

The Grammar of Intensionality

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Intensionality phenomena were first discussed by Frege (1893) in the context of sentential complement constructions like (1a,b). Frege noted that substitution of co-referring terms in clausal complements needn't preserve truth (1a,b).¹ Another feature of these environments is that the presence of a nonreferring or nondenoting term needn't yield a false sentence (2a). Furthermore, an indefinite in such an environment can be read nonspecifically; thus in (2b), Max can believe a famous actor to be in the movie without there being any particular famous actor such that Max believes he or she was in the movie:

- (1) a. Max believed [_{CP} [_{NP} Boris Karloff] was in the movie].
b. Max believed [_{CP} [_{NP} Bill Pratt] was in the movie].
- (2) a. Max believed [_{CP} [_{NP} a werewolf] was in the movie].
b. Max believed [_{CP} [_{NP} a famous actor] was in the movie].

Intensionality effects are not standardly observed with non-clausal complements. With noun phrase objects, for example, substitution of co-referring object NPs typically preserves truth (3a,b), and the presence of a nonreferring or nondenoting object typically yields a false sentence (3c); furthermore, an indefinite object is understood specifically, in the sense that if Max Vs an N then there is some N such that Max Vs him, her, or it (3d):

- (3) a. Max met [_{NP} Boris Karloff].
b. Max met [_{NP} Bill Pratt].
c. Max met [_{NP} a werewolf].
d. Max met [_{NP} a famous actor].

These results raise a simple, but interesting question: is the apparent correlation between clausal complementation and intensionality a real one? Is intensionality connected with a particular grammatical environment, or is the semantic phenomenon in fact a more general?

In this paper I discuss two opposing views of this question: one, sententialism, which holds to a grammatically conditioned view of intensionality, and the second intensionalism, which holds that intensionality is quite general in occurrence, and is to be found in a wide range of constructions. More exactly, I will examine three putative cases of intensionality effects in non-clausal complement structures: (i) so-called intensional transitives, (ii) adverbial modifiers, and (iii) adjectival modifiers. I will argue that in each case, recent work in syntax and semantics casts doubt upon the claim that these structures provide evidence for intensionality divorced from clausal complementation. Intensional transitives can be argued to be a form of concealed clausal structure, and hence a case of

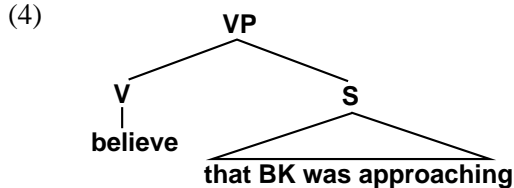
¹'Boris Karloff' was the stage name taken by Mr. William Henry Pratt.

clausal complementation after all. By contrast, adverbial and adjectival modifiers can be shown to be non-intensional in the crucial range of cases. The result is that the more restricted, sententialist picture appears sustainable.

1.0. Sententialism versus Intensionalism

In "Sense and Reference," Frege (1893) introduces intensionality in the context of clausal complementation. As is well-known, Frege ascribes intensionality in examples like (1) to the fact that the embedded sentence contributes its sense to the interpretation of the larger clause, rather than its usual referent (a truth-value). The sense or "thought" expressed by the embedded sentence is the product of the senses of its component expressions, and because *Boris Karloff* and *Bill Pratt* express different senses, the thoughts expressed by *Boris Karloff was approaching* and *Bill Pratt was approaching* are different as well. This entails a difference in truth conditions for (1a) and (1b) because Max is asserted to believe different thoughts in the two cases.

For Frege, the invocation of senses in cases like (1a,b) appears to proceed in the following way: *Boris Karloff* and *Bill Pratt* contribute senses (and not referents), because their containing sentence does. And their containing sentence contributes a sense (and not a referent), because of the presence of a verb like *believe*, which expresses a relation between an agent and a thought, the sense of a sentence. It is the presence of the clause-taking, propositional attitude verb, together with the clausal complement construction, that invokes senses.²



Frege's line of reasoning appears straightforward enough, however it leaves open the general question of our access to senses in semantics. Is the picture described above exhaustive? Is this the only way that senses can enter semantic evaluation? Or are there additional possibilities - additional configurations - in which senses can be invoked?

One view might be that senses & intensions are accessed only through thoughts, and hence only through predicates like *believe*, which express relations to thoughts. I will refer to this view as **sententialism**, because it entails that intensionality can arise only in the context of sentential complements to predicates like *believe*. A second, opposing view is that clausal complements represent only one case of a more general phenomenon: relations to

²This situation distinguishes a predicate like *believe* from a truth functional connective like *and*. The latter may combine with a sentence (cf. *Bela Lugosi was departing and Boris Karloff was approaching*), but the composition does not produce intensionality, because *and* does not relate an agent to a thought.

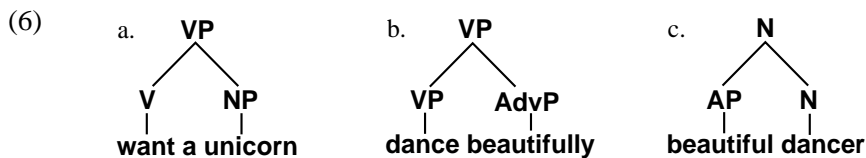
senses. Verbs like *believe* express relations to one kind of sense: the sense of a clause. But other kinds of predicates may express relations to other kinds of senses, such as the sense of a nominal or a predicate. I will refer to this second view as **intensionalism**, since in principle it would allow for intensionality to arise in any category X, so long as the expression with which X semantically combines selects for the sense of X.³

Sententialism and intensionalism have both had their exponents. But within linguistic semantics at least, intensionalism has overwhelmingly been the position of choice, in large part due to influence of Richard Montague (1970a, 1970b, 1973, 1974), whose views have formed the basis of modern formal linguistic semantics for over two decades. Montague framed his proposals within the general program of possible world semantics, analyzing intensions as functions from possible worlds to denotations. Arbitrary intensions are formed by means of an operator " \wedge ", which, for any expression α , yields an expression $\wedge\alpha$ denoting the intension of α . In his general analysis of semantic combination, Montague invokes the intensional operator wherever function-argument composition occurs. Thus in a structure of the general form $[_x Y Z]$, where Y is analyzed semantically as combining with Z as function to argument, the intensionality operator always occurs in the result. The interpretation of X is the interpretation of Y applied to the intension of the interpretation of Z:

$$(5) \quad [[[_x Y Z]]] \Rightarrow [[Y]](\wedge[[Z]])$$

Ceteris paribus, this analysis predicts intensionality effects to arise wherever function-argument combination is present, whether the combining elements be subject & object, object & verb, modifier & modified, determiner & noun, etc.

Montague (1970a, 1970b, 1973) offers three grammatical environments in support of his generalized approach to intensionality - three environments presenting themselves as semantically intensional, but syntactically non-clausal. These are: (i) transitive constructions involving one of a select set of verbs such as *want*, *need*, *seek*, *imagine*, etc., (ii) adverbial modifier constructions, and (iii) adjectival modifier constructions. These environments are illustrated schematically in (6a-c), respectively, using familiar tree diagrams:⁴



³It is interesting to observe that, despite a wide-ranging discussion of construction types, and despite his obvious awareness of the importance of senses to his analysis, Frege (1893) never embraces intensionalism. He never speaks of predicates bearing relations to any other senses but those of clauses.

⁴Montague himself did not use standard phrase-markers in representing the syntax of natural language constructions, but instead employed a syntax based on Categorical Grammar. I will ignore this detail and use tree diagrams throughout.

If the claim that these environments are both intensional and nonclausal can be upheld, this result plainly yields a direct empirical refutation of the sententialist position. In view of their importance, let us examine these cases further to see if they do indeed provide a compelling argument for intensionalism.

2.0. Intensional "Transitives"

Intensional transitive constructions show apparent verb-object syntax, but intensional behavior on the part of the object; (7a-c) represents a typical case. Suppose Max is a 1930's Hollywood producer casting a new musical, horror-film; it's clear that (7a) could be true and (7b) nonetheless false, even if the dancers and singers were the same. Similarly, it seems that (7c) could be true even assuming that *werewolf* is non-denoting. Finally, either (7a) or (7b) could be true without there being any specific dancer or singer (respectively) that Max wants:

- (7) a. Max wants a dancer
- b. Max wants a singer
- c. Max wants a werewolf.

