’s interpretation of opaque complements as property-denoting expressions as a special case of the general ability of verbs to combine with such expressions. One mechanism for effecting this combination is ‘semantic incorporation’ (Van Geenhoven, 1998), which we introduce below. We also show that we need further access to the meaning components of opaque verbs in order to distinguish intensional from extensional property-taking, arguing, against Zimmermann, that verbs of resemblance do not present a problem for treating opaque verbs in some sense decompositionally. We then argue, in reply to Moltmann, that the semantic differences between overt and covert attitude reports are also not an obstacle for such a treatment. This latter discussion will revolve around the semantic effects that arise when temporal adverbials and *no N* complements combine with verbs of absence and will clarify the extent to which the lexical meaning components of opaque verbs must also be syntactically visible.

3.1. Nonspecific complements as properties

In the literature on NP interpretation, it is widely accepted that NPs can have families of denotations (e.g. Williams, 1983; Partee, 1987). For example in (20), (21) and (22), the italicized NPs can be analyzed as denoting a quantifier (*each girl*), an entity (*John*), and a property (*a student*), respectively:

(20) *Each girl* was wearing a pink hat.
(21) *John* entered the bar.
(22) Emil is *a student.*

However, it is much less widely accepted that — in addition to their appearance in predicative positions (see (22)) — property-denoting nominal expressions can occur in ordinary argument positions. It is this idea, first generalized in Ladusaw (1994), that we will exploit, since it serves as the basis both for Zimmermann’s and for our own analysis of opacity. To do so, it will be useful to briefly review some of our earlier work on property-type complements and show how it deals with nonspecificity and (inherent) narrow scope.

In developing a semantics for the existential predicate, McNally (1992, 1998) proposes that the complement of the existential predicate (for example, the indefinite *a student* in (23)) denotes a property:

(23) There is *a student* in the library.

McNally’s proposal straightforwardly accounts for the inherent narrow scope of the existential predicate’s argument — or its inherent nonspecificity —, illustrated in (24):

(24) There aren't many students in the library.
   i. 'It is not the case that many students are in the library.'
   ii. # 'There are many students such that it is not the case that they are in the library.'

Here, the subject *many students* receives only a narrow scope interpretation with respect to the negation. This fact follows if we assume that *many students*, as a property-type expression, must get any associated existential force from an external source, in this case, the existential predicate. Every operator which has this external source in its scope, as does the negation in (24), will automatically have scope over the property argument. This explanation is fundamentally similar to Carlson's (1977b) explanation of the narrow existential interpretation of the English bare plural, illustrated in (25):

(25) Billy didn't eat bananas.
   i. 'It is not the case that Billy ate bananas.'
   ii. # 'There were bananas such Bill did not eat them.'

Carlson's analysis differs in that he took the bare plural *bananas* to denote a kind, rather than a property, and the instances of this kind are introduced by the stage-level predicate *eat*. Given that *eat* is in the scope of a negation operator, the existentially interpreted *bananas* is in the scope of this operator as well. The main difference for our purposes between treating *bananas* as a property versus a kind in (25)[6] is that the former analysis gives us a basis for a generalized semantics of inherent narrow scope, since it can account for the inherent narrowness not only of the English existential bare plural but also of expressions which are arguably never kind-denoting. A case in point is *many students*, the argument of the existential predicate in example (24) above. Other cases will be illustrated below.

In the spirit of McNally's proposal, Van Geenhoven (1995, 1998) proposed that incorporated nouns in West Greenlandic and their modifiers also denote properties. Two examples are given in (26) and (27). Interestingly, example (26) shows that the existential predicate in West Greenlandic is the obligatorily noun-incorporating verb -*qar*-:

(26) Festi-mi qallunaar-passua-qar-p-u-q. (Van Geenhoven, 1998: 27)
   party-LOC white.man-many-have-IND-[-tr]-3SG
   'There were many Danes at the party.'

[6] In fact, we do not exclude the possibility of *bananas* denoting a kind in (25), since it must independently be assumed that bare plurals can denote kinds in English. However, what we are interested in is the independent availability of the property denotation.

(27) Marlun-nik ammassat-tur-p-u-nga. (Sadock, 1991: 94)
two-INS.PL sardine-eat-IND-[-tr]-1SG
'I ate two sardines.'

One of the crucial arguments for this analysis of incorporated nouns in West Greenlandic is based on Bittner's (1994) observation that these nouns have inherent narrow scope, as illustrated in (28) and (29):

(28) Juuna Kaali-mit marlun-nik allagar-si-nngi-l-a-q. (Bittner, 1994: 118)
J.ABS K.-ABL two-INS.PL letter-get-NEG-IND-[-tr]-3SG
i. 'It is not the case that Juuna got two letters from Kaali.'
ii. # 'There are a two letters from Kaali that Juuna didn't get.'

(29) Arnajaraq aalisaga-si-nngi-l-a-q. (Van Geenhoven, 1998: 31)
A.ABS fish-buy-NEG-IND-[-tr]-3SG
i. 'It is not the case that Arnajaraq bought (one or more) fish.'
ii. # 'There is/are (a) fish that Arnajaraq didn't buy.'

To explain this fact, Van Geenhoven also adopts the Carlsonian explanation that the verbal affixes in these incorporating constructions are responsible for the narrow scope effect. That is, the affix -*si*- 'get, buy' is responsible for the existential interpretation of *marlunnik allagar*- 'two letters' in (28) and of *aalisaga*- 'fish' in (29). Given that this affix is in the scope of negation in both sentences, the incorporated nominal material is in the scope of negation as well.

Similarly, the obligatory narrow scope of Spanish bare plurals, observed inter alia by Laca (1994) and illustrated in (30), was one of the reasons for which McNally (1995) proposed interpreting them as properties: [7]

(30) A la reunión no asistieron profesores.
at the meeting not attended professors
i. 'The meeting was not attended by professors.'
ii. # 'Some professors did not attend the meeting.'

[7] McNally (1995) rejects a kind-based analysis of bare nominals in Spanish (compare Chierchia's 1998 proposal for bare nominals in Italian), since bare nominals in Spanish never occur with kind-taking predicates:
(i) ?? Mamá, ¿quién inventó ordenadores?
Mama who invented computers
We should also note that, in contrast to what Chierchia (1998) claims for Italian, the second author has found no evidence for the existence in Spanish of true wide scope readings for any kind of bare nominal. Note in this respect that Spanish bare plurals are quite clearly inherently opaque, as observed e.g. in Laca (1994).

