

## Intensional verbs and their intentional objects

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**Abstract** The complement of transitive intensional verbs, like any nonreferential complement, can be replaced by a ‘special quantifier’ or ‘special pronoun’ such as *something*, *the same thing*, or *what*. In previous work on predicative complements and *that*-clauses I argued that special quantifiers and pronouns introduce entities that would not have occurred in the semantic structure of the sentence without the special quantifier, entities that one would refer to with the corresponding nominalization. Thus *something* in *John thinks something* or *the same thing* in *John thinks the same thing as Mary* ranges not over propositions, but rather over entities of the sort ‘John’s thought that S’ or ‘the thought that S’, without those entities acting as arguments of the *think*-relation. Despite initial apparent lack of evidence for this view for transitive verbs like *need*, a closer inspection of a greater range of data gives in fact further support for the ‘Nominalization Theory’ of special quantifiers, once ‘nominalization’ is viewed in a suitably extended and flexible way.

**Keywords** Transitive intensional verbs · Intensional quantifiers · Modality · Situation · Intensionality

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## 1 Introduction

The semantics of transitive intensional verbs as in (1) has long been the subject of debate:

(1) John needs an assistant.

The question of the semantics of the construction in (1), with its full NP-complement, is related to the question what ‘special quantifiers’ like *something* in (2) range over, which can replace the full NP-complement of the intensional verb:

(2) John needs something.

Let me call the kind of entity which *something* in (2) ranges over and which provides the argument of the intensional verb the *intentional object* of the intensional verb.

In this paper I will focus on the semantics of the construction in (2), though I will also propose a particular account of the semantics of (1). In particular, I will argue that there is a significant range of data relating to (2) that has as yet been ignored, namely data that constrain when intentional objects can be shared by different verbs. These data provide problems for one common theory of special quantifiers like *something*, namely what I will call the Abstract Meaning Theory, the theory that takes such quantifiers to range over possible meanings of full NP complements as in (1), namely properties or intensional quantifiers. The data also initially seem to pose problems for another theory of special quantifiers, which I have developed in earlier work in a different context, namely the Nominalization Theory. The Nominalization Theory maintains that special quantifiers like *something* in (2) range over things that the corresponding nominalizations refer to, in (2) things of the sort of needs. I will show that a more thorough understanding of the data ultimately supports the Nominalization Theory, once this theory is modified in a certain way, allowing *something* as in (2) to not only range over needs but also things that are ‘the satisfaction of a need’, or what I will call satisfaction types. The Nominalization Theory so modified is further supported by its ability to explain the particular monotonicity behaviour of intensional verbs, observed by Zimmermann (2006), and by its ability to account for definite NPs of the sort *the assistant John needs*. The Modified Nominalization Theory will go along with a modal analysis of intensional verbs like *need*.

I will start by clarifying the criteria for the relevant notion of intentionality, based on those proposed in Moltmann (1997). I then discuss problems for the Abstract Meaning Theory of special quantifiers, which posits as intentional objects either properties or quantifiers. I will motivate and present the Nominalization Theory of special quantifiers first with intensional verbs taking clausal complements. I then turn to the crucial data which will motivate the Modified Nominalization Theory for special quantifiers with intensional verbs.

## 2 Criteria for NP intensionality

It is still often customary to take as criteria for the intensionality of NP complements the failure of existential generalization and the failure of substitutivity of coreferential terms. However, there are problems with both criteria: they do not distinguish verbs like *worship* or *revere* from those verbs that exhibit the linguistically relevant criterion of intensionality of NP complements, namely a certain form of nonspecificity (Moltmann 1997, see also Zimmermann 2001; Forbes 2004). There are various linguistic tests for that form of nonspecificity:

### 1. The use of ‘special’ quantifiers and proforms

Intensional NP complements are replaced by quantifiers like *something*, *everything*, *the thing that...*, *several things*, *that*, rather than quantifiers like *someone* or *some entity*:

- (3) Mary is looking for an assistant.  
 Mary is looking for something / \* for someone / \* for some entity.

Special quantifiers include combinations with the morpheme *-thing*, as well as the pronouns *that* and *this* and relative pronouns like *what*.

### 2. Identity conditions

By this criterion I mean the validity of the kind of inference below:

- (4) John is looking for an assistant.  
Mary is looking for an assistant.  
 John and Mary are looking for the same thing.

That is, the two premises identify the same intentional object, and do so even if it is clear that the search will be satisfied by different entities.

### 3. No support (nonspecial) anaphora

NP-complements of intensional verbs support only special anaphora of the sort *the same thing* or *that*, not ‘nonspecial’ anaphora like *it*, *him*, or *her*:

- (5) a. John is looking for a horse. Also Bill is looking for \* it / ✓ that /  
 ✓ the same thing.  
 b. John needs a very good secretary. Bill needs that / \* her too.

Given these criteria there is a somewhat greater class of verbs that come out intensional than is often recognized. Two traditionally well-recognized classes of intensional verbs are:

1. (Simple) predicates of absence: *need, lack, omit, fit (into, onto)*
2. Psychological verbs of absence: *promise, desire, want*

Another somewhat less recognized class of intensional verbs are verbs of transaction and possession:

3. Predicates of transaction and possession: *own, posses, owe, offer, buy, accept, have*

With such predicates, the relevant kind of intensionality, in the sense of lack of specificity, is exemplified by the sentences below, in the contexts indicated:

- (6)a. John owns half of the estate (but no specific half).
- b. John offered Mary a glass of wine. (before opening the bottle).
- c. John just bought a case of wine on the internet
- d. Mary accepted a glass of wine (before John poured here one).
- (7)a. Bill bought the same thing as Joe, namely a slave.
- b. Jim bought that / \* him too.

Two other important classes, somewhat related to each other, are predicates of representation and epistemic predicates:

4. Predicates of representation: *draw, paint, imagine, represent, show*

The behaviour of this class with special quantifiers can be seen in (8), with (8b) being a continuation of (8a):

- (8)a. John painted the same thing as Mary, namely a woman with a cat.
- b. Sue painted that / \* her too.

5. Epistemic predicates: *see, recognize, find, count*

Examples of intensional readings of epistemic predicates are those in (9):

- (9)a. John recognised a true talent when his daughter started singing.
- b. John found someone who knows Paris extremely well (when he had a conversation with his secretary about Paris).
- c. John counted ten people (but in fact there were twelve people).

The behaviour of epistemic predicates with special quantifiers is illustrated in (10):

- (10) John discovered the same thing as Mary, namely a wunderkind.

Epistemic predicates are also predicates of representation, in that they involve a mental representation. They at the same time are directed toward an actual situation verifying that representation.

Finally, verbs of creation in the progressive are arguably to be considered intensional predicates (Bennett 1977; Zucchi 1999; Forbes 2006).

6. Verbs of creation in the progressive:

- (11)a. John is building a house.  
b. John is creating a company.

The behaviour of special quantifiers confirms the status of such verbs in the progressive as intensional predicates. Thus, (11a) allows the inference to (12a), but not to (12b), with a nonspecial quantifier, a quantificational full NP:

- (12)a. There is something John is building.  
b. There is a house John is building.

Note the use of the present indicative in (12a), which is impossible with a nonspecial quantifier as in (12b). The present indicative in (12a) makes clear that the quantifier *something* is truly special. This quantifier obviously ranges over entities that exist in the present context, not just in some future possible world. Entities that special quantifiers range over are entities that non-special quantifiers as in (12b) do not have access to. Outside the scope of the progressive, non-special quantifiers are possible only in contexts such as (13), with future tense and the verb of creation in the future perfect:

- (13) There will be a house John will have built.

The contrast in (12) can be replicated by using modals and by putting the verb in the future perfect rather than the progressive. Thus the inference in (14a) is valid, but not that in (14b):

- (14)a. John might have built a house.  
There is something John might have built.  
b. John might have built a house.  
There is a house John might have built.

