

Chapter 1

Adverbial Modification of Adjectives: Evaluatives and a Little Beyond

1. Introduction

One of the principal analytical challenges of adverbial modification is how to account for the intricate and often subtle correlation between an adverb's syntactic position and its interpretation. Why, to consider one familiar class of examples, should subject-oriented readings be associated with an intermediate position in the clause? Why should manner readings be associated with relatively lower positions, and speaker-oriented readings be associated with higher ones? Attempts to grapple with these kinds of issues, from Jackendoff (1972) and McConnell-Ginet (1982) to Cinque (1999) and Ernst (2002), have focused on adverbial modification in the verbal and sentential domain. But adverbial modification can be found elsewhere as well—in English and many other languages, adverbs can also occur in the extended AP. Importantly, the interpretation adverbs receive in these less understood 'ad-adjectival' positions varies predictably from the one they receive elsewhere. And, strikingly, the position of adverbs *within* the extended AP varies in a similar way. For example, subject-oriented(-like) interpretations, such as the one *defiantly* receives, are possible only right of degree words:

- (1) a. He seemed enormously more defiantly sedentary than Greta.
- b. *He seemed defiantly more enormously sedentary than Greta.

Similarly, evaluative readings are not possible to the right of an adjective, though domain-adverb readings¹ are:

- (2) a. George seems intellectually inadequate.
- b. George seems inadequate intellectually.
- c. George seems shockingly inadequate.
- d. *George seems inadequate shockingly.

Because of these properties, then, adverbial modification in the extended adjectival projection may offer a fresh perspective on the larger problem.

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This paper examines one large natural class of such AP-modifying adverbs, which have an evaluative interpretation and include *remarkably*, *surprisingly*, and *breathtakingly*, among many others, and considers how the account proposed might extend to other varieties of ad-adjectival adverbs. The core proposal will be that these adverbs widen the domain of salient degrees, and are interpreted as arguments of unrealized degree morphology in much the same way as measure phrases have been proposed to be. This approach turns out to extend naturally to uses of these adverbs in other positions.

Section 2 identifies the class of adverbs of interest here and explores its distinguishing characteristics. Section 3 develops an analysis of the semantics of sentences containing *remarkably* adverbs based in part on a notion of domain widening in the degree domain, assimilating them to certain exclamatives. Section 4 confronts problems of compositionality these adverbs pose, and arrives at a kind of decomposition in which part of the interpretation of a *remarkably* adverb is contributed by its lexical semantics and part is contributed directly by its place in the architecture of the extended adjectival projection. Section 5 sketches how these syntactic and semantic assumptions can be the foundation of a more general theory of how the meaning of these adverbs is related to the meaning they have in other structural positions. Section 6 applies the approach that has been developed more broadly, examining ad-adjectival uses of subject-oriented adverbs. Section 7 concludes.

2. *Remarkably* Adverbs

2.1. The Cast of Characters

Very roughly, the adverbs of interest here, henceforth ‘*remarkably* adverbs’, give rise to a judgment about having a property to a particular degree—that it is, say, remarkable or surprising or horrible:²

- (3) a. Clyde is *remarkably* tall.
- b. Floyd is *surprisingly* ugly.
- c. Tranquility is *heartbreakingly* difficult to attain.
- d. Self-referential example sentences are *disappointingly* distracting.

This class of adverbs is quite large—indeed, it is an open class. Among its many other members are *amazingly*, *astoundingly*, *arousingly*, *calmingly*, *dis-*

appointingly, earth-shatteringly, extraordinarily, frighteningly, grotesquely, heartbreakingly, impressively, inconceivably, infuriatingly, interestingly, mind-numbingly, nauseatingly, provocatively, revoltingly, shockingly, terrifyingly, unnervingly, (un)pleasantly, (un)remarkably, and wonderfully. New adverbs of this class can be coined quite easily (I might describe shoes as *cringe-inducingly uncomfortable*, for example). Importantly, in all these cases, there is a predictable semantic relation between the adverb and the corresponding adjective.

2.2. Contrast with Clause-Modifying Uses

These adverbs can occur high in a clause-modifying position as well, where they receive a different reading entirely:

- (4)
- a. *Remarkably*, Clyde is tall.
 - b. *Surprisingly*, Floyd is ugly.
 - c. *Heartbreakingly*, tranquility is difficult to attain.
 - d. *Disappointingly*, self-referential example sentences are distracting.

Here, no judgment is being rendered specifically about having a property to any particular degree. Rather, very crudely, the judgment in these sentences is about the proposition expressed by the sentence as a whole. These readings are truth-conditionally distinct—if, for example, Clyde is a professional basketball player and therefore expected to be very tall, *Clyde is remarkably tall* could be true while (4a) could be false. Indeed it is not possible to construe any of the sentences in (4) as having the interpretations of their counterparts in (3). Just as the meaning of a *remarkably* adverb is predictable from its adjective counterpart, the meaning of sentences like those in (3) is predictable from their counterparts in (4). These facts, then, seem to reveal robust, apparently exceptionless grammatical regularities.