Another case is provided by example (12), mentioned in section 2 and repeated here as (31), which illustrates that certain NPs in extensional contexts can receive obligatory nonspecific interpretations:

(31) Bill caught rabbits behind the house.

Following Van Geenhoven (1998), we translate the extensional verb *catch* in (31) as the following ‘semantically incorporating’ verb:[8]

(32) catch $\Rightarrow \lambda P\ \lambda w\ \lambda x\ \exists y\ (\boldsymbol{catch}_w(x,y) \wedge P_w(y)\ )$
where P is a variable of type <s,<e,t>> , w of type s, and x of type e

(32) captures the fact that the existential force associated with the object argument y is contributed by the verb: The expression corresponding to the property argument P contributes no variable of its own.

On the present proposal, then, an extensional transitive verb will generally have two lexical representations. One corresponds to its semantically incorporating interpretation, as in (32); the other, to its standard interpretation as a relation between two individuals, as in (33):

(33) catch $\Rightarrow \lambda w\ \lambda y\ \lambda x\ (\boldsymbol{catch}_w(x,y))$

This double lexical representation does not amount to any deep lexical semantic ambiguity. For example, one could imagine the lexicon of English to have a lexical rule which systematically derives the opaque entry from the transparent one; the same could be posited for West Greenlandic, with the difference that such a lexical rule might be idiosyncratically excluded from applying to certain verbs, while other verbs might be assigned exclusively an opaque entry.[9] Also note that our proposal should not be understood as entailing that if Bill caught rabbits, for example, he caught a property; that is, the contribution of our property-type argument to the semantics of the sentence is different in nature from the contribution of the property-type arguments discussed in, e.g., Chierchia (1984). Note also that semantic incorporation is not restricted to bare constituents; it will combine any syntactically or morphologically appropriate property

[8] We present a static version of semantic incorporation in this paper. See Van Geenhoven (2002) for a dynamic version of semantic incorporation.

[9] Another option, proposed in Chung and Ladusaw (2003), is to assign verbs only one lexical entry and make use a semantic composition rule other than function application which would appropriately combine the property-type complement with the verb. The arguments made here are equally compatible with this option.

complement, which may or may not be bare, with an appropriate verb. Semantic incorporation opens a way towards a generalized account of narrow scope, nonspecificity, and, as we will see below, a generalized account of opacity.[10]

3.2. Opaque complements as properties of modally embedded individuals

Once we treat nonspecific (or narrow scope) complements of extensional verbs as properties, the proposal that a verb combines with a property can no longer *by itself* be used to account for the two distinguishing features of opaque complements: their lack of existential entailment and their failure to permit substitution. We must also consider in some detail the lexical semantics of the various classes of property-taking verbs. In the spirit of Quine (1960), we will treat verbs of absence like *look for* as 'decomposable' at the level of lexical entailment in terms of an attitude towards a proposition, as illustrated under (34):

(34) look for $\Rightarrow \lambda P\, \lambda w\, \lambda x\, (\boldsymbol{look\ for}_w(x,P))$
where $\boldsymbol{look\ for}_w(x,P) = 1$ iff in the world of evalutation w an individual x is trying in w to bring it about that there is an individual y in a world w' which x finds in w' and which is P in w'

(34) makes explicit the hypothesis that verbs like *look for* are intensional in two respects: first, in the sense that they denote a relation towards an intensional object, that is, a property; and second, in the sense that they express an attitude towards a proposition. Crucially, unlike the property argument of an extensional verb (see (32)), the individual that is described by the property argument of an opaque verb is modally embedded. This explains why on its opaque reading the complement of *look for* fails to allow an existential inference. Unlike (36), (35) may be true even if no unicorn exists:

(35) John is looking for a unicorn.
(36) John caught a unicorn.

In a modally embedded world w' — which we will identify as the subject's belief world —, it is very well possible that unicorns exist. Therefore, (35) can be true even if no unicorns exist in the world of evaluation.[11]

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[10] See Van Geenhoven (2000) for a more extended discussion of property vs. kind arguments which also answers some general objections to semantic incorporation (see Chierchia, 1998).
[11] See Farkas (1997) for a similar account of modal embedding which, however, does not make use of property arguments.

The proposal that verbs of absence take properties as their arguments might seem to predict that such verbs should permit adjectival complements, since in general adjectives are property-denoting expressions. Examples like (37), however, are clearly ungrammatical:

(37) * John is looking for pretty.

One way to explain this would be to say that verbs of absence require an NP complement; the ungrammaticality of (37) would then be a case of syntactic illformedness. But one could also regard it as a case of semantic illformedness if the property denoted by a nominal differs in some essential way from that denoted by an adjectival expression. On this view the descriptive content delivered by an adjectival property-denoting expression could never be used to describe an individual of the sort required by the verb even though the material delivered by a nominal property-dentoing expression could. While we cannot explore this issue in any detail here, the semantic explanation of (37) is supported by the fact that incorporated material in West Greenlandic sentences such as (38) does not translate as an adjective but as a nominalization. That is, the property *kusanartu-* 'pretty' must describe an individual or object, and not the property 'pretty' itself:

(38) Arne kusanartu-ssar-siur-p-u-q.
A.ABS pretty-FUT-look.for-IND-[-tr]-3SG
i. 'Arne is looking for a pretty one/something pretty.'
ii. # 'Arne is looking for pretty.'

It would appear, then, that the difference between adjectives in English and West Greenlandic is that the former cannot be used to refer to objects or individuals, as the verb *look for* appears to require.

Finally, although we 'decompose' the lexical semantics of verbs of absence in terms of an attitude verb we do not regard the embedded proposition as a real argument of these verbs. In (34), the argument of *look for* is clearly a property. Zimmermann points out that his property analysis "is perfectly compatible with Quine's decomposition of *seek*" (1993: 168) and yet that he is "not forced to adopt [a decomposed translation, *VG & McN*] but may instead regard *seek* as an irreducible attitude a person bears to a property" (1993: 168). However, making the underlying attitude explicit has three advantages. First, it makes it easier to compare nonspecificity in opaque contexts with nonspecificity in transparent contexts. Second, it helps to clarify the distinction between opaque verbs and verbs of resemblance, as we discuss in section 3.4 below. Finally, it allows for integrating a property analysis of opacity into an analysis of the de dicto/de re distinction as proposed in Cresswell and von Stechow (1984). The need for this integration is what we now turn to.