The intensionality tests of identity conditions and lack of support of nonspecial anaphora are illustrated with verbs in the progressive in (15)<sup>1</sup>:

<sup>1</sup> In Moltmann (1997) I had distinguished further classes of intensional verbs, in particular predicates of creation like *hire*, *find* (on one reading). Such predicates, however, do not seem to pattern quite the same with special quantifiers; thus the following is unacceptable:

- (1) \*John hired the same thing as Mary, namely an assistant.

Another class of intensional verbs are predicates of resemblance, like *resemble*, *compare*, and comparatives. They do not, however, accept quantifiers in the same way and thus, as I have suggested in Moltmann (1997), should receive a different treatment.

- (15)a. John is building the same thing as Bill, a house.  
 b. Joe is building that / \* it too.

In the discussion to follow, I will concentrate on verbs of absence, transaction, and creation, though I will indicate how the account might be generalizable to predicates of representation and epistemic predicates.

### 3 The standard account of NP-taking intensional verb constructions

#### 3.1 Intensional verbs taking quantifiers as arguments

On one standard account (Montague 1973; Moltmann 1997), intensional verbs take generalized quantifiers as arguments, so that (16a) is analysed as in (16b):

- (16)a. John needs a horse.  
 b. *needs*(j, Q)

On that view, full intensional NPs denote intensional generalized quantifiers, whereas special NPs such as *something* or *that* take intensional generalized quantifiers as semantic values, that is, functions from worlds to extensional quantifiers (semantic values of type  $\langle s, \langle \langle e, t \rangle, t \rangle \rangle$ ), or, on Montague's (1973) conception, functions from worlds to functions from properties to truth values (that is, semantic values of type  $\langle s, \langle \langle s, \langle e, t \rangle \rangle, t \rangle \rangle$ ). Quantifiers like *something* will actually be ambiguous when they act as complements of intensional verbs. First, they may range over the intensional quantifiers that are potential arguments of the intensional verb. Second, their own intension may constitute the argument of the intensional verb. While (17a) can only display the first reading, (17b) can only display the second reading, and a sentence like (17c) is ambiguous:

- (17)a. John needs something, namely a good secretary.  
 b. John needs something against headaches, anything will do.  
 c. John needs something.

Distinguishing two meanings of *something*, as a higher-order quantifier ranging over quantifier intensions and as an ordinary quantifier providing its intension as an argument, leads to serious problems, though. It predicts that inferences such as the following are valid, (18b) having been noted by Zimmermann (2006) in a different context:

- (18)a. John needs at most one assistant.  
       John needs something.  
 b. John promised nothing.  
       John promised something.

Neither (18a) nor (18b) is valid. The premise of (18a) could be true even if John does not in fact need anything, in which case it is not the case that he needs something. Later we will see that the Nominalization Theory straightforwardly accounts for the invalidity of such inferences.

### 3.2 Intensional verbs taking properties as arguments

On another standard account (Zimmermann 1993), intensional verbs take properties as arguments:

- (19)a. John needs an assistant.  
 b.  $\text{need}(j, \lambda x[\text{assistant}(x)])$

On this account, special quantifiers either act as second-order quantifiers ranging over properties, or else, if they are indefinites like *something*, they may define the most general property (being an entity) as the argument of the intensional verb.

The most notorious problem for this account is that it fails to be applicable to truly quantificational complements such as *at most two assistants* in *John needs at most two assistants* (Moltmann 1997).

I now turn to some further serious problems for both of the accounts.

## 4 The modal account of intensional verbs

Two related problems for the standard account are what I have called the *Substitution Problem* and the *Objectivization Effect* (Moltmann 2003a, b). These problems, which arise for any nonreferential complements, consist in the invalidity of an inference with (20a) as premise to a conclusion such as (20b) or (20c):

- (20)a. John needs an assistant.  
 b. John needs the quantifier that...  
 c. John needs the entity that...

The two problems are avoided if complement and verb are taken to form a complex predicate, with both of them having a syncategorematic meaning.

There are in fact independent reasons to adopt a particular syncategorematic account of intensional verbs, namely what I will call the *modal account*. I will come to its further motivations shortly. The modal account takes intensional verbs to involve quantification over possible worlds, or rather, as I will argue, situations. For the verb *need* the modal account is particularly plausible. A first version of that account is the one below, which is parallel to Hintikka's analysis of doxastic and epistemic verbs as modal operators. This account makes use of a verb-specific accessibility relation such as  $R_{\text{need},j}$ , which relates worlds in which the agent *j*'s needs are satisfied to the world considered actual:

- (21) *The modal account of intensional verbs—first version:*  
 $x$  needs  $Q$  is true in  $w_o$  iff for every world  $w$ ,  $w_o R_{\text{need},j} w$ ,  
 for some property  $P \in [Q]$ ,  $\{y \mid \langle x, y \rangle \in R_c(w)\} = P(w)$

Here  $R_c$  is the contextually determined relation that must be established in a world of satisfaction between the agent and the things needed (ownership, being in the disposition of, or whatever).

This version of the modal account is not adequate yet. It would give the wrong results for non-upward monotone quantifiers like *no assistant*, *at most two assistants*, *few assistants*, or *exactly two assistants*. The crucial observation is that such quantifiers are understood differently in NP-complements and in clausal complements of intensional verbs (Moltmann 1997):

- (22)a. John needs at most one assistant.  
 b. John needs to have at most one assistant.
- (23)a. John promised exactly two papers.  
 b. John promised to write exactly two papers.

Whereas (22b) excludes that John having more than one assistant is compatible with his needs being satisfied, (22a) does not exclude that. Similarly, having written more than two papers is incompatible with John's fulfilling his promise in (23a), but not in (23b). Let me call the reading of the quantifiers in (22a) and (23a) the *external reading* and that in (22b) and (23b) the *internal reading*. The modal account as given in (21) is unable to represent this difference.<sup>2</sup>

There are two ways of modifying the modal account to take care of downward monotone quantifiers. First, as Richard (2001) does, one may add a subset to a given accessible world, a subset that will contain the entities the agent 'has' when his needs are satisfied. Second, one may replace quantification over possible accessible worlds by quantification over minimal situations (Moltmann 1997). A situation in the latter case is to be understood simply as a partial possible world, containing only a subset of the domain of a world and only a partial specification of the entities in that subset with properties. I will adopt the second approach, purely for the sake of formal simplicity. (15) is then to be replaced by (24):

<sup>2</sup> Forbes (2006), whose account, though very different from the first version of the modal account, also faces problems with downward monotone quantifiers, argues that such quantifiers should in fact be decomposed into sentence negation and an upward monotone quantifier; that is, *at most one* would be 'not—more than one'. I do not think such an analysis is plausible linguistically. It is hard to see, for example, how to separate negation from one quantifier in a coordinate NP like *at most one assistant and at least two secretaries* or *an assistant and at most one secretary*. Forbes' (2000, 2006) is an 'internalist' account of intensional transitive verbs, an account on which the intensional complement serves to characterize the event or state described by the verb. Any such account faces problems with the external reading of non-upward monotone quantifiers.

(24) *The modal account of ‘need’—second version:*

$x$  needs  $Q$  is true in  $w$  iff for every minimal situation  $s$  such that  $w R_{\text{need},x} s$ , for some property  $P \in [Q]$ ,  $\{y \mid \langle x, y \rangle \in R_c(s)\} = P(s)$ .

This account is still not adequate though. One reason is the ‘conjunctive force’ of disjunctive complements, discussed by Forbes (2006), as in (25):

(25) John needs a sweater or a jacket.

On the relevant reading, (25) says that John’s needs can be satisfied by both a sweater and a jacket. (25) is not a valid conclusion from (26):

(26) John needs a sweater.

However, (25) would follow from (26) if the modal account is applied to it:

(27) *John needs a sweater or a jacket* is true in  $w_o$  iff for every minimal situation  $s$  such that  $w_o R_{\text{need},j} s$ , either for some  $x \in [\text{sweater}]^s$ ,  $\langle \text{John}, x \rangle \in R_c(s)$  or for some  $x \in [\text{jacket}]^s$ ,  $\langle \text{John}, x \rangle \in R_c(s)$ .