Various classes of apparent transitive verbs have been claimed to show intensionality in this way. A rough (but by no means complete) classification is given in (8):⁵

- (8) **Verbs of Desire and Volition**
want, need, desire, hope-for, lust-for, require, insist-on, demand
- Verbs of Search and Examination**
seek, look-for, search-for, hunt-for, quest-for
- Verbs of Depiction and Imagination**
picture, imagine, suppose, conceive, envisage, envision, fancy, visualize
- Verbs of Expectation and Presumption**
expect, anticipate, foresee, await,, presuppose
- Verbs of Veneration and Worship**
venerate, revere, adore, reverence, idolize, honor
- Verbs of Resemblance and Similarity**
resemble, be-like, be-similar-to, simulate, remind-one-of

Under the Montagovian view, the analysis of intensional transitives proceeds straightforwardly along the lines sketched above. The interpretation of a verb phrase (VP) such as *wants a werewolf* is analyzed as in (9), where the interpretation of the verb applies to the intension of the interpretation of the object. The intensional operator is analyzed as the source of intensionality effects.

⁵This list is far from complete. Antonyms of verbs of these classes show similar properties. For example, along with *venerates* (as in *Max venerates Christ*) we also have *rejects* (as in *Max rejects Christ*). Furthermore, many verbs have associated adjectival predicates that show similar intensional behavior; thus: *need/be-in-need-of, desire/be-desirous-of, hope-for/ be-hopeful-of*, etc.

(9) [[[VP [V wants] [NP a werewolf]]]] ⇒ [[[V wants]]] (^ [[NP a werewolf]]])

Under the sententialist view, however, a sharply different approach is required. Given that these environments appear to be genuinely intensional, the only option for the sententialist is to ascribe a clausal syntax. If we would maintain the view that intensionality and clausal complementation are linked, we are obliged to say that, surface appearances notwithstanding, constructions like those in (7) are not really verb-object structures at all. Rather they are verb-clause structures in which significant portions of the clausal complement have been "concealed" or left abstract.

2.1. Concealed Clausal Complements

In fact a "hidden clause" analysis of intensional transitive constructions is plausible in many cases, and has been urged by a number of researchers. Quite typically, intensional transitive constructions have a close paraphrase involving a clausal, or clause-like construction. Consider the pairs in (10), for instance, with verbs drawn from the first four classes in (8):

- (10) a. i. Max wants [Boris (in his movie)].
 ii. Max wants [PRO to have Boris (in his movie)].
 b. i. Max is seeking [a vampire].
 ii. Max is seeking [PRO to find a vampire].
 c. i. Max visualized [a unicorn].
 ii. Max visualized [a unicorn in front of him].
 d. i. Max expects [a spaceship].
 ii. Max expects [a spaceship to appear].

For verbs of volition and search, the transitive form typically corresponds to a nonfinite complement construction containing a "silent" subject (*PRO*) and one of a small number of understood verbs. Thus, with the volitional verbs, V-NP, almost always has a counterpart clausal form V-*to-have*-NP. And with verbs of search, V-NP generally has a matching clausal form V-*to-find*-NP. For verbs of depiction, the transitive form typically corresponds to a "small clause" construction, containing an overt subject and a bare predicate. Thus V-NP corresponds to V [NP XP], where XP is some kind of bare predicate phrase, such as a PP (*in front of him*), or an AP (*present*), etc.

The hidden clause analysis of intensional transitives is supported by certain well-known empirical phenomena. Consider, for example, the fact that (11a,b) are both ambiguous depending on what the adverb *tomorrow* is taken to modify:⁶

- (11) a. Max will need to have a bicycle tomorrow. (ambiguous)
 b. Max will need a bicycle tomorrow. (ambiguous)

⁶This point is noted by McCawley (1974), Karttunen (1976), and Ross (1976). The latter attributes the basic observation to Masaru Kajita.

In (11a), the adverb can be understood as modifying either the matrix verb *need* or the embedded verb *have*: it can either be the needing that will be tomorrow (cf. *Tomorrow Max will need to have a bicycle*), or the having that will be tomorrow (cf. *Max will need to have a bicycle, and he must have it tomorrow*). A similar pair of readings is available for (11b). In the clausal case, the ambiguity can be analyzed straightforwardly as arising from the two possible attachments for *tomorrow* (12a,b).

- (12) a. [Max will need [PRO to have a bicycle tomorrow]]
 b. [Max will need [PRO to have a bicycle] tomorrow]

If (11b) is underlying clausal, then its ambiguity can be explained in exactly the same way (13a,b):

- (13) a. [Max will need [PRO TO HAVE a bicycle tomorrow]].
 b. [Max will need [PRO TO HAVE a bicycle] tomorrow]].

If we reject this approach, we must provide an alternative analysis of the ambiguity in (11b). And we must also explain why ambiguity fails to arise with extensional transitive verbs that do not select clauses, such as *repair/ride*:

- (14) Max will ride/repair a bicycle tomorrow. (unambiguous)

2.2. Intensional Transitives of Volition and Search as Restructuring Verbs

For the sententialist who is a realist about linguistic theory and is interested in more than traditional analysis of concepts, the main challenge posed by intensional transitives is syntactic.⁷ For then the task is not merely to provide a bi-clausal analysis of intensional transitive structures that offers an intuitively acceptable paraphrase relation (*want* NP \Leftrightarrow *want to have* NP). The sententialist must show that this analysis represents the actual structure of the sentences in question and accords with established syntactic theory.

This challenge is a formidable one. As noted above, the bi-clausal analysis of intensional transitives requires a significant amount of inaudible structure in the complement. Modern grammatical theory sharply constrains the distribution of such inaudibilia through a highly restrictive set of principles. Hence inaudible verbs, tense elements, complementizers, etc., must be shown to fall under these principles. Furthermore, the bi-clausal analysis assumes a dependency to hold between specific higher verbs (such as *want* or *need*) and specific, lower, abstract verbs (like *HAVE*). Given the non-local nature of the relation, this dependency is not easy to express. Finally, the bi-clausal analysis is obliged to explain why intensional transitives and their overt clausal counterparts behave differently in certain cases. Consider the fact that passive can front the object of an intensional transitive

⁷By a "realist approach," I mean one that views linguistic theory as theorizing about a real body of knowledge (knowledge of language) acquired by the speaker in the course of language acquisition. For a general defense of realism in linguistics see Chomsky (1975, 1986, 1995). For a realist approach to semantic theory, see Larson and Segal (1995).

verb, but cannot front the corresponding NP in its putative clausal source (15a,b):

- (15) a. A werewolf is needed t by Max
b. *A werewolf is needed [PRO to have t] by Max.

Some account must be given of such divergences.

2.2.1 Restructuring

Larson, den Dikken and Ludlow (1996, 1997) are recent attempts to take up the syntactic challenges of a bi-clausal analysis within modern syntactic theory. The key starting point for these authors is the observation that certain intensional transitives in English correspond to verbs that, in other languages, undergo a special process through which bi-clausal structure seems to "collapse".⁸ In the Romance languages some volitional verbs may undergo a syntactic operation permitting complement elements to behave syntactically as if they were members of the matrix clause. This operation is known in the literature as **restructuring**, and is illustrated by the Italian data in (16) and (17), from Burzio (1986). (16a) shows that non-finite complements generally do not allow object clitic pronouns from the complement clause to be promoted into the matrix clause. With volitional verbs like *volere* 'want', however, promotion of a clitic is possible (16b). Similarly, (17a) shows that the passive-like impersonal construction in Italian doesn't in general allow promotion of a complement object to matrix subject position. However, (17b) illustrates that with verbs like *volere* such movement is possible:

- (16) a. *Mario **lo** odia [PRO leggere t].
Mario it hates to read
'Mario hates to read it'
b. Mario **lo** vuole [PRO leggere t].
Mario it wants to read
'Mario wants to read it'
- (17) a. ***Questi libri** si odiavano proprio [PRO leggere t].
these books SI hated really to read
'We really hated to read these books'
b. **Questi libri** si volevano proprio [PRO leggere t].
these books SI wanted really to read
'We really wanted to read these books'

Numerous analyses have been proposed for the restructuring phenomenon. One persistent intuition is that these examples exhibit some form of "clause-union" in which a biclausal structure becomes, at some level, uni-clausal (Aissen and Perlmutter (1983), Rizzi (1978)).