3.3. Inherent opacity of NPs and verbs

In section 2 we pointed out that Zimmermann derives the transparent reading of the indefinite in (35) from its opaque reading. Hence, his account predicts that whenever a complement has an opaque interpretation it receives a transparent reading as well. This prediction is falsified by two kinds of data. First, some NPs never receive transparent readings when they combine with an opaque verb, even though transparent readings are not in principle excluded by those verbs when they combine with other types of NPs. A case in point is the English bare plural, illustrated in (14), above, and repeated here as (39):

(39) Max is looking for books on Danish cooking. (Carlson, 1977b: 17)
  i. 'Max is trying to find books on Danish cooking.'
  ii. # 'There are books on Danish cooking such that Max is trying to find them.'

Second, some verbs simply never give rise to a transparent reading, as we illustrated with the West Greenlandic noun incorporating affix *-siur-* 'look for' in (17), repeated here as (40):

(40) Vittu marlun-nik cykili-ssar-siur-p-u-q.
  V.ABS two-INS.PL bike-FUT-look.for-IND-[-tr]-3SG
  i. 'Vittus is looking for any two bikes.'
  ii. # 'There are two bikes such that Vittus is looking for them.'

We conclude that it is empirically problematic to derive extensional, transparent readings from intensional, opaque ones via an operation that does not take into account the peculiarities of individual verbs and NPs; some means of prohibiting the derivation of transparent readings is needed in those cases where we do not find them. Thus, we propose that the transparent version of *look for* is not derived from its opaque counterpart in (34) but rather arises via the following, independently available lexical entry:

(41) look for $\Rightarrow \lambda w\ \lambda y\ \lambda x\ (\boldsymbol{look\ for}_w(x,y))$
  where $\boldsymbol{look\ for}_w(x,y) = 1$ iff in the world of evalutation w there is an individual x and an individual y such that x is trying in w to bring it about that, in some world

w', x finds y in w'

Assuming that bare plurals in existential contexts must denote properties,[12] a bare plural can only combine with property-taking *look for* in (34). If incorporating -*siur*- 'look for' has only a denotation like that represented in (34), it follows that (40) has only an opaque reading. We thus adopt the hypothesis that, while many languages might systematically provide two types of lexical entries analogous to (34) and (41) for its verbs of absence, not every verb which expresses the notion of e.g. looking for will automatically receive (34) as its translation, nor will it automatically be translated as (41).[13]

One type of NP that would appear to pose a problem for our analysis are those indefinites that seem to force a transparent reading because they contain an adjective or other element indicating some kind of specificity, such as *certain*:

(42) Jim is looking for a certain man from Alberta.

Given its distribution in existential sentences (e.g., *There is a certain man from Alberta at the door*), we follow McNally (1992) and maintain that *a certain man from Alberta* in (42) denotes a property. Nonetheless, in (42) there seems to be an existence entailment which we do not predict. We suggest that indefinites of the form *a certain N* are like the indefinites of the form *this N*, which can occur in existential sentences but which, in an opaque environment, also come with an existence entailment as well. Both facts are illustrated in (43):

(43) a. There is this man from Alberta at the door.
b. Mary wants to marry this man from Alberta.

Prince (1981) argues that *this N* indefinites carry a speaker presupposition of existence, which explains why (43b) receives only a transparent reading (see also Farkas, 1994, on a very similar notion of speaker specificity); such a presupposition could also be associated with *a certain N*. This presupposition will guarantee that the use of (indefinite) *this N* or *a certain N* will be felicitous only if the speaker presumes the existence of a referent for the NP. Thus, if (42) is felicitous and true, then the existence of the referent described by *a certain man from Alberta* is going to be entailed. Note, however, that this is not because *a*

[12] Again, setting aside the option of a (derived) kind-type denotation, which is irrelevant here.
[13] Note that in languages like West Greenlandic we must explicitly block the logical option of combining (34) with the property $\lambda w \lambda z\ [z =_w y]$ (the property of being identical to the individual denoted by the variable y), so that (41) could be derived from it.

certain man from Alberta cannot denote a property or because it must have wide scope but rather because of the independent fact that this NP carries a speaker presupposition.

3.4. Opaque/transparent vs. de dicto/de re

In addition to distinguishing opaque representations like (34) from transparent ones like (41), it is important to tease apart the opaque/transparent from the de dicto/de re distinction. The former is strictly defined here as the distinction between a property-type complement being ascribed to a modally embedded vs. not modally embedded (set of) individual(s). The latter distinction, in contrast, involves reference to a set of beliefs. The following example illustrates these distinctions. Kratzer (1980) argues that in (44) the bare plural *Tollkirschen* 'belladonna berries' must have wide scope with respect to *wollte* 'wanted' because (44) implies that Otto did not want to poison the fruit salad:

(44) Otto wollte Tollkirschen in den Obstsalat tun, weil er sie mit richtigen Kirschen verwechselte.
'Otto wanted to put belladonna berries in the fruit salad, because he mistook them for real cherries.'

This would appear to be a counterexample to the claim maintained, for example, in Van Geenhoven (1998) that bare plurals in German, like those in English, necessarily denote properties. But this conclusion is unwarranted. What matters here is that the information that what Otto wanted to put in the salad was *Tollkirschen* must be understood as not belonging to his set of beliefs—that is, the description *Tollkirschen* must be interpreted de re. However, as Van Geenhoven (1998) argues, this is not incompatible with *Tollkirschen* denoting a property of a modally embedded set of individuals—that is, opaquely. Adopting Cresswell and von Stechow's (1984) treatment of de re interpretation, in which embedded reports are represented as a structured proposition, that is, as a pair consisting of a proposition and the exported de re material, we can represent the relevant interpretation of (44) as follows (where *w* is the world of evaluation):

(45) $\boldsymbol{want}_w(\boldsymbol{otto}, < \lambda P\ \exists y[\boldsymbol{put\text{-}in\text{-}fruitsalad}(\boldsymbol{otto},\mathrm{y}) \wedge P(y)], \boldsymbol{belladonna\ berries} >)$

The distinction between de re (and de dicto), on the one hand, and between opacity (and transparency) on the other, will become particularly relevant when we discuss intensional readings of quantificational complements of verbs of absence in section 4.[14]

[14] See also Kratzer (1998) for discussion of the distinction between de dicto/de re and opaque/transparent.