The disjunction thus must provide more than a necessary condition on the satisfaction situations. In some way it must also provide a sufficient condition to yield the conjunctive force. Clearly the disjunctive NP as such does not generally provide necessary and sufficient conditions on satisfaction situations. Thus if John needs a sweater or a jacket, then it may be that his need is satisfied only if he has a warm sweater or a warm jacket. This condition can be generalised to any NP complement of intensional verbs: the NP complement partially characterizes a quantifier that provides necessary and sufficient conditions on satisfaction situations, in the sense specified below, where  $\leq$  is the part-of relation among intensional quantifiers defined in (28b):

(28)a. *The modal account of ‘need’—third version:*

$d$  needs  $Q$  is true in  $w$  iff for some quantifier  $Q'$ ,  $Q' \leq [Q]$  and for every situation  $s$ ,  $s$  is a minimal situation such that  $w R_{\text{need},d} s$  iff for some property  $P \in Q$ ,  $\{y \mid \langle d, y \rangle \in R_c(s)\} = P(s)$ .

- b. For intensional quantifiers  $Q$  and  $Q'$ ,  $Q \leq Q'$  iff for any property  $P \in Q$ , there is some property  $P' \in Q'$  such that for any world or situation  $s$ ,  $P(s) \subseteq P'(s)$ .

How does this account apply to (25)? (25) is true just in case for some possibly more specific property  $P$  than that of being a sweater or a jacket, any situation  $s$  is a minimal satisfaction situation of John’s needs just in case in  $s$  John has something falling under  $P$ . Note that this account allows for the possibility of John actually needing only a sweater as well as the possibility

of John's needs being satisfied by something that is either a sweater or a jacket.<sup>3</sup>

The third version of the modal account has a further advantage over the second version in applying adequately to quantificational NPs such as *at most two horses* in *John needs at most two horses*. *John needs at most two horses* has in fact two readings: on one reading, let's call it the *exact-match reading*, John's needs are satisfied just in case John has at most two horses, be it zero, one, or two. On the second reading, there is in fact a particular number *n* of horses, be it zero, one, or two, and John needs *n* horses. Let's call this the *partial characterization reading*. On this reading, *at most two horses* gives only a partial characterization of the exact need. On the exact-match reading, no more specific property is needed to characterize the satisfaction situations. On the partial characterization reading, there will not be quantification over properties, but rather over more specific quantifiers. Thus, the account in (28) as such already captures both readings.<sup>4</sup>

I will assume that a version of the modal account is correct for at least a significant class of intensional verbs. Let me just make a few remarks of how such an account could be applied to other intensional verbs.

Certainly other verbs of absence can be analysed in the same way, with each verb of absence being associated with its own accessibility relation.

Verbs of ownership exhibit the external reading of downward monotone quantifiers, and also display the conjunctive force of disjunction:

- (29)a. John owns at least half of the estate.  
 b. John now owns a bottle of red wine or a bottle of white wine.

The conjunctive reading of (29) is natural in a situation in which John has paid for a bottle of wine without that wine being specified as red wine or white wine—John's ownership is thus realized both by his in fact having a bottle of red wine as well as by his having a bottle of white wine. What is involved in both (29a) and (29b) is arguably quantification over minimal situations actualizing the state of ownership that results from the act of transaction. That is, if John owns half of the estate (in the intensional sense), then any situation in which John 'has' half of the estate will realize John's ownership.

<sup>3</sup> The account also rules out the following invalid inference discussed by Forbes (2006):

- (1) Perseus is looking for a gorgon.  
 Perseus is looking for a mortal gorgon or an immortal gorgon.

The conclusion does not obtain because Perseus would not be interested in an immortal gorgon. Here the exact match, the property that is to be found in every minimal satisfaction situation for Perseus' search, is in fact 'mortal gorgon'.

<sup>4</sup> (28) is not unproblematic when applied to universal quantifiers, as a referee pointed out: 'John needs every green sweater' seems to entail 'John needs every sweater'. However, it is not clear that universal quantifiers allow for an intensional reading of the same sort in the first place (Moltmann 1997, 2006).

Verbs of representation also exhibit the external reading of downward monotone quantifiers:

- (30)a. John painted at most two horses.  
 b. John recognized at most one talent.

However, the conjunctive force of disjunction seems to be absent with such verbs. Verbs of depiction arguably involve existential quantification over entities—‘situations’ resulting from the painting, with the quantifier then characterizing the result. This means the quantifier counts created, and thus ‘fictional’ objects, not actual objects. In the case of epistemic verbs, the quantifier arguably characterizes the actual situations that are minimal situations making the epistemic state true.

Verbs of creation in the progressive exhibit the external reading of downward monotone quantifiers. The progressive itself arguably involves quantification over future possible worlds.

## 5 The Nominalization Theory of special quantifiers with other verbs

What do special quantifiers replacing nonreferential complements range over? To answer this question I would first like to return to some previous work on the semantics of special quantifiers when they replace clausal complements (Moltmann 2003a, b; 2004b).

To start with, a special quantifier like *something*, when replacing a clausal complement, cannot be substitutional, because of cases like (31):

- (31) John said something Mary never thought about.

In (31), *say* requires a sentential complement, whereas *about* only allows for NPs as complements. A substitutional analysis would require the same category for both positions and thus fails as a general account. Therefore, special quantifiers will have to receive an objectual interpretation of some kind.

In the cited previous work, I argued that special quantifiers replacing clausal complements in fact act as nominalizing quantifiers, ranging over the kinds of things the corresponding nominalizations refer to, that is, things of the sort of claims, thoughts, or assertions. There are two sorts of reasons for that.

First, the entities that special quantifiers range over can have evaluative, causal and perceptual properties, which are not the kinds of properties (under the relevant interpretation) that propositions could have. Thus, *nice* in (32a) evaluates John’s claim, rather than some proposition involved in his claim. Similarly, *surprising* in (32b) evaluates John’s thought, rather than a proposition:

- (32)a. John said something nice.  
 b. John thought something surprising.

Similarly, the causal and perceptual predicates in (33) can only apply to something like a claim, not a proposition:

- (33)a. John said something that caused Mary consternation.  
 b. John said something unheard of.

Entities of the sort of claims, thoughts, or assertions thus are both concrete and have a propositional content (and thus have truth conditions). They are, one might say, concrete instantiations of propositional contents in attitudinal states or acts.

The second reason for taking special quantifiers to act as nominalizing quantifiers comes from the restrictions on sharing intentional objects by different intensional verbs. These restrictions are entirely unpredicted on the Abstract Meaning Theory. The generalization is that different intensional verbs cannot share their intentional object, unless the verbs are of the same type:

- (34)a. ??John asserted what Mary imagined.  
 b. ??John said what Mary whispered.  
 c. ??John thought what Mary was hoping (namely that it will rain).
- (35)a. John claimed what Mary claimed.  
 b. John claimed what Mary suggested.

The reason is that an assertion and an imagination are just not the same thing, and similarly for an assertion and a whisper as well as for a thought and a hope. By contrast, a claim can be a suggestion because both of the things in a way are claims, one with a greater, the other with a weaker degree of illocutionary strength. The analysis I proposed, that special quantifiers range over the kinds of things that the corresponding nominalizations refer to, is supported by the behaviour of identity statements involving the explicit nominalizations:

- (36)a. ??John's assertion was Mary's imagination.  
 b. ??John's claim was Mary's whisper.  
 c. ??John's thought was Mary's hope.
- (37)a. John's claim was Mary's claim.  
 b. John's assertion was Mary's suggestion.

Special quantifiers range over things of either the sort of 'John's thought that S' or 'John's claim that S' or else of the sort of 'the thought that S' or 'the claim that S'. In cases in which the agents or the two verbs are different, as in (35a, b), they can still share their intentional object, due to a reanalysis of the content of the nominalizations in (37a) and (37b) as indicated in (38a, b) (Moltmann 2003a):

- (38)a. The claim which was made by John is the claim which was made by Mary.  
 b. The strong claim of John was the weak claim of Mary.