⁸The discussion in this and the next paragraph is adapted directly from Larson, den Dikken and Ludlow (1997).

A complementary intuition is that the matrix and embedded predicates merge to form a single complex form - 'want-to-read' - so that objects of the complement verb become objects of the single, merged form.

Developing ideas by Burzio (1986), Baker (1988) proposes that infinitival complements embedded under restructuring verbs like *volere* involve a form of verb incorporation. First, the complement verb phrase (VP) raises from its source position (18a) to the front of the embedded clause (CP) (18b).⁹ From this point, the lower verb incorporates into the matrix verb by adjoining to it (18c). As Baker discusses in some detail, incorporation has the effect of extending the domain of the matrix verb; whereas the clitic *lo* was initially governed only by the lower verb *leggere* 'read', it is now governed by the complex form *vuole-leggere*, 'want-to-read'. This change in government relations is what allows the object clitic pronoun to move into the matrix clause, as shown in (18d). A similar story accounts for the object promotion in (17b).

- (18) a. Mario vuole [_{CP} [PRO [_{VP} leggere lo]]]
 b. Mario vuole [_{CP} [_{VP} leggere lo] [PRO t]]
 c. Mario vuole-leggere [_{CP} [_{VP} t lo] [PRO t]]
 d. Mario lo-vuole-leggere [_{CP} [_{VP} t t] [PRO t]]

Larson, den Dikken and Ludlow extend this analysis directly to intensional transitives of volition and search in English. Simplifying slightly, *Max needs a werewolf* is assigned the derivation in (19), and *Max seeks a werewolf* receives the derivation in (20). As above, the lower verb phrase raises up and the hidden verb (*HAVE* or *FIND*) incorporates into the higher one, forming a complex predicate:¹⁰

⁹In the derivations below, I use *t* to stand for the structural "trace" of the moved element.

¹⁰Quine (1960) suggests that surface transitive constructions like (ia) be paraphrased with infinitives embedded under *try*, as in (ib). However, Larson, den Dikken and Ludlow point out that they can also be paraphrased as in (ic), retaining the original main verb:

- (i) a. Max is looking for/seeking survivors.
 b. Max is trying [_{CP} PRO to find survivors].
 c. Max is looking/seeking [_{CP} PRO to find survivors].

This result is interesting insofar *look-for* and *seek* appear equivalent to *try-to-find* in (ia), but equivalent to *try* alone in (ic) since 'find' is contributed independently. Larson, den Dikken and Ludlow suggest that the same verbs *look-for* and *seek* are present in (ia) and (ic) with meaning equivalent to *try*. They suggest that the additional 'find' meaning in (ia) results from incorporation of the abstract, independent *FIND* predicate, equivalent to that found overtly in (ic). Note that this move forestalls the worry expressed by Partee(1974) that if all verbs of search are "decomposed" as *try to find* NP, then differences among them will be lost. What is claimed here, in effect, is that verbs of search differ in the way in which the agent tries to locate the object in question, but not in the goal

- (19) a. Max needs [_{CP} [PRO [_{VP} HAVE a werewolf]]]
 b. Max needs [_{CP} [_{VP} HAVE a werewolf] [PRO t]]
 c. Max needs-HAVE [_{CP} [_{VP} t a werewolf] [PRO t]]
- (20) a. Max seeks [_{CP} [PRO [_{VP} FIND a werewolf]]]
 b. Max seeks [_{CP} [_{VP} FIND a werewolf] [PRO t]]
 c. Max seeks-FIND [_{CP} [_{VP} t a werewolf] [PRO t]]

This derivation succeeds in capturing many of the desired properties of the intensional transitive construction. Since the higher and lower verbs (*need-HAVE*, *seek-FIND*) ultimately form a single complex predicate, the relation between the two is ultimately a very local one, and can be "checked" in the local configuration. Likewise the contrast in behavior noted in (15a,b) can be ascribed to the fact that the intensional transitive has undergone restructuring, raising the downstairs object (*a werewolf*) into the matrix clause. From there it can be promoted to subject position (15a), analogously to what occurs in (17b). By contrast in (15b) the complement clause has not undergone restructuring and hence promotion is not possible.

2.2.2 Try as a "Tense-Defective" Restructuring V

The analysis also affords some grasp on certain differences between intensional transitives. We noted earlier that temporal modifiers provide evidence in favor of a concealed clause analysis of *need* and *want*. Thus (11b) (repeated below) is ambiguous with respect to the attachment of *tomorrow*, just like its full clausal counterpart (11a):

- (11) a. Max will need to have a bicycle **tomorrow**. (ambiguous)
 b. Max will need a bicycle **tomorrow**. (ambiguous)

Perhaps surprisingly, however, *seek* and *look-for* do not show the same behavior. Partee (1974) observes that (21a) is ambiguous in a way parallel to (11a); thus Fred can be understood as trying before the meeting began, or he can be understood as having the goal of locating the minutes before the meeting began. By contrast, (12b) is unambiguous: it has only the first reading corresponding to a main clause attachment for the adverb:

- (21) a. Fred was trying to find the minutes **before the meeting began**. (ambiguous)
 b. Fred was looking for the minutes **before the meeting began**. (unambiguous)

Interestingly, in recent work Wurmbrand (1997) notes facts suggesting that certain restructuring infinitives may lack an independent tense specification in their complements. Specifically, she observes the following contrasts between German *versuchen* 'try' and *beschliessen* 'decide':

of their efforts: the finding of it.

- (22) a. i. #Hans **versuchte** Maria in zwei Monaten in Wien zu besuchen
 Hans tried Maria in two months in Vienna to visit
 'Hans tried to visit Maria in Vienna in two months'
 ii. Hans **beschloß** Maria in zwei Monaten in Wien zu besuchen
 'Hans decided to visit Maria in Vienna in two months'
- b. i. #weil Maria zu Weihnachten den Hans an seinem Geburtstag
 because Maria on Christmas Hans on his birthday
 zu besuchen **versuchte**
 to visit tried
 'because Maria tried on Christmas to visit Hans on his birthday'
- ii. weil Maria zu Weihnachten den Hans an seinem Geburtstag zu besuchen
 beschloß
 'because Maria decided on Christmas to visit Hans on his birthday'

As Wurmbrand discusses, *versuchen* patterns as a restructuring verb according to tests of clitic promotion and the availability of "super-passive" movement similar to that seen in (17b). Correlatively, *versuchen* resists an independent temporal specification in its complement. By contrast, *beschliessen* is not a restructuring verb by the same tests, and *beschliessen* permits independent temporal reference in its complement. These points suggest that the lack of ambiguity observed by Partee (1974) is plausibly due to an independent fact about restructuring verbs of the *try*-class: the fact that they are "tense-defective" in an important sense. If so, then although the presence of ambiguity with temporal adverbs is evidence in favor of a concealed complement, the lack of such ambiguities is not (contra Partee (1974)) evidence against such an analysis. The non-ambiguity is plausibly due to an independent fact about these verbs, one that is observable even when the complement clearly contains more than the bare nominal of an intensional transitive construction.¹¹

Larson, den Dikken and Ludlow (1997) represents one recent attempt to give a sententialist analysis of intensional transitive constructions. Although many specific cases remain to be analyzed, the basic programme and its obligations are clear-cut: to analyze intensional transitives as bi-clausal, but at the same time to link them to constructions in which bi-clausality is concealed by grammatical reduction and restructuring processes. The success of this program is for the future to determine, but at the very least it appears to represent a promising and coherent alternative to the Montagovian thesis that intensionality is simply available in transitive constructions.

3.0. Intensionality in Adverbial Modification

Let us turn now to Montague's second putative instance of non-clausal intensionality: adverbial modification. As it turns out there are there are two discrete groups of cases to

¹¹Wurmbrand (1997a,b) actually proposes that all restructuring infinitives lack a tense projection in their complements, and thus that all should resist independent modification by temporal adverbs. Unfortunately, her discussion simply ignores the facts of *want*, which is a restructuring verb by standard tests and yet does permit independent time adverbs.

consider, which I will term **fully intensional adverbs** and **partially intensional adverbs**.

3.0.1. Fully Intensional Adverbs

Fully intensional adverbs show all the intensional behavior observed with clausal complementation; (23a-c) are examples.

- (23) a. Olga **allegedly** dances.
b. Olga levitated **in Rudolphe's dream**.
c. DeKok **supposedly** met a pick-pocket.