3.5. Verbs of resemblance

We mentioned in section 2.1 that Zimmermann considers the similarity of verbs of resemblance and verbs of absence as problematic for a decompositional analysis of the latter, and as an argument in favor of treating the complements of opaque verbs as properties. Although we agree that opaque verbs should not be given decomposed *translations*, in apparently rejecting the intuition behind decomposition altogether Zimmermann loses the insight that verbs of resemblance are not referentially opaque in exactly the same sense that verbs of absence are: A full understanding of failure of existential quantification and substitutivity requires a close look at the lexical entailments of each verbal predicate, and decomposition is one way to do this.

The difference between the referential opacity of verbs of resemblance and that of verbs of absence can be seen in their diverging behaviour with respect to a different kind of substitutivity test from that discussed in section 2.1. If we replace the descriptive content of the complements of *resemble* in (46) and of *look for* (48) with an equivalent description, for instance with *mythological animal with one horn* as in (47) and (49), we get different truth-conditional effects. If (46) is true, then (47) must be true as well. However, this does not hold for (48) and (49), because John may not know that unicorns are mythological animals which have one horn:

(46) John resembles a *unicorn.*
(47) John resembles a *mythological animal with one horn*.
(48) John is looking for a *unicorn.*
(49) John is looking for a *mythological animal with one horn*.

This contrast shows that, while John's beliefs are crucial for understanding the semantics of *look for* and other verbs of absence, the beliefs of the subject of *resemble* in (46) and in (47) are entirely irrelevant.

If verbs of resemblance and verbs of absence do not behave uniformly with respect to this second substitutivity test, how do we explain their uniform behaviour with respect to the failure for substitutivity and existential entailment discussed in section 2.1? To answer this question we propose the following interpretation for *resemble*:

(50) resemble $\Rightarrow \lambda P\ \lambda w\ \lambda x\ (\boldsymbol{resemble}_w\ (x, P))$
where $\boldsymbol{resemble}_w(x, P) = 1$ iff in the world of evaluation w there is an individual x and there is a property Q such that x is Q in w and Q is among the prototypical properties of the individuals that are P

(50) captures the fact that if some x resembles some property-denoting expression P, this is always with respect to a particular property Q this x has, e.g., his shape, his color, his behaviour, etc. This relativizing property is among the prototypical properties of the individuals which are P. For example, if John resembles a unicorn, then this could be because the shape of his carneval mask is the shape that a unicorn's head usually has. It follows that *John resembles a unicorn* does not imply that *John resembles a gnome*, even if the extension of *a unicorn* and *a gnome* happens to be identical (viz. the empty set) in the relevant world, since the prototypical properties of a unicorn are not the same as those of a gnome. This explains the failure of substitutivity that was pointed out by Zimmermann and that makes verbs of resemblance superficially resemble verbs of absence. Moreover, the possible failure of existential entailment for the complement of *resemble* also follows from this semantics, since the lexical entailments of *resemble* make clear that at a fundamental level it describes a relation between an individual and a property, and not between an individual and another individual, like, for instance, *look for* does. In this respect, the complement of *resemble* is like any other predicative complement. For example, for (51) or (52) to be true, it is not required that any doctor exist at the time of utterance:

(51) John is becoming/will be a doctor.
(52) John considers himself a doctor.

In sum, the referential opacity that seems to arise with verbs of resemblance is an effect triggered by the fact that these verbs denote relations involving individuals and properties similar to those denoted by the predicative verbs *become* or *be*.[15] This opacity is distinct from that associated with verbs of absence, where the opacity is due to the modal embedding of the individual ultimately described by the verb's property-type complement. Appealing to the decomposability of the verbs of absence, rather than being problematic, thus helps us to better understand their distinctive characteristics.

[15] Note that the complement of *resemble* can also have what appears to be a transparent reading, as in (i):
(i) John resembles Bill/his mother.
This reading resembles the so-called 'identificational reading' of *be*. Although it would be natural on our analysis to account for this reading by positing that *resemble* can also take an entity-type complement, we will not pursue this possibility here for two reasons. First, the exact analysis of this reading is not crucial to our main argument, and second, an adequate account of it would probably require a thorough treatment of the complex issue of the identificational reading of copular sentences, an issue that goes beyond the scope of this paper.

3.6. Overt versus covert attitude verbs

As stated above, we appeal to 'decomposition' only at the level of lexical entailment. However, the fact that verbs of absence do not behave uniformly in combination with temporal adverbials has been used by Larson, den Dikken, and Ludlow (1997) to argue that, in general, this decomposition should also be syntactically manifest. In this section we argue that these supposed syntactic decomposition effects and certain related effects involving negation arise only in very specific cases in which verbs of absence can be independently shown to have an overt infinitival complement; thus, these facts provide no reason to reject the position that the verbs in question take property-type complements (as opposed to e.g. clausal complements). This same argumentation will serve to rebut at least one of Moltmann's (1997) objections to decomposition.

In (53), the adverbial *before the meeting* can specify either the time of Walter's desire to have a camera, or the time at which Walter may have a camera:

(53) Walter wanted a camera before the meeting.

Similarly, *before the meeting* in (54) can specify the time of Walter's needs or the time at which Walter may have a camera:

(54) Walter needed a camera before the meeting.

According to Larson et al., the ambiguity of (53) and (54) is evidence for the syntactic visibility of the meaning components of opaque verbs, that is, *want* decomposes as *want to have* and *need* as *need to have* with two adjunction sites for the temporal adverbial in the syntax, one in the matrix and one in an embedded clause. This view can be roughly captured for (53) as follows:

(55') [Walter wanted $[_{CP}$ PRO HAVE a camera] before the meeting]
(55") [Walter wanted $[_{CP}$ PRO HAVE a camera before the meeting]]

However, attributing the original observation to Partee (1974), Forbes (1998) points out that temporal adverbials behave differently with *look for.* Unlike (53) and (54), (56) is not ambiguous and can only mean that *before the meeting* specifies the time of Walter's search, that is, of his attempt to find a camera, and not the time at which Walter may find a camera:

(56) Walter was looking for a camera before the meeting.