That is, what is shared according to (35a) is a type of entity of the sort 'the claim that S' (which is made both by John and by Mary). What is shared

according to (35b) is also an entity of the sort ‘the claim that S’, which is what was strong when made by Mary and weak when made by John.

What are entities like thoughts or assertions if not propositions? Unlike propositions they are concrete particulars with causal and temporal properties, though at the same time they inherit content-related properties from the propositional content they involve. They are what I call *attitudinal objects* (Moltmann 2003a, b). Thus, the attitudinal object that is John’s thought that Mary is intelligent may be surprising or sudden, and it has a truth value and is about Mary. As I proposed in Moltmann (2003a), John’s thought that Mary is intelligent can roughly be construed as the content consisting of Mary and the property of being intelligent qua being entertained in the ‘thinking mode’ on the part of John. That is, we would have  $[John's\ thought\ that\ Mary\ is\ intelligent]^w = f_1(R_{think}, John, \langle [intelligent], Mary \rangle, w)$ . Here  $\langle [intelligent], Mary \rangle$  is the structured proposition expressed by *Mary is intelligent* (which I will denote by ‘ $[Mary\ is\ intelligent]$ ’). The attitude verb itself, I had argued, forms a unit with the morpheme-*thing*, which has a nominalizing function. This unit, *think-thing*, will denote a relation between agents and thoughts. The remaining part *some* will quantify over entities that could be such thought arguments of the *think-thing* relation. Thus, a sentence such as (40a) will be analysed as in (40b), or formally, based on the denotation of *think-thing* in (40c), as in (40d):

- (40)a. John thought something surprising.  
 b. ‘For some sentence S, John thought that S is true and for some x such that  $thought(John, x)$ ,  $surprising(x)$ .’  
 c.  $[thought-thing_1] = \{ \langle x, y \rangle \mid \exists S \in Sent(ENG) (x \in [thought\ S] \ \& \ y = f_1(R_{think}, y, [S], w)) \}$   
 d.  $\exists x (thought-thing_1(j, y) \ \& \ surprising(y))$

(40c) involves quantification over sentences of English (or a possible extension of English).

What are entities like ‘the thought that Mary is intelligent’ or ‘the claim that Mary is intelligent’? These are kinds whose instances are objects of the sort ‘John’s thought that Mary is intelligent’ or ‘John’s claim that Mary is intelligent’. Kinds here are not natural kinds, but rather universals that inherit their properties from their instances in various ways (Moltmann 2004a). For example, the thought that Mary is intelligent has been entertained because there is one thought, John’s thought that Mary is intelligent, that has been entertained. Moreover, the thought that Mary is intelligent is reasonable because for any agent d, d’s thought that Mary is intelligent is reasonable. Kinds in fact are roughly to be understood in Carlson’s (1977) sense, except that they can also act as the semantic values of definite NPs (like *the thought that S*), not just bare plurals and mass nouns—and they can also act as the entities which special quantifiers range over. Most importantly in the present context, entities like the thought that S are the entities said to be shared by John and Mary in (41a), a sentence which requires distinguishing a second *think-thing* relation, as in (41c), so that (41a) can be analysed as in (41d):

- (41)a. John thought what Mary thought.  
 b. 'John thought something that is something that Mary thought.'  
 c.  $[thought\text{-}thing_2] = \{ \langle x, y \rangle \mid \exists S \in \text{Sent}(\text{ENG}) (x \in [thought\ S] \& y = f_2(\mathbf{R}_{\text{think}}, [S], w)) \}$   
 d.  $\exists x(thought\text{-}thing_2(j, x) \& thought\text{-}thing_2(m, x))$

In (41c)  $f_2$  is a function mapping attitudinal relations, propositional contents, and worlds onto kinds of attitudinal objects.

## 6 The Nominalization Theory for special quantifiers with transitive intensional verbs

### 6.1 Evidence for the Nominalization Theory

With special quantifiers replacing the NP complement of intensional verbs, there is similar evidence that such quantifiers do not quantify over abstract meanings, that is, intensional quantifiers. The first observation is that the sentences in (42) are equivalent to those in (43), rather than anything of the sort in (44), which, even if they were acceptable, would have the wrong truth conditions:

- (42)a. John counted all he needed.  
 b. John enumerated the things he needed.  
 c. John described exactly what he needed.
- (43)a. John counted all his needs.  
 b. John enumerated his needs.  
 c. John exactly described his needs.
- (44)a. John counted the quantifiers that...  
 b. John enumerated the quantifiers that...  
 c. John exactly described the quantifier that...

A quantifier like *all (that) he needed* thus appears to range over the things that the corresponding nominalization refers to, that is, things of the sort of needs, rather than intensional quantifiers, the arguments of the verb *need* on the standard view.

Further evidence for the account is the use of measure phrases. When replacing an NP-complement of an intensional verb, measure phrases will measure the kind of thing that the corresponding nominalization refers to rather than something of the sort of a quantifier:

- (45)a. John promised a lot (namely a car).  
 b. John's promise was great.  
 c. ??That quantifier was great.

Finally, evaluative and causal predicates apply to the values of a special quantifier replacing the NP rather than to abstract objects of the sort of a quantifier:

- (46)a. John needs ten maids.  
 b. John needs something strange.  
 c. What John needs is exaggerated.
- (47)a. John promised something that makes Mary happy (namely a trip).  
 b. John's promise makes Mary happy.

Quantifiers are neither strange nor exaggerated, nor can they make someone happy.

The Nominalization Theory straightforwardly accounts for the invalidity of inferences such as (18a, b) (repeated below), which were problematic for the Abstract Meaning Theory:

- (18)a. John promised at most two papers.  
 John promised something.
- b. John promised nothing.  
 John promised something.

(18a) does not imply any promise on the part of John; thus there need not be anything to make the conclusion true. (18b) implies that there is no promise on the part of John; thus there is nothing to make the conclusion true. Special quantifiers with intensional verbs invariably act as quantifiers ranging over the kinds of things corresponding nominalizations refer to. Thus the validity of inferences with special quantifiers depends on the availability of the latter.<sup>5,6</sup>

<sup>5</sup> With some intensional verbs, for example *want*, the inference does go through. In my ears the following is valid, on one interpretation of the premise:

- (1) John wants no distractions.  
 There is something John wants.

The inference is valid because there is in fact a desire on the part of John, namely not to have any distraction. The verbs with which a negative quantifier characterizes the content of the actual state or act described by the verb appear to be just those that also take small clauses as complements, thus perhaps requiring a clausal analysis, at least on one interpretation (Larson et al. 1997).

<sup>6</sup> Conjunctions like (1) below might be considered problematic:

- (1) John needs something strange and a sweater.

But first of all, sentences like (1) hardly sound very natural. Moreover, the phenomenon is a general one, occurring with any non-referential terms, for example predicative complements and *that*-clauses:

- (2) a. John became a baker and something else I cannot remember.  
 b. John said that he would leave and something very strange, which I cannot remember.

The phenomenon can thus be set aside as a general issue having to do with conjunctions of mixed types, rather than being a particular problem arising with intensional verbs.

The second sort of evidence against the Abstract Meaning Theory of special quantifiers, the sharing of intentional objects, raises a range of complications, and these in fact require a significant modification of the Nominalization Theory when applied to special quantifiers with transitive intensional verbs.

## 6.2 Complications: sharing of ‘intentional objects’

### 6.2.1 *Extensional and intensional verbs sharing*

The Nominalization Theory in its present form would say that intensional NP-taking verbs can share their intentional object only if they are identical or at least of the same ‘type’, allowing a reanalysis into one and the same predicate with different modifiers. Certainly then, extensional and intensional verbs should not be able to share their intentional object. However, as a matter of fact, they seem to be able to, in valid inferences such as (48a) and (48b):

- (48)a. John buys whatever (the thing/those things) he needs.  
       John needs car.  
       John buys a car.
- b. John needed car.  
       John bought a car.  
       John bought what he needed.