Substitution of coextensive predicates can fail to preserve truth with this class. Thus if the dancers and singers are the same, it will follow that if Olga dances, she sings. But this will not entail that if Olga allegedly dances, she allegedly sings. Likewise, the presence of a non-denoting predicate may fail to induce falsity. (23b) can be true despite the fact that *levitate* is (I assume) non-denoting in this world. Finally, an indefinite in the scope of the adverb needn't receive a specific interpretation. If DeKok supposedly met a pick-pocket, it doesn't follow that there is a pick-pocket that DeKok supposedly met.

3.0.2. Partially Intensional Adverbs

In addition to the fully intensional adverbs, there is a second class of adverbial constructions showing a subset of the semantic behavior observed with clausal complements. (24a-c) and (25a-c) are examples:¹²

- (24) a. Max **intentionally** fell.
b. Olga **reluctantly** danced in the ballet.
c. Izzy **willingly** ate spinach.
- (25) a. Olga dances **beautifully**.
b. Kathrin manages the team **skillfully**.
c. Jean sings **at three o'clock**.

The situation with these forms is more complicated than with the previous class. In brief, all the relevant adverbs show the intensional behavior of blocking substitution with co-extensive predicates. None show the intensional behavior of allowing a truth when combined with a non-denoting predicate. And some show the nonspecific readings characteristic of intensional environments

To illustrate the first point, consider the verbs *dances* and *sings* and assume the two predicate to denote the same set. Plainly, even in these circumstances (26a,b) do not entail each other. Substitution of co-extensive predicates thus fails.

¹²The adverbs in (25a-c) are discussed in Partee (1974).

- (26) a. Olga dances willingly/beautifully.
 b. Olga sings willingly/beautifully.

Next, observe that when adverbs like *willingly*, *intentionally*, *beautifully*, and *skillfully*, and prepositional phrases like *at three o'clock* combine with a nondenoting predicate they always yield a falsity. Thus (27) is false with all of the indicated adverbs, given that *levitates* is not (we assume) true of any individuals:

- (27) Olga levitated willingly/skillfully/beautifully/at three o'clock

None of the class of adverbs illustrated in (24) or (25) show the intensional property of being able to combine with a non-denoting predicate to yield a truth.

Finally, consider the pair in (28a,b). Notice that (28a) can be true without there being any particular word that Max repeated intentionally. Max may have decided to add repetition to his speech without intending to reiterate any particular word. By contrast if (28b) is true, then there must be a word - a particular expression - that Max repeated quickly.

- (28) a. Max repeated a word **intentionally**.
 b. Max repeated a word **quickly**.

More generally, adverbs of the *intentionally*-class appear to support the non-specific reading characteristic of intensional environments whereas manner adverbs like *beautifully*, *skillfully*, *quickly*, etc. do not support the non-specific reading.

3.1. The Intensionalist Account

The intensionalist account of fully intensional adverbs is parallel to its account of intensional transitives: semantic combination of an adverb and a verb phrase introduces an intensional operator, which accounts for the intensionality effects. Coextensive predicates cannot be substituted because substitution would occur within the scope of " \wedge " (29).

- (29) a. Suppose: $\{x: x \text{ dances}\} = \{x: x \text{ sings}\}$
 Then: *Olga dances.* \leftrightarrow *Olga sings.*
 But: *Olga allegedly dances.* \nleftrightarrow *Olga allegedly sings.*
 b. Analysis: **allegedly'**(\wedge **dance'**)(o) \nleftrightarrow **allegedly'**(\wedge **sing'**)(o)

Likewise, the intensional operator allows for the potential truth of *Olga allegedly levitates*, since *allegedly levitates* may have a non-empty extension even if *levitates* does not (30):

- (30) a. Suppose: $\{x: x \text{ levitates}\} = \emptyset$
 Then: *Olga levitates* is false.
 But: *Olga allegedly levitates* may be true
 b. Analysis: **allegedly'**(\wedge **levitate'**)(o)

Finally, the semantics of " \wedge " does not support exportation of an existential quantifier in its scope; the existence of a world w in which some individual ϕ 's does not ensure the existence

of an individual in our world that ϕ 's. Hence the possibility of a nonspecific reading in the scope of an adverb that introduces " \wedge " (31):

- (31) a. *DeKok supposedly met a pick-pocket.* $\text{---}/\rightarrow$
There is a pick-pocket that DeKok supposedly met.
 b. Analysis: **supposedly'**($\wedge\lambda y[\exists x[\text{pick-pocket}'(x) \wedge \text{met}'(y,x)]]$)(d)

The situation with partially intensional adverbs is somewhat more involved. Consider first the issue of non-denoting predicates. We noted that *willingly*, *intentionally*, *beautifully*, *skillfully*, etc. depart from intensional behavior in so far as they always yield a falsity when they combine with an empty predicate like *levitate*. Thus *Olga levitated skillfully* cannot be true given that *levitates* has a null extension. Within an intensionalist account, this behavior can be taken to follow from an auxiliary fact about the adverbs in question, namely that they fall under a semantic postulate like (32a). The latter allows an adverbially modified predicate ($\text{Adv}'(\wedge\Pi)$) to hold of an individual x , only if the unmodified predicate (Π) holds of x . In the case at hand, this postulate mandates that *Olga levitates skillfully* can be true only if *Olga levitates* is itself true, contrary to fact (32b):¹³

- (32) a. $\forall x\forall\Pi [(\text{Adv}'(\wedge\Pi))(x) \rightarrow (\Pi)(x)]$
 b. $\text{---} [(\text{skillfully}'(\wedge\text{levitates}'))(o) \rightarrow (\text{levitates}')(o)]$

According to this analysis, then, although the presence of a nondenoting predicate does yield falsity with these adverbs, the departure from expected intensional behavior follows from an independent lexical fact about items of this class: the fact that they fall under postulate (32a). The environment in question is intensional; it's simply that some intensionality effects are masked by independent properties of the adverbs. So the account goes.

Finally, consider the unavailability of non-specific readings with manner adverbs like *beautifully* and *skillfully*, as opposed to adverbs like *willingly* and *intentionally*. To my knowledge this issue has been not explicitly discussed in the literature on intensionality, and indeed appears to present a problem for the Montagovian account. The postulate in (32a) does not explain it. The latter guarantees that if Max repeated a word quickly, then Max repeated a word, and hence there was a word that Max repeated. But this doesn't entail there being a word that Max repeated quickly. Note further that cannot appeal to a meaning postulate that would simply extensionalize V-Adv combinations with adverbs like *beautifully* and *skillfully*. To do this would lose the fact that substitution of coextensive terms is blocked in their scope. But then how do we account for the apparently obligatory exportation of the indefinite? The answer is not apparent.

¹³For a postulate of this kind, see Dowty, Wall and Peters (1981) p.234, who attribute it to Bennett (1974).

3.2. The Sententialist Account

Let us now consider a sententialist account of the adverb facts. For the sententialist, the class of fully intensional adverbs is fairly straightforward insofar as all of these forms have counterpart predicates taking a clausal complement (33a-c). Notice that in each case the verbal material corresponds to material inside the clausal complement - that is, to material in an intensional environment on the sententialist account. Hence we expect the observed intensionality effects.

- (33) a. i. Olga **allegedly** dances.
ii. Ivan **alleges** that Olga dances.
b. i. DeKok **supposedly** met a pick-pocket.
ii. It is **supposed** that DeKok met a pick-pocket.
c. i. Rudolph was dancing **in Natasha's dream**.
ii. Natasha **dreamed** that Rudolph was dancing.

The general lines of the sententialist analysis are therefore clear: the "i" cases of (33a-c) should all be analyzed as involving a clausal complement to the adverb.