Forbes raises the question of why a clausal analysis seems to capture the semantics of *want*/*need* but cannot be generalized to *look for*. Larson et al. claim that the different behavior of *want*/*need* and *look for* with respect to temporal adverbials lies in the pragmatics of *look for*: If someone is looking for a camera before the meeting, it cannot mean that the attempt to find a camera takes place before the meeting but that the finding itself is intended to take place during or after the meeting. However, additional facts involving negation suggest an alternative, syntactic/semantic account.

One of Moltmann's (1997) objections to a decompositional analysis of verbs of absence is that such an approach cannot deal with the truth-conditional differences between overt attitude reports, as in (57), and covert attitude reports, as in (58):

(57) John needs to have no assistant.

(58) John needs no assistant.

She observes that (57) tells us that John's needs are satisfied only if he will not have any assistant at all. In contrast, John's needs as expressed in (58) are satisfied in a minimal situation in which he has no assistants. This does not force him to be without any assistant whatsoever. To this observation we add that (58) also has the reading that John's needs are satisfied only if he will not have any assistant at all. That is, (58) can also mean what (57) means. The following piece of conversation could provide a context in which this reading arises:

(59) A: How many assistants does John need?
B: He needs two or three.
C: No, John needs no assistant.

The contribution given by C to the conversation between A and B clearly indicates that *no assistant* is in the scope of *need* and that, therefore, John needs are satisfied only if he ends up assistantless. (58) is thus ambiguous, an observation that correlates with the ambiguity of (53) and (54), above. Note that the absence of ambiguity in (56) matches that in (60), which we take to be a covert attitude report:

(60) John was looking for no assistant.

(60) merely entails that it is not the case that John was looking for an assistant. (60) cannot mean that John was trying to find 'no assistant', or trying not to find any assistant. Compare this with the overt attitude report in (61):

(61) John was trying to find no assistant.

(61) is also unambiguous, but with precisely the reading that (60) lacks: it entails that John was trying to remain assistantless, i.e., with *no assistant* having narrow scope with respect to *try*, which is analogous to *no assistant* in (57) having narrow scope with respect to *need.*

Summarizing, we see that *need* and *want* behave similarly with respect to temporal adverbials and with respect to a *no N* complement: They give rise to an ambiguity in both cases. In contrast, *look for* is ambiguous neither if it combines with a temporal adverbial nor if it interacts with a *no N* complement. How do we account for this double contrast?

Unlike Moltmann, we follow Ladusaw (1992) in positing that *no* NPs are semantically equivalent to ordinary indefinites, with the exception that the *no* signals that the NP must appear in the scope of an abstract negation operator *NOT* that has the predicate to which the NP serves as a complement in its immediate scope. For example, in (57), this negation operator has scope over the complete subordinate infinitival clause *to have no assistant*, as in (57'):

(57') John needs [$_{\text{NEGP}}$ NOT [$_{\text{VP}}$ to have no assistant]]

In contrast, in (58) the negation operator *NOT* required by *no* has scope over the verb *needs*, to which *no assistant* serves as a complement. Even if we semantically 'decompose' *needs* as *needs-to-have*, on our analysis this decomposition is not syntactically visible and, therefore, no negation can be inserted between the attitude component *need* and the embedded infinitival *to have*. This is illustrated in (58'):

(58') John [$_{\text{NEGP}}$ NOT [$_{\text{VP}}$ needs-to-have no assistant]]

While in (58) *NOT* has wide scope with respect to *needs*, in (57) *NOT* has narrow scope. This is a consequence of the fact that the two sentences are syntactically different.

However, we noted above that, in addition to its wide scope reading, (58) also has a narrow scope reading equivalent to that of (57). We suggest that the syntactic structure that corresponds to this reading results from ellipsis. That is, on its narrow reading (58) is in fact an overt attitude report structure like (57') from which the embedded infinitival *to have* is deleted. This is illustrated in (58"):

(58") John needs [$_{\text{NEGP}}$ NOT [$_{\text{VP}}$ ~~*to have*~~ no assistant]]

Crucially, this option is ostensibly not available for all of the verbs that we interpret as covert attitude reports — for example, *look for.* This brings us back to the nonambiguity of (60):

(60) John was looking for no assistant.

Recall that (60) can only be interpreted with the negation having wide scope over *look for.* If *look for* does not permit an overt infinitival complement, then even if we lexically 'decompose' *look for* as *try-to-find* there is no way for the operator *NOT* to be inserted into these underlying lexical components because they are not syntactically visible. The negation can only take scope over the complete decomposed verb. This is illustrated in (60'):

(60') John [$_{\text{NEGP}}$ NOT [$_{\text{VP}}$ tries-to-find no assistant]]

Note, moreover, that even if *look for* did accept such a complement, it would be surprising if it permitted ellipsis of the embedded verb. Consider the structure of the overt attitude corresponding to the missing reading of (60), namely, of (61), given here as (61'):

(61') John was trying [$_{\text{NEGP}}$ NOT [$_{\text{VP}}$ to find no assistant]]

Suppose we delete the embedded infinitival *to find*, as illustrated in (62), the remaining construction corresponds to sentence (63), which is grammatical but lacks a reading that we could assign to (60):[16]

(62) John was trying [$_{\text{NEGP}}$ NOT [$_{\text{VP}}$ ~~*to find*~~ no assistant]]
(63) John was trying no assistant.

[16] The fact that *want/need* and *look for* behave differently with temporal modifiers and with *no N* complements is probably related to the fact that only the former can combine with a small clause:
(i) John wants [Bill alive]
(ii) * John is looking for [Bill alive]
Example (i) is paraphraseable as 'John wants it to be the case that Bill be there alive' but one could also treat (i) as an elliptical construction in the way we will suggest for (53) and (54), namely as (i'):
(i') John wants [~~*to have*~~ Bill alive]
Note that, in contrast, there is no motivation for an ellipsis analysis of (ii).