The validity of such an inference in fact seems to support a Montagovian account on which both intensional and extensional verbs take intensional quantifiers as arguments; with meaning postulates on intensional verbs ensuring the right truth conditions (Montague 1973).

However, besides the problems for the Abstract Meaning Theory already mentioned, there are serious problems for the Montagovian account of (48). The first problem is that not all extensional-intensional verb pairs can share their intentional object. The following inference, for example, is intuitively invalid:

- (49) Mary needs a book  
       John read a book.  
       John read what Mary needs.

Or perhaps not quite: there is in fact a reading on which (49) is valid, though intuitions here are fluctuating. There is a feeling that the reading in question involves coercion: what happens on that reading is semantic type shift from the type of singular indefinites to the type of bare plurals. The latter is of course the type of kinds in the sense of ‘kind’ of Carlson (1977). This means the intensional type of *a book* in the first premise of (48b) and the extensional type of *a book* in the second premise of (49) shift to the type of the bare plural *books*. Bare plurals, on Carlson’s, Chierchia’s, and my own view, provide arguments of both extensional and intensional verbs, allowing for intensional, extensional,

generic, as well as kind readings (Carlson 1977; Chierchia 1998; Moltmann 2004a).

The type shifting account of the validity, on one reading, of the inferences in (48) is supported by the validity, on any reading, of the corresponding inference with bare plurals:

- (50) Mary needs books.  
       John reads books.  
       John reads what Mary needs.

In general, intensional and extensional verbs do not permit inferences such as (49). Two further examples where sharing is not allowed are those below:

- (51)a. ??John drank what Mary needs.  
           (John drank a glass of water; Mary needs a glass of water.)  
       b. ??John destroyed what Mary built. (John destroyed a hut,  
           Mary built a hut.)

Those examples do of course again allow for one reading, the one based on type coercion.

But there is at least one intensional verb that does not allow for any sharing of an intentional object with an extensional verb on any reading. This is the intensional verb *count*:

- (52) \*John counted what Mary met.

Sentence (52) can never mean something like ‘John counted ten people, and Mary met ten people’.

Why is (52) (as opposed to (49) and (51a, b)) never good? The reason is that type coercion here is impossible: no kind argument can be construed because intensional *count* requires a quantificational NP (with a weak quantifier) and does not accept bare plurals. Note that no intensional reading is available in (53):

- (53) John counted men.

The case of intensional *count* is a strong argument in favour of the coercion account of the validity of (49) and (51a, b) on the relevant reading.<sup>7</sup>

<sup>7</sup> One question the type shifting account raises is why type shifting of the type of a singular indefinite to the type of a kind-denoting bare plurals is not available in the context of proper kind predicates such as *widespread* or *extinct*:

- (1)a. \*A lion is widespread.  
       b. \*A lion is extinct.

The reason might be the plural requirement of those predicates. Perhaps the kinds that singular indefinites may denote under type shifting provide only individuals as instances, not collections of them.

The second problem for the Montagovian account of the validity of (48a, b) is that extensional verbs do not allow for special quantifiers in the same way as intensional ones. The following examples are unacceptable:

- (54)a. \*John met what Bill is looking for, namely a rich heiress.  
 b. \*John talked to what Bill needs, namely an assistant.

Note that the same observations obtain for kind-denoting NPs:

- (55)a. \*John met what Bill met, local politicians.  
 b. \*John met something, namely local politicians.

There is no second reading available for (55a, b) that would make the examples acceptable. This means coercion is impossible with special quantifiers. This again supports the view that it is type coercion which takes place in (49), rather than an intensional reading being generated in an extensional context.<sup>8</sup>

A third problem for the Montagovian account is that two extensional verbs cannot share an 'intentional object':

- (56)a. ??John read the same thing that Bill read, namely a book.  
 (John read a cookbook, Bill read *Faust*)  
 b. ??John bought what Bill destroyed, namely a car.

Even such cases, though, allow for a reading, accompanied by the same sense of effort as in the other cases. This again is the reading based on type coercion. On that reading (56a) is synonymous with 'John read the same thing as Bill, namely books', and (56b) with 'John bought what Bill destroyed, namely cars'.

Given the restrictions on sharing of intentional objects with extensional and intensional verbs (apart from readings with coercion), the question is: under what circumstances can extensional and intensional verbs share their intentional object, rendering arguments like (48a, b) valid? It appears that the condition is that an extensional verb must characterize a specific situation or a type of situation that would be a satisfaction situation of the state described by the intensional verb. This is the case in (57a), (57b), and (57c), all of which are acceptable:

- (57)a. John bought what he needed. —actual situation is satisfaction situation  
 b. John bought what Mary really needs. (But John did not buy it for her) —type of situation is satisfaction situation  
 c. John got what his grandfather always dreamt of, namely a Ferrari. —type of situation is satisfaction situation

<sup>8</sup> Also the following example seems possible:

- (1) John married what Bill is looking for, namely a rich heiress.

One might speculate that the verb *marry* is also intensional, being a type of verb of ownership.

In (57a) the actual situation described by the matrix sentence, of John buying something, is in fact a satisfaction situation for John's needs as described by the relative clause. In (57b) it is not the actual situation described by the matrix clause that is a satisfaction situation for John's needs, but rather a type of situation of which the actual situation is an instance: It is not John's purchase that is a satisfaction situation for Mary's needs, but rather the type of situation in which someone buys an object of the relevant sort. (57c) also involves a type of situation: it is not John's purchase as an actual situation that could be a satisfaction situation of his grandfather's dreams, but rather the type of situation it exemplifies: the actual situation will have happened at an entirely different time under different circumstances.

The difference between (57b) and (57c) is that in (57c) the situation described by the extensional context involves an entirely different time than the satisfaction situation of the intensional context could involve. By contrast, the satisfaction described by the extensional context in (57b) involves a time that might also be involved in a satisfaction situation of the intensional context. In this paper, I will for the sake of simplification ignore the role of time for satisfaction situations, and develop the semantics of special quantifiers setting temporal concerns apart.

Below are two further sets of examples where the extensional verb specifies a satisfaction situation with a particular agent or else a type of satisfaction situation involving no particular agent:

- (58)a. John has what Mary needs. (Thus Mary should ask John for it).  
—actual situation is possible satisfaction situation
- b. John has what Mary once needed. —type of situation is satisfaction situation
- (59)a. John gave Mary what she wanted. —actual situation is satisfaction situation
- b. John gave Mary what Sue wanted. (John gave Mary a horse, Sue wanted a horse.) —type of situation is satisfaction situation

The conditions on when extensional and intensional verbs can 'share' their intentional object are thus as follows:

1. The extensional verb describes a situation that is a satisfaction situation of the state or activity described by the intensional verb.
2. The extensional verb represents the type of situation whose instances are satisfaction situations of the state or activity described by the intensional verb.
3. Coercion takes place, that is, a type shift of special quantifiers from the type of nominalizations to the type of kinds, which will then act as arguments of the verb in question.

### 6.2.2 *Two intensional verbs sharing*

Given that intensional and extensional verbs can share their intentional object only under particular conditions, the next question is: When can two intensional verbs share their intentional object? Again I will focus on verbs of absence and transaction. Two verbs of absence can share their intentional object under certain conditions, as can two verbs of transaction, and a verb of absence and a verb of transaction.

One condition under which such verbs can share their intentional object is of course if the two verbs are very similar or even identical, as in (60):

- (60)a. John needs the same thing Mary needs.  
 b. John would like what Mary wants too, namely an apple.

This is of course what the Nominalization Theory of special quantifiers predicts, which relates the acceptability of (60a, b) to the acceptability of the following identity statements:

- (61)a. John's need is Mary's need.  
 b. John's desire is Mary's wish.

But a second possibility for two intensional verbs to share their intentional object is when a possible satisfaction situation of the one will also be a possible satisfaction situation of the other, as in (62a, b):

- (62)a. John promised Mary only what she really needed, namely a car.  
 b. Mary needs what she lacks.