Interestingly, under current syntactic proposals, VP adverbs do in fact have a clause-like object as their complement. Kitagawa (1986), Kuroda (1988), Koopman and Sportiche (1991) and Chomsky (1995) have argued that in underlying form, all arguments of a verb, including the subject originate within the verb phrase. Thus (34a), for instance, is analyzed as in (34b), where the subject *Max* begins inside VP and where the subject position is initially empty (*e*). *Max* subsequently raises out of VP to its surface position (34c):

- (34) a. Max will probably eat spinach
b. e will probably [_{VP} Max eat spinach]
c. Max will probably [_{VP} t eat spinach]

This analysis entails that modals like *will*, and VP adverbs like *probably*, *supposedly*, *allegedly*, attach to a structure that is semantically clausal, insofar as it contains a verb and all its arguments. There is thus no barrier to regarding these adverbs as clausal-complement taking in the semantic sense.¹⁴

The sententialist analysis can also be extended to certain of the adverbs that we have identified as partially intensional. Recall that forms like *intentionally*, *reluctantly* and

¹⁴Note that the raising analysis also suggests how the subject in a sentence like (ia) can behave intentionally:

- (i) a. A unicorn allegedly gored Max..
b. e allegedly [_{VP} a unicorn gored Max]
c. A unicorn allegedly [_{VP} t gored Max]

On the raising account, the subject actually begins within the scope of the adverb (ib,c), and presumably retains its option of being interpreted in that position.

willingly block substitution of co-extensive forms and permit a non-specific reading of an indefinite, but do not combine with a non-denoting predicate to yield a truth. Interestingly, there is a class of clause-taking predicates with very similar properties. Consider the pair *believe* and *regret* and their behavior as illustrated in (35a-c)

- (35) a. i. Max believes/regrets that **Boris Karloff** is unavailable.
 ii. Max believes/regrets that **Bill Pratt** is unavailable.
 b. Max believes/regrets that **a Norwegian** was involved.
 c. i. Max believes that **a unicorn** is approaching.
 ii. Max regrets that **a unicorn** is approaching.

Notice that both verbs block substitution of *Bill Pratt* for the co-extensive term *Boris Karloff*: Max can believe or regret the unavailability of the one without believing or regretting the unavailability of the other (35a). Note also that both support a nonspecific reading for the indefinite *a Norwegian*: the truth of (35b) doesn't require there to be any particular Norwegian that Max has beliefs or regrets about. Interestingly, however, *believe* and *regret* part company when their complement contains a non-denoting predicate. Although (35c.i) can be true despite the real-world absence of unicorns, (35c.ii) cannot be true. Max cannot regret the approach of a unicorn if there are no unicorns in the world. The departure from full intensional behavior with verbs like *regret* is generally analyzed by saying that *regret* (unlike *believe*) presupposes the truth of its complement. Thus for any S, regretting S presupposes the truth of S. Clause-taking verbs having this behavior are called "factive" (refs.). Other factive verbs include *know*, *understand*, and *accept*.

Under a sententialist analysis of intensional adverbs, we might expect forms parallel to *believe* and *regret*. That is, we might expect adverbs like *allegedly*, which show fully intensional behavior parallel to *believe*. But we might also expect adverbs showing partially intensional behavior like *regret*; these would block substitution and permit non-specificity, but would yield falsity with a non-denoting predicates given their factivity. Adverbs like *intentionally*, *reluctantly* and *willingly* are obvious candidates. It is natural to take these forms to be the adverbial counterparts of verbs like *regret*, which are intensional but presuppose the truth of their complement. Under this proposal, we would require no separate extensionalizing postulate like (32a) for these forms.¹⁵ Rather, the account of factivity for them would simply fall together with that of forms like *regret*, *know*, *understand*, etc.¹⁶

¹⁵If the factivity of verbs like *regret* is a matter of presupposition, and not entailment, and if *regret* and *willingly*-class adverbs are to be treated in parallel, then in fact we do not want a postulate like (32a).

¹⁶Partee (1974) notes the factivity of VP adverbs like *intentionally*, *reluctantly*, and *willingly*, but questions a sententialist analysis of them given that they seem to lack an adequate clausal paraphrase. She writes (p.91): "On the [sententialist] alternative, the problem is to find a suitable paraphrase to serve as the underlying form...I am convinced that no such suitable paraphrases exist..." The point seems to me to beg the question of what constitutes a clause. Modern grammatical theory recognizes a spectrum of clausal complements including full, tensed finite clauses (ia), subjunctives (ib), independent infinitives (ic), so-called "ECM infinitives" (id), and "small clauses" (ie), among others. These clausal complement types are not readily, or regularly paraphrasable one with another:

These remarks suggest that a sententialist analysis can handle fully intensional adverbs in a way that is syntactically and semantically plausible, and that it can also handle partially intensional adverbs like *intentionally*, *reluctantly* and *willingly* by analyzing them as clause-taking factives. On reflection, however, one class of adverbs remains as problematic for the claim that intensionality is tied to clausal complementation. This is the class of adverbs like *beautifully*, *skillfully*, and *at three o'clock*. The latter do not have a plausible sententialist analysis in so far as they do not appear to relate an individual to a proposition. On the other hand they do appear to show intensional behavior in so far as they block substitution of co-extensive terms. The account of this behavior in an intensionalist account like Montague's is the same as that given earlier for *allegedly*; substitution failure is attributed to the presence of the intensional operator:

- (36) a. Suppose: $\{x: x \text{ dances}\} = \{x: x \text{ sings}\}$
 Then: *Olga dances.* \leftrightarrow *Olga sings.*
 But: *Olga dances beautifully.* \nleftrightarrow *Olga sings beautifully.*
 b. Analysis: **beautifully'**([^]**dance'**)(o) \nleftrightarrow **beautifully'**([^]**sing'**)(o)

If the sententialist position is to be maintained, the intensional account of substitution failure in (36) must be shown to be wrong, and an alternative account of substitution failure must be found. In other words, the sententialist must show that it is wrong to invoke the same mechanism to explain substitution failure with *dance/sing allegedly* versus *dance/sing beautifully*. And a better account must be offered.

3.3. More on Substitution Failure

McConnell-Ginet (1982) supplies the first demonstration, providing two simple but compelling reasons for rejecting the Montagovian intensional analysis of substitution failure with adverbs like *beautifully* and *quickly*.¹⁷

-
- (i) a. Max said [that she was on the boat].
 b. Max insisted [that she be on the boat].
 c. Max wanted [(for) her to be on the boat].
 d. Max believed [her to be on the boat].
 e. Max needed [her on the boat].

In the account suggested here, VP adverbs like *allegedly* and *willingly* combine with the equivalent of a VP small clause. There is thus no greater expectation that they will have, say, finite-clause paraphrases than there is that (ie) will have such a paraphrase (cf. **Max needed that she was on the boat.*).

¹⁷The discussion in this section and the following ones is adapted from Larson (1998, in prep), which contains a fuller presentation of the ideas discussed here.

Substitution Failure Does Not Entail Intensionality

Consider the argument and analysis given in (37), parallel to (36). Suppose the sets of individuals who eat and cook are identical, so that Olga eats iff Olga cooks. Under this assumption, it still doesn't follow that Olga eats fish iff Olga cooks fish (25a). Reasoning as before our diagnosis would be that the object combines with the verb as function to argument, invoking intensions (37b):

- (37) a. Suppose: $\{x: x \text{ eats}\} = \{x: x \text{ cooks}\}$
Then: *Olga eats.* \leftrightarrow *Olga cooks.*
But: *Olga eats fish.* \nleftrightarrow *Olga cooks fish.*
b. Analysis: **fish'**(**eat'**)(**o**) \nleftrightarrow **fish'**(**cook'**)(**o**)

But we do not give this analysis in fact. Rather, we attribute substitution failure to a relationality in *eat* and *cook* that is concealed in the simple intransitive absolute forms (38a,b). If *eat* and *cook* are reanalyzed as transitive, then the inference pattern in (37a) is predicted on simple 1st-order grounds. (39a) doesn't entail (39b), but intensions have nothing to do with it:

- (38) a. $\text{eat}(x,y)$
b. $\text{cook}(x,y)$
- (39) a. $\forall x [\exists y[\text{eat}(x,y)] \leftrightarrow \exists y[\text{cook}(x,y)]]$ "Whoever eats cooks "
b. $\forall x [\text{eat}(x,\text{fish}) \leftrightarrow \text{cook}(x,\text{fish})]$ "Whoever eats fish cooks fish"

The first point is thus that substitution failure is not a transparent diagnostic for intensionality. Logic allows for different sources of entailment failure in such cases. Hidden relationality, in particular, is an alternative source.¹⁸

Intensionality Does Not Track Our Intuitions about the Cases

McConnell-Ginet's second point can be seen by comparing the two cases of substitution failure given in (40a) and (41a), the analyses suggested for them, and the intuitive correctness of these analyses given how we actually reason with the cases.