This treatment of *no N* complements extends straightforwardly to the different behavior of *want*/*need* and *look for* with temporal adverbials. The ambiguity of (53) and (54) follows immediately if they each receive two syntactic structures, as in (64) and (65), respectively:

(64) Walter [wanted-to-have [a camera] before the meeting]

(65) Walter [wanted [~~*to have*~~ a camera before the meeting]]

Since the latter of these structures is unavailable to *look for,* (56) lacks the reading on which *before the meeting* modifies a deleted *to find*.

Thus, the distinct truth-conditional behavior illustrated in (57) and (58) is not necessarily a reason to reject the view that verbs of absence can be understood as covert attitude reports. Rather, it is a consequence of the fact that some sentences which can be understood as covert attitude reports can also be analyzed as elliptical overt attitude constructions.

3.7. Summary

Summarizing, we have proposed that verbs of absence are best analyzed as relations towards a property which nonetheless lexically entail (covert) attitude reports. Taking these lexical entailments seriously allows us both to maintain Zimmermann's insight that opaque verbs and verbs of resemblance are fundamentally similar and to explain the differences between these two classes of verbs. We have also argued that the differences in behaviour within the class of verbs of absence are not problematic for a generalized property analysis of opaque complements.

4. Our replies to criticisms of Zimmermann's analysis

In this section we answer some criticisms that have been raised against the property analysis of verbs of absence. First, we respond to Moltmann's (1997) claim that the behavior of verbs of resemblance argues against analyzing verbs of absence as relations between an individual and a property. We then answer her criticism that some crucial NPs yielding opaque readings with verbs of absence cannot denote properties. Finally, we discuss supposed counterexamples to Zimmermann's prediction that quantificational complements of *look for* and *want* are never opaque.

4.1. More on verbs of resemblance

Surprisingly, while Zimmermann uses verbs of resemblance in support of a property analysis of verbs of absence, Moltmann (1997) uses verbs of resemblance to *reject* a property analysis of verbs of absence. Moltmann argues that the class of opaque verbs divides into two subclasses. One class contains those verbs which take a property as their complement. These verbs are analyzed as proposed by Zimmermann. This class includes only verbs of resemblance. The other class contains verbs such as *look for*, which are given an intensional quantifier as their complement (type <s, <<s,e>,t>,t>>), as in Montague (1974):[17]

(66) resemble $\Rightarrow \lambda P\ \lambda w\ \lambda x\ (\boldsymbol{resemble}_w(x,P))$ [18]

(67) look for $\Rightarrow \lambda Q\ \lambda w\ \lambda x\ (\boldsymbol{look\ for}_w(x,Q))$

One of the reasons she rejects the property analysis for *look for* in favor of Montague's analysis is the existence of contrasts such as the following:

(68) Bill and John are looking for two doctors.

(69) ?* Bill and John resemble two doctors.

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[17] Besides the verbs of absence, Moltmann discusses four additional subclasses of verbs that take an intensional quantifier complement. These are epistemic verbs (e.g., *see*), resultative verbs (e.g., *elect, appoint, hire*), verbs of creation (e.g., *paint*), and verbs of ownership (e.g., *own*). A full discussion of these verb classes is beyond the scope of this paper. Note, however, that resultative verbs, which Moltmann analyzes as relations towards intensional quantifiers, are also cases of underlying predicative constructions. As Moltmann herself points out in a footnote, *John hired an assistant* means *John hired x as an assistant,* in which *as an assistant* clearly has a predicative status.

[18] Incidentally, there is a conflict between Moltmann's treatment of verbs of resemblance and her analysis of partitives because she assumes that partitives are always quantificational expressions, commenting that "there is one quantificational construction involving a previously established domain that always allows for an intensional reading, namely partitives" (1997: 29). But if one assumes this, then it is impossible to account for the opaque reading of sentences like (i) because the verb of comparison *to look like* is not supposed to combine with an intensional quantifier:

(i) Bill looks like one of those soccer players who only care about money.
 a. 'Given his behavior, Bill looks like any of the soccer players who only care about money.'
 b. 'There is one of those soccer players who only care about money that Bill looks like.'

However, both an opaque and a transparent reading exist and they can be regarded as the respective answers to the questions under (iia) and (iib), respectively:

(ii) a. WHAT does Bill look like?
 b. WHO does Bill look like?

We see no reason to assume that an NP denotes a quantifier just because it carries a presupposition that its descriptive content refers to an existing and/or familiar set (see e.g. Ladusaw's 1982 analysis of partitives). Instead, we take the sentence in (i) to show that partitives are not obligatorily quantificational but rather can receive a predicative interpretation as well (for independent grounds for this conclusion see McNally, 1998; Van Geenhoven, 1998). On this view, the opaque reading of (i) automatically follows.

If *two doctors* in (68) denotes a property it should in principle be able to combine with *resemble*, and yet she claims it cannot, as shown in (69). However, from the seemingly unacceptable combination of *resemble* with the NP *two doctors* in (69) it does not follow that the same NP in (68) on its opaque reading cannot be interpreted as a property. If *two doctors* were not property-denoting, we would expect (69) to be a clear case of ungrammaticality or anomaly as the result of a type clash. But (69) is not ungrammatical or anomalous, it is just odd. It is this oddness which we must explain.

Note first that *resemble a doctor* is a predicate that can either hold of singular individuals or of plural ones. On the so-called opaque reading of *a doctor,* (70) can mean that John resembles a doctor and that Bill resembles a doctor. On this reading, (70) is synonymous with (71):

(70) John and Bill resemble a doctor.
(71) John and Bill resemble doctors.

(70) can also mean that the group consisting of Bill and John resembles an individual which is a doctor. On this reading, Bill could be sitting on John's shoulders and they could be dressed up together as a giant doctor.

Let us now assume that an NP like *two doctors* is interpreted as the complex property that holds of all plural objects that consist of two individuals which are each a doctor. If we combine *resemble* with a complex property as decribed by *two doctors,* as in (69), the resulting sentence can be interpreted in two ways as well. One way is to give it the highly implausible interpretation that John and Bill each resemble a group of two doctors. On the second interpretation, (69) means that a group consisting of John and Bill resembles a group consisting of two doctors. But in this case the semantic contribution of *two* is totally superfluous because we already know that the cardinality of the group *John and Bill* is two. On this reading, (69) is synonymous with (71). If a plural subject does not express its cardinality, as is the case with the pronoun *they* in (72), adding the numeral *two* to the complement of *resemble* immediately becomes informative:[19]

(72) They resemble two doctors.