In (62a, b) any satisfaction situation of the matrix intensional context will be a satisfaction situation of the embedded intensional context.

Instead of sharing specific possible satisfaction situations, the matrix and embedded intensional context may also share just a type of situation, different instances of which would constitute satisfaction situations of the two contexts. This is the case in (63a, b):

- (63)a. John promised Mary what Sue really needs, namely a car.  
 b. John himself lacks what Mary needs.

Also, a transaction verb may share an intentional object with a verb of absence. Here any actualization situation of the transaction verb should be the satisfaction situation of the verb of absence:

- (64)a. I found what I needed.  
 b. John offered Mary what she wanted (namely a glass of wine—he actually did not get to pour her one).  
 c. I now own what I needed (namely half the estate).  
 d. He accepted what I offered him (namely a glass of wine, but before I could pour him one, a fire broke out).

Alternatively, what is shared may be a type of situation different instances of which provide actual or possible satisfaction situations for the two intensional verbs.

What about other intensional verbs? Without going into too much detail, it appears that here the nature of the situation matters. Thus, verbs of representation cannot share their intentional object with any other kind of verb, which is what is predicted if the situations involved in depiction verbs are something like fictional contexts:

- (65)a. \*?John painted what Mary needs / recognized / owns / described, namely a castle.  
 b. \*?John imagines the thing that Mary needs / recognized / owns / described, namely a castle.

Though, again, on a second intuition, these examples are acceptable, that is, on a type coercion reading.

Two verbs of representation, however, may under suitable circumstances share their intentional object, namely if the one created situation is a realization of the other, as in (66):

- (66) John painted what he had imagined, namely a beautiful castle.

With some epistemic verbs, such as epistemic *find*, sharing with a verb of absence is possible:

- (67) John has found what Bill is still looking for, namely a person who can do the job.

Here obviously the situation verifying the epistemic state is in fact also a situation of satisfaction of the verb of absence.

With verbs of creation in the progressive, sharing is possible with a verb of absence:

- (68) John is building what Mary needs, namely a castle.

Here any future situation that is the successful result of John's act of building is of the type of a situation of the satisfaction of Mary's need.

There are lots of cases in which intensional verbs may not share their intentional object, for example:

- (69)a. ??John owns what Mary found, namely a white horse.  
 b. ??This resembles what I need. (This resembles a horse, and I need a horse.)  
 c. ??John is building what Mary gave Sue, namely a box.

But again, there is a second intuition about these examples, on which they involve type coercion. On that reading (69a) is synonymous with (70a), (69b) with (70b), and (69c) with (70c):

- (70)a. I own white horses, and Mary found white horses.  
 b. This resembles horses, and I need horses.  
 c. John is building boxes, and Mary gave Sue boxes.

Given these data, it is safe to generalize that the cases in which sharing of intentional objects is possible (without coercion), are those in which the two verbs would not only share the same indefinite NP, but either possible (or actual) satisfaction situations or else a type of satisfaction situation.

What do special quantifiers then in fact range over? It does not seem adequate to take special quantifiers themselves to range over sets of satisfaction situations or types of them. First of all, the two intensional contexts always interest themselves in the same object in a satisfaction situation, which would not correctly be accounted for if what they shared were the entire situations themselves. For example, if John needs what Mary needs, namely the solution to a problem, then the satisfaction situations for John and Mary's needs contain both solutions and problems. But what John's need and Mary's need have in common is that having a solution satisfies them, rather than having a problem. Second, special quantifiers can take modifiers which always act as predicates of individuals (satisfaction objects) and not satisfaction situations:

- (71) John wants something very luxurious, namely a Bentley.

*Very luxurious* is a predicate of individuals, not of situations.

I propose that the kind of object special quantifiers with transitive intensional verbs range over is what I will call a *satisfaction type*. Satisfaction types also have the advantage of allowing us to unify the case where specific possible satisfaction situations are shared with the case in which types of such satisfaction situations are shared. Let us take (63a). Here, a satisfaction situation of John's promise (of a car) is a satisfaction situation of Mary's need (of a car). In any such satisfaction situation there is an object of a certain type, namely a car that Mary has (possibly as a result of John having given it to her). The type of object 'car that Mary has' will be a satisfaction type. Satisfaction types for types of satisfaction situations involve existential quantification over the relevant agents. Thus, in (63a) the satisfaction type is in fact the type of object 'car that someone has'. Two intensional verbs thus can share their intentional object just in case they share a satisfaction type.

How is a satisfaction type obtained from an intensional verb or rather its nominalization? Satisfaction types can be obtained from the satisfaction situations of intensional verbs: satisfaction types are uniformities across satisfaction situations, in a sense I will make precise in the next section.

What happens when an extensional and an intensional verb share their intentional object? At first sight, such cases seem problematic for the account I have proposed. Extensional verbs take objects as arguments and do not involve satisfaction situations. However, when looking at the various acceptable examples of extensional and intensional verbs sharing an intentional object, it

appears that in all those cases the extensional verbs themselves are those that also have intensional (nonspecific) readings. In the examples mentioned, the verbs were transaction and possession verbs like *buy*, *give*, and *have*. By contrast, no sharing was possible with verbs that lack an intensional reading, such as *read*, *drink*, and *destroy*. Sharing of a satisfaction type with a verb of absence and a verb of transaction is of course possible even if the satisfaction type was obtained from different satisfaction or realization relations in the two cases.

### 6.2.3 *The formal account*

I will now develop the semantic analysis of special quantifiers with intensional NPs, based on the notion of satisfaction type, a notion that itself needs to be made precise.

The generalization established in the previous section about sharing of intentional objects with intensional verbs does support the Nominalization Theory of special quantifiers. However, it also requires a significant modification of that theory: the entities which special quantifiers with intensional verbs stand for are not necessarily just the entities which the corresponding nominalizations refer to, but may only be intentional objects derived from them, namely satisfaction types. In fact, the latter can also be referred to by nominal constructions, but those constructions will be of a more complex sort. Let us take the verb *need*. The intentional objects of *need* may be of the following sorts which are of increasing generality or derivativeness:

- [1]a. John's need of a horse
  - b. the need of a horse
  
- [2]a. the satisfaction of John's need of a horse
  - b. the satisfaction of the need of a horse

While the step from a to b consists in the familiar process of abstraction of a kind from a particular—a kind of need from a particular need—the step from [1] to [2] consists in deriving a satisfaction type from a need.

First of all, what exactly is an entity like John's need of a horse? John's need of a horse is a particular state involving John. Such a state may be taken to be a Davidsonian argument of the verb. Alternatively, one may take it to depend on the sentence *John needs a horse* and the world in question, in the sense that the state is the truth maker of that sentence at that world (Moltmann 2007). I will adopt the latter alternative, though it is not crucial. Then we have  $[John's\ need\ of\ a\ horse](w) = \lambda e[e \models_w [John\ needs\ a\ horse]]$ , where  $\models$  is the truthmaking relation that holds between an entity and a sentence relative to a world. What is crucial is that this state has satisfaction conditions. The satisfaction conditions of a need are obviously related to the accessibility relation that *need* specifies when taking a full NP as complement:

- (72) For an event  $e$ ,  $e \models_{w_o} \textit{John needs a horse}$ :  
for any situation  $s$ ,  $s$  *satisfies*  $e$  iff  $s R_{\text{need},j} w_o$

The entity that is the need of a horse, by contrast, is the kind of state  $E$  such that for any instance  $e$  of  $E$ , there is an agent  $x$  such that  $e = [x\text{'s need of a horse}]$ . A kind of state is to be understood in just the same way as an entity like *the thought that S*.

What is a satisfaction type? This is the type of object that satisfies a need or John's need. What satisfies a need is an object that has certain properties and stands in a certain kind of relation to the relevant agent. Two possibilities of formally conceiving of satisfaction types are these. First one may take satisfaction types to be properties, functions from worlds or situations to sets of individuals. Second, one may take them to be individual concepts, functions from worlds or situations to individuals. In the latter case, it must obviously also be allowed that the individual concepts are individual concepts of pluralities, for examples like (73):

- (73) John needs something, namely two assistants.