- (40) a. Suppose: $\{x: x \text{ dances}\} = \{x: x \text{ sings}\}$
Then: *Olga dances.* \leftrightarrow *Olga sings.*
But: *Max thinks Olga dances.* \nleftrightarrow *Max thinks Olga sings.*
b. Analysis: **think'**(**m**, **dance'**)(**o**) \nleftrightarrow **think'**(**m**, **sing'**)(**o**)

¹⁸Intensionality may be looked at as hidden relationality if object-language predicates are relativized to possible worlds (e.g., $\text{dancer}(x,w)$ "dancer in world w "). In this case the point would be that hidden dimension made available by possible worlds semantics is not the correct one for accounting for substitution failure with adjectival modification.

- (41) a. Suppose: $\{x: x \text{ eats}\} = \{x: x \text{ cooks}\}$
 Then: *Olga eats.* \leftrightarrow *Olga cooks.*
 But: *Olga eats fish.* \nleftrightarrow *Olga cooks fish.*
 b. Analysis: **eat'(o,f)** \nleftrightarrow **cook'(o,f)**

An informal account of the lack of entailment in (40a) might go as follows: "Even if the actors and singers happen to coincide in this world, in the world of Max's thoughts the two sets might well diverge. So, thinking that the one predicate is true of Olga might very well be different than thinking that the other is true of her." Here we are using the idea of worlds compatible with the beliefs of the subject (Max). The appeal to alternative worlds offers a plausible model of why speakers judge the inference to fail.

By contrast, substitution failure in (41a) arises from an intuitively different source. It's not a matter of what *eats* and *cooks* might have meant in alternative circumstances. Rather there is a hidden dimension in the predicates. "Look," we might say, "whenever there is eating, there is eating of something. Likewise whenever there is cooking, there is cooking of something. And even if all the same people eat and cook, it still needn't be true that any of them eats and cooks the same thing." Here our explanation doesn't appeal to potential extensions in alternative worlds; rather it analyzes the predicate more finely in this world.

Now reconsider the adverbial entailment paradigm in (36), and our intuitions about why substitution fails. Interestingly, as McConnell-Ginet observes, they do not seem to involve thinking about who *dance* and *sing* might have applied to in alternative circumstances, but rather to hidden relationality. "Look," we might say, "whenever there is dancing and singing there is a performance. And even if the same people dance and sing, the performances are still different. And one might be beautiful, and the other not." Reasoning this way, we follow the model of (41), and not the model of (40).

The second point is thus the following: for the cases at hand, an intensional analysis of substitution failure in adverbial modification (unlike an intensional analysis of substitution failure in clausal complements) does not correctly track our intuition about why inference fails. Not only does logic provide us with alternative means of understanding why substitution fails, the alternative seems to offer a better model of how we actually reason in these cases.

3.4. Davidson's Analysis of Adverbial Modification

Davies (1991) rediscovered McConnell-Ginet's points about substitution failure with adverbials, but put the issue in a stronger form. Davies notes that the lack of entailment from *sang beautifully* to *danced beautifully* holds not only if singers and dancers happen to be the same, but even if they are necessarily are the same. Even if singers and dancers coincided in all possible worlds, it still wouldn't follow intuitively that singing beautifully would entail dancing beautifully, or vice versa.

Davies (1991) goes on to make an interesting proposal based on Davidson's 1967 theory of adverbial modification. On Davidson's view, action verbs like *sing* and *dance* are not simple one-place, intransitive predicates. Rather they are relational, containing an extra argument place for an event *e* (42a,b). Adverbs relate to verbs by being predicated of the

Fully intensional adjectives show the complete range of intensionality effects when combined with a noun (44a-c).

- (44) a. Olga is an **alleged** dancer.
b. Alice is an **imagined** werewolf.
c. Boris is a **supposed** perpetrator of a crime.

Substitution of coextensive predicates can fail to preserve truth; if the dancers and singers are the same, it will follow that if Olga is a dancer, she is a singer. But this will not entail that if Olga is an alleged dancer, she is an alleged singer. Likewise, the presence of a non-denoting predicate may fail to induce falsity. *Alice is imagined werewolf* can be true despite the fact that *werewolf* is (we hope) non-denoting. Finally, an indefinite in the scope of the adverb needn't receive a specific interpretation. If Boris a supposed perpetrator of a crime, it doesn't follow that there is a particular crime that Boris has been supposed to commit.

(45a-c) illustrate the partially intensional adjectives that are counterpart to *intentionally*, *reluctantly*, and *willingly*.

- (45) a. Max made an **intentional** mistake.
b. Olga was a **reluctant** dancer.
c. Boris was a **willing** perpetrator of a crime.

Like the corresponding adverbs, these forms block substitution; if Olga is a reluctant dancer she is not necessarily a reluctant singer, even if singers and dancers are the same. Likewise these adjectives license a non-specific indefinite in their scope: Boris can be a willing perpetrator of a crime without there being a particular crime that he willingly committed. He simply might enjoy acting illegally. But unlike the fully intensional adjectives, forms of this class cannot combine with a non-denoting predicate to yield a truth; *Alice is a reluctant levitator* cannot be true given that there are no individuals that levitate.

Finally, (46a-c) illustrate the second class of partially intensional adjectives, which are the counterparts of adverbs like *beautifully*, *skillfully*, *quickly*, etc. Some care must be taken here, since attributive adjectives of this kind are often ambiguous between what are often termed "intersective" and "nonintersective" readings; thus (46a) has the two readings paraphrased informally in (47a,b):

- (46) a. Olga is a **beautiful** dancer.
b. Kathrin is a **skillful** manager.
c. Peter is an **old** friend.
- (47) a. 'Olga is a dancer and Olga is beautiful' (intersective)
b. 'Olga is beautiful as a dancer'/'Olga dances beautifully' (nonintersective)

On the first reading, *beautiful* applies to Olga; she herself is beautiful, even if her dancing is awkward. On the second reading, *beautiful* applies to Olga qua dancer; Olga's dancing is beautiful even if she herself is unattractive. Similarly, (46b) can mean that Kathrin is a manager and a skillful person - the intersective reading; alternatively it can mean that she is

skillful as a manager or that she manages skillfully - the nonintersective reading. Likewise, (46c) can mean that Peter is a friend who is old or aged; or it can mean that Peter is a friend of longstanding.

(46a-c), on their nonintersective readings, exhibit the partial intensional behavior of their corresponding adverbs. Thus there is failure of substitution with coextensive predicates; if Olga is a beautiful dancer (on the non-intersective reading) then she isn't necessarily a beautiful singer (on the non-intersective reading), even if the singers and dancers are the same. On the other hand, combination with a non-denoting predicate does not yield truth: *Alice is skillful levitator* cannot be true if there are no people that levitate. And indefinites cannot receive a non-specific reading within their scope. To my intuitions, if *Boris is a skillful perpetrator of a crime* is true, there must be a crime that he skillfully perpetrated.

4.1. The Intensionalist Analysis

Montague's intensionalist account of the adjective facts is exactly parallel to that of the adverbial cases: combining an adjective with a noun invokes the intensional operator.²⁰ The presence of " \wedge " blocks substitution with all three kinds of adjectives (48):

- (48) a. Suppose: $\{x: x \text{ dances}\} = \{x: x \text{ sings}\}$
 Then: *Olga is a dancer.* \leftrightarrow *Olga is a singer.*
 But: *Olga is an alleged dancer.* \nleftrightarrow *is an alleged singer.*
Olga is a reluctant dancer. \nleftrightarrow *is a reluctant singer.*
Olga is a beautiful dancer. \nleftrightarrow *is a beautiful singer.*
- b. Analysis: **alleged'**(\wedge dancer')(o) \nleftrightarrow **alleged'**(\wedge singer')(o)
reluctant'(\wedge dancer')(o) \nleftrightarrow **reluctant'**(\wedge singer')(o)
beautiful'(\wedge dancer')(o) \nleftrightarrow **beautiful'**(\wedge singer')(o)

The intensional operator also blocks exportation of a quantifier from out of its scope, accounting for the availability of a non-specific indefinite with adjectives like *supposed* and *willing*(49):²¹

- (49) a. *Boris is a supposed perpetrator of a crime.* \Rightarrow
supposed'(\wedge $\lambda y[\exists x[\text{crime}'(x) \wedge \text{perpetrate}'(y,x)]]$)(b)
- b. *Boris is a willing perpetrator of a crime.* \Rightarrow
willing'(\wedge $\lambda y[\exists x[\text{crime}'(x) \wedge \text{perpetrate}'(y,x)]]$)(b)

Finally, the fact that partially intensional adjectives yield a falsity when combined with a non-denoting predicate is also taken to follow from an independent fact about their meanings. Adjectives like *intentional* and *beautiful* are assumed to fall under the semantic

²⁰See Siegel (1976a,1976b) for the most detailed account of adjectival modification within the Montagovian framework.