In sum, there is no reason to follow Moltmann's conclusion that from the oddness of (69) it follows that *two doctors* cannot be property-denoting and that, hence, verbs of absence cannot denote a relation towards a property. Her criticism does not hold because it fails to take into account the fundamentally different lexical semantics of these two verb classes.

[19] Note that Moltmann's analysis cannot account for the grammaticality of (72).

This closes our discussion of verbs of resemblance: We have shown that they in no way pose a problem for a property analysis of verbs of absence.

4.2. (Non)increasing NPs as properties

One of the major objections raised against the property analysis is the claim that some nominal expressions cannot be analyzed as properties, namely, the so-called nonincreasing NPs such as the direct objects in the following examples:

(73) John needs no assistant/few assistants.
(74) Bill wants at most/exactly/at least two assistants.
(75) We're looking for between five and ten good examples of that construction.

However, reconsideration of these expressions shows that these objections are not convincing. McNally (1998), building on earlier observations by Klein (1981), Jacobs (1982), and Ladusaw (1992), shows that *few N* and *no N* expressions in (74) can be analyzed as (property-denoting) indefinites which must be licensed by clausal negation (see also our discussion of *no* in section 3.6). Krifka (1999) argues that nonincreasing NPs of the form *at most N*, *exactly n N*, and *between m and n N*, as well as the increasing *at least n N*, (see (75)) should not be analyzed as quantifiers at all. Rather, he factors out the *at least*, *at most*, *exactly* and *between … and …* elements in these NPs as focus particles, similar to *only* or *even*, which modify the property-denoting nominal expression *n N*.[20] These alternatives permit the integration of nonincreasing NPs into a property analysis of opacity. For reasons of space we cannot give the details of this integration here, but rather refer the reader to the cited references.

4.3. (Putative) quantifiers and their opaque readings

In the present proposal quantificational complements can combine only with the nonincorporating counterpart of verbs of absence, as for example with the nonincorporating version of *look for* in (41), repeated here as (76):

(76) look for $\Rightarrow \lambda w\ \lambda y\ \lambda x\ (\textbf{\textit{look for}}_w(x,y))$
where $\textbf{\textit{look for}}_w(x,y) = 1$ iff in the world of evalutation *w* there is an individual *x* and an individual *y* such that *x* is trying in *w* to bring it about that, in some world

[20] Specifically, Krifka treats *between … and …* as a two-place particle equivalent to a combination of *at least* and *at most*.

w', *x* finds *y* in *w'*.

Hence, like Zimmermann's, our account correctly predicts that (10), repeated here as (77), has only a transparent reading:

(77) Alain is seeking each comic book.

However, Dowty (p.c. cited in Zimmermann, 1993) and Moltmann (1997) point out that cases exist in which an apparently quantificational complement of *look for* receives an opaque interpretation. (78) is one of the examples discussed:

(78) I am looking for every typo in the manuscript.

(78) can be true if the speaker is not after any specific typos — the manuscript may not contain any typos —, namely, if the speaker tries to bring it about that the typos he finds are all the typos there are. This suggests that we are dealing with an opaque reading. What is it that gives (78) this intensional flavor? And is it compatible with our analysis of *look for*?

To answer these questions we begin by observing, as do Moltmann and Zimmermann, that *every* is the only necessarily quantificational determiner that gives rise to an opaque reading with *look for*.[21] For example, *each* and (ostensibly) *most* do not:[22]

(79) I looked for each typo in the manuscript.
(80) Marta wants most books written by Dr. Seuss.

The fact that only one determiner behaves problematically indicates that the explanation for the opaque interpretation of (78) is due to some special semantic characteristic of this determiner. For instance, Moltmann herself suggests that *every* might (exceptionally) quantify over *possible* objects in addition to *existing* ones and that (78) is synonymous with (81):

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[21] We do not consider *all* in *all N* a necessarily quantificational determiner; it thus falls outside of the scope of consideration here. See Brisson (1997) and Lasersohn (1999) for recent nonquantificational treatments of *all* which are compatible with our assumptions.

[22] It is crucial to distinguish *most Ns* from *most of the Ns*: Only the former is ostensibly necessarily quantificational; only the latter can systematically be used in episodic contexts. For example, the second author considers sentences such as (i) anomalous:

(i) ?? I am looking for most typos in the manuscript.

The overwhelmingly strong preference for *most N* to appear in generic contexts makes it extremely difficult to evaluate whether *most N* NPs genuinely give rise to opaque readings (contrary to what we would predict) or not.

(81) I am looking for every typo in the manuscript *that I can find*.

However, Moltmann does not provide any kind of formalization for the notion of a possible object.[23] Moreover, this kind of explanation is only applicable if the complement's descriptive content is understood as the description of a possibly nonexisting object. In other cases Moltmann discusses, e.g., (82) and (83), this solution does not seem applicable:

(82) John needs every book about Picasso.
(83) John wants every painting by Matisse.

(82) and (83) each have a reading which she describes as follows:

> "[(82)] allows for a reading in which John's needs pertain to the totality of (actual) books about Picasso and [(83)] has a reading in which John's desire aims at exhausting the paintings of Matisse" (1997: 28).

In addition to this, she observes that to arrive at these readings John may not know of any particular book about Picasso or any painting by Matisse.

How can we analyze these readings of (82) and (83) without appeal to possible objects and in a way that is compatible with our analysis of verbs of absence? We suggest that, alongside an extensional generalized quantifier denotation, *every N* NPs also have a property type denotation. Moreover, we will show that this opaque denotation for *every N* can be either de dicto or de re, thus underscoring the need for teasing apart the notions opaque/transparent and de dicto/de re, commented on in section 3.4.