In (73) *something* would range over individual concepts mapping worlds or situations to collections of assistants.

There are reasons to prefer the second alternative, that is, individual concepts rather than properties. The reason is that satisfaction types rather play the role of individual arguments than that of predicative entities like properties. That is, special quantifiers behave like quantifiers ranging over individuals rather than quantifiers ranging over properties. In particular, restrictions on special quantifiers are always restrictions on individuals, not on properties, as we have already seen with (71).

Thus, if the need is John's need of a horse (any horse), then the satisfaction type will be the individual concept  $\hat{t}x[\textit{horse}(x) \ \& \ R_c(\textit{John}, x)]$ , that is, the function that maps a world or situation to the individual that is a horse and at the disposition of John (or whatever the relation) in the world or situation. This satisfaction type has the property of being at John's disposition as an essential component. By contrast, any particular actual or possible horse can have that property only accidentally. This is the reason that satisfaction types, rather than possible objects or sets of objects, should be considered the shared intentional objects: properties like being at the disposition of John may have to be crucial part of a shared intentional object.

Unlike a need, the satisfaction type of a need does not include the content of the verb. As a consequence, satisfaction types may be shared by different types of intensional verbs, namely those intensional verbs whose satisfaction situations share the same characteristics.

Satisfaction types are partial functions from worlds or situations to individuals: a situation may easily lack the individual that the satisfaction type would pick out, as could a world.

The satisfaction type for a particular state  $e$ ,  $\text{sat}(e)$ , can now be defined as follows:

(74) Definition of ‘satisfaction type’ of a state or event

A satisfaction type for a state or event  $e$  ( $\text{sat}(e)$ ) is an individual concept  $T$  such for any situation  $s$ ,  $s$  satisfies  $e$  iff  $T(s)$  is defined.

What is the satisfaction type if the need is just the *kind* of need ‘the need of a horse’? There will first be the set of satisfaction types of the instances. But this does not give us the desired ‘shared satisfaction type’, the object shared by John and Mary if John promises Mary what she needs (namely a horse). The satisfaction type of ‘the need of a horse’ should be an individual concept that is independent of any particular agent, applicable to any satisfaction situation of any instance of the kind of state, such as the individual concept  $\hat{\lambda}x[\exists y(\text{horse}(x) \ \& \ R_c(y, x))]$ . This is captured by the following definition:

(75) *Definition of ‘satisfaction type’ for a kind of state or event:*

A satisfaction type for a type of state or event  $E$  ( $\text{sat}(E)$ ) is an individual concept  $T$  such that for any situation  $s$ ,  $s$  satisfies an instance  $e$  of  $E$  iff  $T(s)$  is defined.

We can now give a formal semantic analysis of special quantifiers, distinguishing four different readings:

- (76)a.  $[\textit{need-thing}_1](w) = \{ \langle d, e \rangle \mid \exists X \in \text{NP}(\text{ENG}) \ e \models_w d \textit{ needs } X \}$   
 b.  $[\textit{needs-thing}_2](w) = \{ \langle d, E \rangle \mid \exists e' \ I \ E \ \exists X \in \text{NP}(\text{ENG}) \ (e' \models_w d \textit{ needs } X) \}$

- (77)a.  $[\textit{need-thing}_3](w) = \{ \langle d, \text{sat}(e) \rangle \mid \langle d, e \rangle \in [\textit{need-thing}_1](w) \}$   
 b.  $[\textit{need-thing}_4](w) = \{ \langle d, \text{sat}(E) \rangle \mid \langle d, E \rangle \in [\textit{needs-thing}_2](w) \}$

In (76a), we have existential quantification over noun phrases in English ( $\text{NP}(\text{ENG})$ ).

What are satisfaction types of quantificational NPs like *at most two horses* in *John needs at most two horses*? On the exact-match reading, John’s needs are satisfied just in case he has at most two horses, be it zero, one, or two. In this case the satisfaction type is a disjunctive property of collections  $x$  such that  $x$  consists of zero, one, or two members that are horses. On the partial characterization reading, there will be a particular property  $P$  of groups  $x$  such that  $P$  holds of  $x$  just in case  $x$  contains  $n$  horses as members. Sharing then is correctly predicted to be possible on both readings.

Let us return to the cases of intensional and extensional verbs sharing, such as (58a) below:

- (58)a. John has what Mary needs, namely a car.

This sentence, as I had argued, should be analysed by taking *has* in (58a) to have an intensional reading, even though for the situation described by the main clause, an extensional reading would be entirely sufficient. The state type of John's ownership  $E$  then has as its satisfaction type the individual concept  $\hat{\iota}x[\exists y(\text{horse}(x) \ \& \ R_c(y, x))]$ , for a suitable relation  $R_c$  (being at the disposition of etc). It is this satisfaction type that is also the satisfaction type described by the relative clause *what Mary needs*.

Other cases of sharing with different intensional verbs such as those repeated below are to be treated similarly:

(66) John painted what he imagined, namely a castle.

(67) John found what Bill is still looking for, namely a person who can do the job.

(68) John is building what Mary needs, namely a castle.

Intensional verbs other than *need* may not have satisfaction situations associated with them, but situations that fulfil other roles in relation to the event or state described. Thus, in (66) we will have a created situation (of the act of painting) and a realization situation (of the imagination), for which the same individual concept may be defined, the one for which they share a 'satisfaction' type. In (67) we have a verification situation (of an epistemic act of 'finding') and a satisfaction situation (of a search). In (68) we have a created situation (of the building process) and a satisfaction situation (of the need).

#### 6.2.4 *The monotonicity behaviour of intensional verbs*

The observations about sharing of intentional objects can be linked to another peculiarity of intensional verbs, namely their monotonicity behaviour with respect to their intensional argument, as recently discussed by Zimmermann (2006). Two observations are of importance: first, with ordinary NPs, intensional verbs are upward monotone with respect to their intensional argument, that is, the inference in (78) is intuitively valid:

(78) John is looking for a green sweater.  
John is looking for a sweater.

Second, with special quantifiers upward monotonicity is no longer valid:

(79) John is looking for a sweater.  
Mary is looking for a book.  
There is something John and Mary are looking for.

*Something* is possible in this context only if the full intentional objects are the same:

- (80) John is looking for a sweater  
Mary is looking for a sweater.  
 There is something John and Mary are looking for.

The inference in (80) is valid only if John and Mary are just looking for a sweater—any sweater whatsoever.

Zimmermann (2006) proposes the following account to explain the peculiar monotonicity behaviour of intensional verbs: The actual argument of an intensional verb like *look for* is not necessarily the property denoted by the NP complement, but may be a more specific property, the property that is to fully match the agent's search. That is, if John is in fact looking for a green sweater and this is reported as *John is looking for a sweater*, a sweater will only partially characterize the object of John's search. Special quantifiers like *something*, by contrast, quantify over the properties that exactly match the search. Thus, Zimmermann proposes (81), where 'look for' is the relation that is to hold between an agent and his 'exact need':

- (81)a. *John is looking for an N* is true iff  $\exists P(P \leq N \ \& \ \text{look for}'(j, P))$   
 b. *John is looking for something* is true iff  $\exists P \text{ look for}'(j, P)$

Zimmermann's account translates naturally into the present terms: *something* if it does not quantify over entities like searches ranges over types of entities that would satisfy the relevant search, that is, over satisfaction types. The lack of upward monotonicity with special quantifiers follows from the fact that special quantifiers range over satisfaction types, rather than possible meanings of the full NP complement. The upward monotonicity of full NP complements of intensional verbs follows from the fact that such NPs characterize objects in situations. Thus, Zimmermann's monotonicity data are straightforwardly explained by the modified Nominalization Theory of special quantifiers in conjunction with the modal account of intensional verbs.