²¹The fact that adjectives like *skillful* class do not license a non-specific indefinite is undiscussed in the literature to my knowledge, and in fact constitutes a problem for the account.

postulate (50a), which stipulates that an adjectivally modified noun (Adj'(N)) holds of an individual x, only if the unmodified predicate holds of x. Thus *Olga is a skillful levitator* can be true only if *Olga is a levitator* is itself true, contrary to fact (50b):

- (50) a. $\forall x \forall \Pi [(\text{Adj}'(\wedge N)(x) \rightarrow (N)(x))$
 b. $]\ [(\text{skillful}'(\wedge \text{levitator}'))(o) \rightarrow (\text{levitator}'))(o)]$

Postulate (50a) thus is completely parallel to (32a), and has the same semantic function.

4.2. The Sententialist Analysis

The natural move for the sententialist is also to give an account of the adjective facts that parallels his/her account of adverbs. However, this requires some interesting extensions of current thinking. Consider the case of fully intensional adjectives. We suggested a sententialist analysis of their corresponding adverbs in which the latter combined with a clause-like VP: one that contained both subject and predicate. To duplicate this idea, we would evidently need to view the nominal in cases like *alleged dancer* as containing a subject, which, for concreteness, we might construe as a silent pronoun (*pro*) (cf. (34)):^{22,23}

- (51) a. Olga interviewed an **alleged** [_{NP} *pro* dancer].
 'Olga interviewed an x such that it is alleged that x is a dancer'
 b. DeKok arrested the **supposed** [_{NP} *pro* perpetrator of a crime].
 'DeKok arrested the x such that it is supposed that x is a perpetrator of a crime'
 c. Alice talked to an **imagined** [_{NP} *pro* werewolf].
 'Alice talked to an x such that it is imagined that x is a werewolf'

A similar view must be extended to partially intensional adjectives like *willing*, *reluctant* and *intentional*. These must be analyzed as taking a clause-like complement, with the further proviso that the latter is interpreted factively.

- (52) a. Olga interviewed a **reluctant** [_{NP} *pro* dancer].
 'Olga interviewed an x such that x was a dancer and x was reluctant to dance/be a dancer'
 b. DeKok arrested a **willing** [_{NP} *pro* accomplice to a crime].
 'DeKok arrested an x such that x was an accomplice and x was reluctant to be an accomplice'

That is, if an individual is a reluctant dancer, then they must be reluctant to dance/be a

²²Following the point in fn.14, we must also be prepared to view *a unicorn* in a sentence like (ia) as raising from the subject position in the nominal, given that it manifests intensional behavior:

- (i) a. A unicorn is the alleged perpetrator.
 b. e is the alleged [_{NP} a unicorn perpetrator]
 c. A unicorn is the alleged [_{NP} t perpetrator]

²³The view that nominals are sentence-like has been recently argued by Heim (1996) on grounds very different than those considered here.

dancer, but they must also be a dancer. And so. Once again, we may assume that the account of factivity with these clause-taking predicates falls together with that of cases like *regret* and *know*.

These extensions of the sententialist adverbial analysis are nontrivial, but still plausible and largely straightforward. More interesting questions arise in the sententialist account of adjectives like *beautiful*, *skillful*, and *quick*. As in the case of their adverbs, these forms do not have a plausible "hidden clause" analysis. On the other hand, as we saw, they do block substitution of co-extensive terms, an apparent intensional behavior. In the case of the adverbs, substitution failures were reanalyzed as arising from the presence of a Davidsonian event argument with the adverbs semantically combined. If the sententialist position is to be maintained, we are led to seek a similar account of the adjectival modification facts in this case.

4.3. A Davidsonian Analysis of Nonintersective Adjectival Semantics

Larson (1995, 1998) argues that substitution failure between *beautiful dancer* and *beautiful singer* (on their non-intersective readings) should be assimilated to substitution failure between *dance beautifully* and *sing beautifully*. That is, we should import Davidson's event analysis of adverbial modification to adjectives, reproducing the basic technical moves. The analysis incorporates the following three technical proposals:

- The semantics of (at least certain) common nouns involves an event argument²⁴
- Adjectives are potential predicates of events
- In an A-N structure, A may be predicated of an individual or an event

These points are illustrated in (53a-c), which employ the relational evaluation predicate from Larson and Segal (1995):²⁵

- (53)
- a. $\text{Val}(\langle x, e \rangle, \textit{dancer})$ iff $\text{dancing}(e, x)$
 - b. $\text{Val}(x, \textit{beautiful})$ iff $\text{beautiful}(x, C)$ ("x is beautiful for a C")
 - c. $\text{Val}(\langle x, e \rangle, [\textit{NP AP NP}])$ iff $\text{Val}(\langle x, e \rangle, \textit{NP}) \ \& \ \text{Val}(x, \textit{AP})$
 $\text{Val}(\langle x, e \rangle, [\textit{NP AP NP}])$ iff $\text{Val}(\langle x, e \rangle, \textit{NP}) \ \& \ \text{Val}(e, \textit{AP})$

(53a) takes the nominal *dancer* to apply to pairs of individuals $\langle x, e \rangle$ such that x is the agent of e, where e is a dancing. (53b) takes adjectives like *beautiful* to be predicates of things. More exactly, *beautiful* is true of an individual x just in case x is beautiful relative to some comparison class C, which I'll assume here to be given by context, but which may also be given by an explicit *for*-PP. Finally, (53c) gives candidate rules for combining an AP with the nominal it modifies. According to these schemata, when an adjective (AP) combines with a noun (NP) denoting an event-individual pair, the adjective can be predicated of either the x parameter or the e parameter.

²⁴Event modification in nominals is explored in Larson (1983) within the Situation Semantics framework of Barwise and Perry (1983). See also Higginbotham (1985).

²⁵A relational valuation predicate departs from the usual valuation function "[[]]" of model theory. Relational valuation is adopted in Situation Semantics (see Barwise and Perry (1983), Larson (1983)).

In Larson (1995, 1998) and Larson and Segal (1995), the possibility of being predicated of either *x* or *e* is diagnosed as the source of the intersective/nonintersective ambiguity in cases like *beautiful dancer*. When AP is predicated of the *x* variable, it is the subject Olga, the dancer, that is ultimately asserted to be beautiful (54a). By contrast, when AP is predicated of the *e* variable, it is the event, the dancing, that is asserted to be beautiful (54b). A similar analysis can be given for *old friend* as indicated in (55).²⁶

- (54) Olga is a beautiful dancer.
 a. $\exists e[\text{dancing}(e, \text{olga}) \ \& \ \text{beautiful}(\text{olga}, C)]$ ("Olga is beautiful")
 b. $\exists e[\text{dancing}(e, \text{olga}) \ \& \ \text{beautiful}(e, C)]$ ("Dancing is beautiful")
- (55) Peter is an old friend.
 a. $\exists e[\text{friendship}(e, p) \ \& \ \text{old}(\text{pete}, C)]$ ("Peter is old")
 b. $\exists e[\text{friendship}(e, p) \ \& \ \text{old}(e, C)]$ ("The friendship is old")

This account yields an analysis of substitution failure with nonintersective adjectives that is fully parallel to the case of adverbs discussed earlier. Even if singers and dancers are the same, the events of dancing and singing will be different. Since the respective events are different, that one is beautiful will not entail that the other is so. This prediction follows on simple first order grounds, without appeal to intensions or possible worlds.

4.2. Other Consequences

Larson (1995, 1998) argues that this approach not only yields a satisfactory nonintensional account of substitution failure with adjectives, but illuminates a variety of other phenomena as well. Thus, the approach offers some grasp on why it is that certain adjectives (such as *beautiful*) show both an intersective and a non-intersective reading, whereas other adjectives show exclusively one or the other. For example, consider an adjectives like *aged*, *nude*, *portable*, and *tall*, which are exclusively intersective. It seems plausible to think that events cannot be aged in view of the fact that they do not age. Neither can they be nude, portable, or tall. If this is granted, then we correctly predict an example like (56), *Jerry is an aged president*, to be unambiguous. This is so because one of the two possible interpretations, "aged(*e*)", is independently excluded on pragmatic grounds.