Specifically, we follow Zimmermann's suggestion (1993: 177) that in the opaquely interpreted sentences (e.g., (78)) *every* denotes not a quantificational operator but rather a maximality operator (he uses the word *summation*). Moltmann's paraphrases of the readings of (82) and (83) in the above citation echo this suggestion, and the interpretation of (78) is compatible with it as well. She describes what she considers intensional about *every* in (82) and (83) in terms of totality and exhaustiveness, rather than distributivity, as would be appropriate for a true universal quantifier. That such an interpretation must be available for *every* is not a new observation, and can be independently motivated by *every*'s special ability (which is shared by *all* (*the*) but not by

[23] The closest Moltmann gets is to propose that e.g. *book about Picasso that he can get* is translated as "{x | ◇ (book about Picasso(x) & get (John,x))}" (1997: 36). However, this translation is not correct. It is equivalent to 'the set (of presumably existing objects) *x* such that *x* is possibly a book by Picasso and it is possible for John to get x'.

each) to yield an amount reading of relative clauses such as that in (84) (see on amount relatives e.g. Carlson, 1977a; Heim, 1987; and for other applications of a maximality operator e.g. Sharvy, 1980; Zamparelli, 1998; Heycock and Zamparelli, 1999):

(84) Max put every piece of candy he could in his pocket.
- i. 'For all *x* which is a piece of candy that Max could put in his pocket, Max put *x* in his pocket.' (distributive quantificational reading)
- ii. 'Max filled his pocket with the maximum number of pieces of candy that he could put in it.' (amount reading)

Building on Zimmermann's and Moltmann's suggestions, a property-type denotation can be given to e.g. *every painting by Matisse* in (83) if we assume that *every* contributes a maximality operator *TOT* of type <<<s,e>,t>,<<s,e>,t>>, which combines with the property denoted by ***painting by Matisse*** to yield the complex property *TOT*(***painting by Matisse***). The effect of *TOT* is to drastically restrict the set of objects to which the property ***painting by Matisse*** applies. We assume that the set of entities in the domain of our model is stuctured into a complete atomic join semi-lattice. ***Painting by Matisse*** applies to all the members of a specific sublattice of this lattice, namely, that formed by closing the set of atomic paintings by Matisse under the join operation. The effect of *TOT* is to convert this property into one which holds only of the greatest element in this sublattice:

(85) $TOT(P_w)(x) = 1$ iff
for all y such that $P_w(y) = 1$, $y \leq x$

Thus, *TOT*(***painting by Matisse***) denotes a property which applies to a unique, maximal, nonatomic individual.[24]

The opaque reading for this NP can now be straightforwardly characterized as follows. Imagine a situation in which John thinks that some set *y* is the set of all the paintings Matisse did during his life. He may not be sure of its cardinality. We can then utter (83) to express John's desire to own these paintings, where (83) is translated as in (86). Note that *want* is lexically entailed to be equivalent to *want to have*:

(86) $\boldsymbol{want_i}(\boldsymbol{john}, \lambda w\ \lambda y\ TOT(\boldsymbol{painting\ by\ Matisse_w})(y))$

[24] One fact this proposal leaves unexplained, as pointed out by Roberto Zamparelli (p.c.), is that the nominal complement to *every* is singular and not, as one might expect if *every* denotes a maximality operator, plural. We can only speculate that *every* is morphologically specified as singular, and that this might be a case of a morphology/semantics mismatch, similar to what is found with nouns like *scissors*.

where $\boldsymbol{want_i}(\boldsymbol{john}, \lambda w\ \lambda y\ TOT(\textbf{painting by Matisse}_w)(y))) = 1$ iff
in the world of evaluation world *i*, John wants to bring it about that he has a (possibly nonatomic) individual *y* in a world *w* that has the property of being the totality of paintings by Matisse in *w*

(86) neither excludes nor entails that any paintings by Matisse exist in the world of evaluation *i*. This means that the complex property described by the NP *every painting by Matisse* is interpreted opaquely. Note also that in accordance with the situation described above, this complex property belongs to John's beliefs. This means that it is also understood de dicto.

As noted in section 3.4 above, the de dicto/de re distinction is a matter of belief assignation while the opacity/transparency distinction is related to whether an existence entailment is modally embedded or not. Hence, we predict that (83) will have a reading in which *every painting by Matisse*, while opaque, is nonetheless interpreted de re. This reading in fact exists. Imagine a situation in which John wants a set of objects about which he knows nothing, but which the speaker knows to be the totality of the paintings by Matisse. We can describe this situation by exporting the descriptive material contributed by *every painting by Matisse* out of John's beliefs, with the following resulting translation of (83):

(87) $\boldsymbol{want_i}(\boldsymbol{john}, <\lambda P\ \lambda w\ \lambda y\ P_w(y), TOT(\textbf{painting by Matisse}) >)$

Assuming that the speaker is using the de re description truthfully and relevantly, it can at least indirectly be inferred that a set of paintings by Matisse will exist, and yet there is no implication that John has any knowledge regarding these paintings — not even necessarily the knowledge that they exist.[25]

Summarizing, we have shown that an *every*-complement can be analyzed as an opaquely interpreted property which can be interpreted either de dicto or de re, as shown in (86) and (87), respectively. Thus, data such as that in (82), and (83) are not problematic for our property analysis of the complements of verbs of absence.

5. Conclusion

Proposing that verbs systematically combine with nonspecific property-type expressions as well as with entity- and quantifier-type expressions completes a combinatoric paradigm:

[25] Perhaps a more plausible example illustrating this reading is a situation in which the participants in a treasure hunt are given the task of looking for a list of unidentified, or incompletely identified objects, the exact number and description of which are known only to the organizers of the hunt.

Verbs can in principle combine with nominal expressions in any of their potential types. Within this perspective, we presented opacity as a fully expected special case of nonspecificity. Opacity arises when a verb takes a property-denoting argument but lacks existential entailments for that argument. We captured the opacity triggered by verbs of absence by analyzing the lexical semantics of these verbs in terms of covert propositional attitudes into which their property argument is modally embedded.

This proposal has at least four advantages. First, we can distinguish nonspecificity in extensional contexts from nonspecificity in opaque contexts. Second, we can differentiate property-taking verbs of absence from property-taking verbs of resemblance. Third, our lexical decomposition of verbs of absence avoids certain problems faced by analyses in which their semantic decomposition is made syntactically overt. Finally, we can integrate opacity within an analysis of the de dicto/de re dictinction. This, among other things, improves our understanding not only of inherent opacity but also of intensional readings of putatively quantificational complements.

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