### 6.3 Definite NPs and satisfaction types

Satisfaction types also shed light on the semantics of definite NPs with intensional relative clauses:

- (82)a. The book John needs must be about Churchill.  
 b. \*?The book John needs is about Churchill.
- (83)a. The castle John is looking for must be huge.  
 b. \*?The castle John is looking for is huge.
- (84)a. The secretary John is looking for may be Hispanic.  
 b. \*?The secretary John is looking for is Hispanic.

The definite NPs in (82)–(84) appear to take narrow scope with respect to the intensional verb in the relative clause, and they require a modal in the main clause. Such definite NPs, I will argue, make explicit reference to satisfaction types.

Before making this precise, let us consider satisfaction types as objects. There are two kinds of properties satisfaction types can have. First, satisfaction types are composed of subproperties, those subproperties that are constitutive of the satisfaction type. Satisfaction types do not *have* such properties, in the usual sense of ‘having’, though. As Zalta (1983) would say, satisfaction types *encode* rather than *exemplify* such properties. The properties constitutive of satisfaction types can, with some effort, be predicated of satisfaction types, and this is what could make even (82b), (83b), and (84b) possible. However, this reading, that is, the reading on which predication is constitution of a satisfaction type, hardly yields a very natural reading.

Satisfaction types, of course, have other properties than those that are constitutive of them. In particular, satisfaction types have instances, and predicates can be predicated of those instances. But the instances need not be actual. The satisfaction type of John’s need of a horse does not have instances in the actual world, but only in other possible worlds, or rather, the nonactual situations satisfying his need. If the definite NPs in (82)–(84) make reference to satisfaction types, it is clear why a modal of necessity or possibility must be chosen: the modal is needed to access the nonfactual instances.

Some further observations about the definite NPs in (82)–(84) make the view very plausible that such NPs in fact refer to satisfaction types. First, the NPs are obligatorily definite:

(85) \*Some/Every book John needs must be about Churchill.

The star in (85) means ‘impossible on an intensional reading’. The definite determiner is obligatory in the construction in (82)–(84), it appears, for just the same reason that it is obligatory in constructions like *the property of being wise* or *the proposition that John likes Mary*.

Second, definites of the sort in (82)–(84) are possible with any intensional verb that involves nonfactual satisfaction situations, including psychological verbs of absence and verbs of creation in the progressive:

- (86)a. The paper John promised will be about generalized quantifiers.  
 b. The house John is building will be huge.

How are definite NPs as in (82a), (83a), and (84a) able to refer to satisfaction types? In (82a) the relative clause *that John needs* will itself express a property of satisfaction types, the property of being a satisfaction type of John’s needs. For the definite NP to refer to a satisfaction type T, T should be in the extension of *book John needs*. In order for *book John needs* to express a property of satisfaction types, the head noun *book* should not as normally express a property of individuals that is to be intersected with the property expressed by

the relative clause. Rather, it should express a property that is to be partly constitutive of a type in the extension of the relative clause. It appears that this is in fact an independently motivated alternative meaning of a property-denoting part of an NP. Thus, in the previously discussed example (58), repeated below, *luxurious* expresses a property which is not literally predicated of individuals, but rather is said to be partly constitutive of a satisfaction type that *something* ranges over:

(87) John needs something luxurious. (namely a Bentley)

This is captured by the rule in (88a) and the analysis in (88b), where  $\leq$  is the relation 'constituting a subproperty of', defined in (88c):

- (88)a. For a noun or adjective X and a type-denoting NP Y,  
 $[XY] ([YX]) = \lambda T [T \leq X \ \& \ Y(T)]$   
 b.  $[book \ John \ needs] = \lambda T [T \leq book \ \& \ John \ needs(T)]$   
 c. For an individual concept T and a property P,  $\langle T, P \rangle \in [\leq]$  iff for any situation or world s for which T and P are defined,  $T(s) \in P(s)$ .

A definite determiner can then combine with the denotation in (88b) and yield an ordinary definite description.

One further point needs to be made about the interpretation of the modal predicates in (82a), (83a), and (84a). Obviously it should not be the satisfaction type that the definite NP refers to of which the predicate is predicated (relative to the worlds the modal operator quantifies over). Rather, what happens here is that the satisfaction type T, when acting as an argument of a predicate of individuals P at a possible world w, will in fact act as if it was the instance that the satisfaction type has at w. This can be taken as a case of coercion, namely type-lowering to allow for the interpretation of the predicate. In fact, this is something generally found with NPs referring to individual concepts, for example in the following cases:

- (89)a. The future king must be healthy.  
 b. The ideal woman would come from a good family.  
 c. The future king could be a distant relative of the present king.

Here the individual concepts referred to by the subjects will be type-lowered to an individual for the purpose of the application of the predicate. This is covered more generally by the rule in (90):

- (90) For an individual concept T, a predicate of individuals P, and a world w,  $T \in P(w)$  iff  $T(w) \in P(w)$ .

Sentence (82a) can then be analysed simply as in (91):

- (91)  $\lambda x[\Box \text{ be about } Churchill(x)](\iota T[\text{need-thing}_3(\text{John}, T) \ \& \ T \leq book])$

It is interesting to note that in the construction in (82)–(84), no modal is required in the main clause when the head of the NP is not a lexical noun:

- (92)a. What John needs is a huge castle.  
 b. The thing John needs is a huge castle.

Here the definite NPs are in fact special NPs (with the relative pronoun *what* in (92a) and *-thing* in (92b)).

Such sentences do not express predication of a property of a satisfaction type, but should have a semantics entirely different from sentences like (82a, 83a, 84a). Two features distinguish sentences like (92a, b) from those in (82a, 83a, 84a). First, in sentences like (92a, b), the NP in postcopular position must specify the complete satisfaction type. Thus, (93) is unacceptable on the same intensional reading:

- (93) \*What John needs is huge. (meaning ‘what John needs is a huge castle’)

Second, sentences like (94a) and (94b) would be bad with a modal in the main clause:

- (94)a. ??What John needs must be a huge castle.  
 b. ??The thing John needs must be a huge castle.

Rather, the sentences in (94) are of an entirely different type from those in (82)–(84): they are specificational sentences, just like the sentences below.<sup>9</sup>

- (95)a. What John does not want is walk home.  
 b. The thing John does not want is walk home.

Special NPs thus in fact have yet another use besides acting as nominalizing quantifiers. Special NPs also help form subjects of specificational sentences. Specificational sentences, it is commonly agreed, do not express predication nor in fact identity among individuals. Instead, they either express a question-answer relationship or an identity among intensional objects (meanings).<sup>10</sup> Whatever their correct general analysis, it is clear that in specificational sentences the subject asks for (or provides a way of identifying) the complete satisfaction type, with the postcopular NP then spelling out that satisfaction type.

<sup>9</sup> See Higgins (1973), Sharvit (1999), den Dikken et al. (2000) as some references on specificational sentences.

<sup>10</sup> The same contrast can be observed for epistemic verbs. Thus, (1a) below is unacceptable (and with an epistemic intensional verb, there is no acceptable modal variant). By contrast, (1b) is fine, which is because it is a specificational sentence:

- (1)a. \*The horse John saw was grey.  
 b. ✓The thing John saw was a grey horse.

## 7 Summary

The main point of this paper is that the Nominalization Theory of special quantifiers can be maintained when those quantifiers act as complements of NP-taking intensional verbs, once it is allowed that those quantifiers can range also over more derivative entities than those referred to by the corresponding nominalizations. This account was embedded within several further assumptions:

1. An partly 'externalist' account of intensional NPs, the full NP complements of intensional verbs: intensional NPs partly serve to characterize situations of satisfaction and partly the internal content of the act or state described by the intensional verb. Formally this means that intensional verbs when taking a full NP complement, quantify over possible satisfaction situations partly characterized by the NP complement.
2. Nominalizations are systematically ambiguous between referring to a particular and referring to a kind, and the same ambiguity reappears with special, that is, nominalizing quantifiers.
3. Special quantifiers, when acting as complements of intensional verbs instead of referring to the event or state-like entities referred to by the corresponding nominalizations, may refer to satisfaction types, properties obtained partly from the set of possible satisfaction situations of those events or states.

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