- (56) Jerry is an aged president. $\# \exists e[\text{presidency}(e, j) \ \& \ \text{aged}(e, C)]$
 $\exists e[\text{presidency}(e, j) \ \& \ \text{aged}(j, C)]$

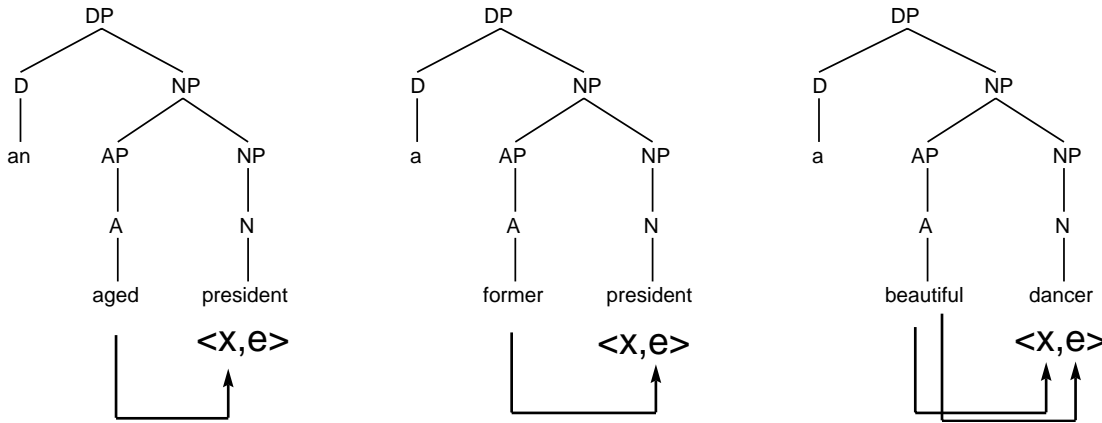
By contrast, consider an adjective like *former*, which is exclusively non-intersective. It is natural to think that *former* applies strictly to events and not to other kinds of things. If so, then we correctly predict that *Jerry is a former president* will be unambiguous, since we can have "former(*e*)" but not "former(*jerry*)" (57):

- (57) Jerry is a former president. $\exists e[\text{presidency}(e, j) \ \& \ \text{former}(e, C)]$

²⁶For simplicity, (54) and (55) are rendered using an existential quantifier. A more correct analysis would involve generic quantification and a generic quantifier. See Larson (1998, in prep) for details.

$\exists e[\text{presidency}(e, j) \ \& \ \text{former}(\text{jerry}, C)]$

The general situation is thus as shown below, with some adjectives applying strictly to non-events (*aged*), others applying strictly to events (*former*), and still others applying naturally to both, yielding ambiguity (*beautiful*):



This view also allows us to capture the observation by Vendler (1967) that coordination cannot join a strictly intersective adjective (*blonde*) with a strictly nonintersective adjective (*fast*) (58a). Correlatively, when an adjective that can be read either way (*beautiful*) is coordinated with a strictly intersective adjective, it must be read intersectively (58b), and when it is coordinated with a strictly nonintersective adjective, it must be read nonintersectively (58c).

- (58) a. *She is a blonde and fast dancer.
 b. She is a blonde and beautiful dancer.
 c. She is a fast and beautiful dancer.

These results follow under a simple coordination rule like (59), according to which an object x is a value of conjoined APs just in case it is a value of both conjuncts:

- (59) $\text{Val}(x, [_{AP} \text{AP1 and AP2}])$ iff $\text{Val}(x, \text{AP1}) \ \& \ \text{Val}(x, \text{AP2})$

This rule entails that both adjectives in a conjoined pair must be predicated of an event, or of a non-event, but that the predications cannot be "mixed".

These results show, I believe, that a Davidsonian analysis of nonintersective modification not only yields a plausible alternative view of substitution failure with adjectival modifiers. It also offers an analysis that is attractive on its own independent grounds. In summary, then, our conclusions about adjectives are the same as our conclusions adverbs: adjectival modification presents no insurmountable threat to the sententialist thesis.

5.0. If Sententialism is Correct, Why is It Correct?

We have considered two positions on intensionality, and its representation in grammar. One holds that intensionality is a semantic phenomenon arising exclusively with propositional attitude predicates and clausal complements. On the sententialist view, intensionality is always the earmark of a sentential environment, no matter how well-hidden by surface form. A non-clausal environment may mimic the effects of intensionality, for example, by blocking substitution of apparently coextensive predicates, as with adverbs and adjectives. But for the sententialist, this behavior must inevitably be exposed as a sham, and as issuing from a fundamentally different source, such as hidden relationality.

The second position holds that intensionality is a perfectly general phenomenon arising as a matter of course with function-argument combination. On this view, intensional behavior is the default expectation and should be observable throughout the grammar, including in environments that cannot be analyzed as involving clausal complementation. Forms may possess individual lexical properties that block full expression of intensional behavior, for example, by being subject to special postulates as in the case of adverbs and adjectives. But these properties simply occlude an underlyingly intensional reality.

We have reviewed three cases of where intensionality in non-clausal environments has been claimed, in support of the second view: intensional transitive verbs, adverbial modifiers, and adjectival modifiers. Our results, although tentative, are the following: in each case where intensional behavior is plainly manifest, there is plausibly an underlying clausal syntax. And in cases where clausal syntax cannot plausibly be attributed, we have indications that there is no intensionality after all.

These results suggest that sententialism may be on the right track after all. If so, they raises another simple question: if sententialism is correct, why is it correct? Why should clausal complements be associated uniquely with intensionality effects? I will declare straightaway that I do not have an answer, and obvious proposals are quickly refuted.

Consider, for example, the idea that the association between clauses and intensionality reflects a basic fact about the mapping of syntax to semantics. Suppose, for example, contra Montague, that intensional operators are not freely introduced in all function-argument combination, but rather are associated with certain specific grammatical formatives. In current syntactic theory, complement clauses are typically assigned the category "CP" which is taken to project from a **complementizer** element (C) - a clause introducing item like *that*, *for*, or *if*.

- (60)
- a. Max asked [_{CP} **that** a unicorn be present].
 - b. Max asked [_{CP} **for** a unicorn to be present].
 - c. Max asked [_{CP} **if** a unicorn would be present].

Given this point, one might speculate that the operator responsible for intensionality is associated specifically with items of the lexical category C, and hence not introducible except in the context of clauses. Such an idea is not implausible. Compare the situation with natural language tenses, which are frequently analyzed semantically in terms of Priorean sentential operators like *P* ('past') and *F* ('future'). Tense is not freely intrroducible in the

course of semantic composition, but rather seems to be associated in a very narrow way with elements belonging to the specific syntactic category, usually designated "T" (for "Tense"). If intensional operators like *P* and *F* are tied by the grammar to a specific syntactic environment, it is not unreasonable to suppose that the intensional operator \wedge might be tied to a specific syntactic environment as well.

Although attractively simple, this idea seems unlikely to be correct. The difficulty is that the range of clausal environments yielding intensionality does not appear reducible to a single syntactic environment like CP. We can observe this with ECM infinitives and small clause complements, as illustrated in (61a,b), respectively. These structures are clause-like, and are intensional environments by the usual tests. But according to modern syntactic theory at least, they are smaller than full CPs. Chomsky (1998), for example, analyzes the former as defective Tense projections (TP), and the latter as projections of their contained predicates (AP, in this case):

- (61) a. Max believes [_{TP} Boris Karloff to be on his veranda].
b. Max considers [_{AP} unicorns dangerous].

We have also seen the point in connection with intensional adverbs like *allegedly* and adjectives like *alleged*. We analyzed these as combining with a predicate (VP) and a nominal (NP) (62a,b):

- (62) a. Boris allegedly [_{VP} t stole the money].
b. Alice met an alleged [_{NP} pro thief].

The latter were clause-like in so far as they contained a predicate and all of its arguments. But there seem to be no question that the clausal category involved is considerably smaller than a full CP.

Since no articulated theory presents itself as to why intensionality should be associated with clausal environments, we are left with a mystery. Nonetheless, the points rehearsed above suggest that the mystery is in fact a genuine one: that the association is a real one and therefore something that needs to be explained.

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