2.3. Not Degree Words

One natural analytical impulse is to suppose that *remarkably* adverbs are in fact a species of degree word (that is, of Degree head; I will use these interchangeably), like *too, very, pretty*, or comparative morphology. But does not

and can be coined essentially on-the-fly; there is no comparably productive, readily-accommodated means of coining new degree words (though to be sure, doing so is not impossible). No doubt related to this is the relative scarcity of degree words—it does not seem at all out of the question that one might be able to compile an exhaustive list. Compiling an exhaustive list of *remarkably* adverbs, on the other hand, would be an enormous undertaking at best, and nearly as futile as attempting to compile an exhaustive list of nouns might be. Another signature characteristic of *remarkably* adverbs is their systematic relationship to their adjective counterparts, and to their corresponding uses in clausal positions. Degree words manifest neither of these characteristics.

3. Developing an Interpretation

3.1. Some Paraphrases

Given the systematic relationship between *remarkably* adverbs and adjectives, it seems appropriate to construct the denotations of *remarkably* adverbs in terms of their adjective counterparts, taking paraphrases like those in (9)–(10) as a starting point:

- (9) Clyde is remarkably tall.
- a. It is remarkable that Clyde is as tall as he is.
 - b. It is remarkable to be as tall as Clyde is.
 - c. It is remarkable how tall Clyde is.
- (10) Floyd is surprisingly ugly.
- a. It is surprising that Floyd is as ugly as he is.
 - b. It is surprising to be as ugly as Floyd is.
 - c. It is surprising how ugly Floyd is.

Not all of these paraphrases are equally good. The (a) and (b) paraphrases all suffer from a problem of ambiguity. For (9a), there is a reading in which what is remarkable is the fact that Clyde is as tall as Clyde. Similarly, in (10a), what is surprising could be the fact that Floyd is as ugly as Floyd.⁴ The *remarkably* adverb sentences do not have this reading. But this problem could be avoided—one could imagine pursuing paraphrases of the form *Floyd is tall to some degree, and it's remarkable that he's that tall*, or, in linguist quasi-

English, *Floyd is d-tall and it's remarkable to be d-tall*. There is, however, a deeper problem.

An inkling of this problem is reflected in (9a) and (9b). If what is remarkable about Clyde's height is that he is very short, both of these paraphrases would be true; but of course, the *remarkably* adverb sentence cannot mean this. This is still only an inkling of the problem, in that it too could be solved relatively straight-forwardly, in this case by adding to the denotation a requirement that, in this instance, Clyde be tall.

The full measure of the problem emerges more clearly in a situation in which we know Clyde to be the victim of a creepy numerological accident. We know that he was born at precisely 5:09 in the morning, on the fifth day of the ninth month of 1959. We further know that he currently lives at 59 Fifty-ninth Street. Discussing this strange happenstance, I might inform you that Clyde's height is precisely five feet and nine inches. So Clyde is not very tall, but he is not very short either. It would be quite natural for you to say, upon having heard this news, that it is remarkable that Clyde is five feet nine inches tall, or to utter (9a). But it would not be natural at all to say that Clyde is *remarkably tall*—indeed, given typical contemporary expectations about adult male height, it would be false.

In this situation, the problem cannot simply be simply that Clyde is not tall. If we increment all the numbers that seem to haunt Clyde to the point that he might qualify as just barely tall but not very tall, the result stays the same—it is still remarkable that he is as tall as he is, in light of the numeric coincidences in his life, but he is not *remarkably tall*.

What this demonstrates is that to qualify Clyde as *remarkably tall*, it is not sufficient that he be tall and that there be something remarkable about his height. It must also be the case that what is remarkable about his height is how great it is. Similar facts hold for other *remarkably* adverbs—for (10), for example, what is surprising must be how great Floyd's ugliness is, not simply that he is ugly.

So there is something fundamentally inadequate about the (a) and (b) paraphrases above, and more generally about paraphrases that involve predicating an adjective of a proposition in this way. But all this also strongly suggests that the (c) paraphrases above, which involve embedding *wh*-clauses, are on the right track. They face none of these difficulties. They do not give rise to the undesirable ambiguity discussed above—they have only the interpretation that *remarkably* adverbs have. Nor do they fail to reflect that *remarkably* adverbs always seem to require that the degree in question be high, and that

it must be the highness of the degree that leads to the judgment expressed by the *remarkably* adverb.

In light of the close parallel between these paraphrases and *remarkably* adverbs, then, taking them as a guide seems to be an approach with some empirical support—these really are very close paraphrases, close enough to suggest that what they reflect is genuine.

3.2. Embedded Exclamatives

There is, however, a complication in taking the semantics of these *wh*-paraphrases as a guide: it is less than clear what the semantics of these paraphrases themselves is. The *wh*-clause in these paraphrases is not, as it might initially seem, an indirect question. Rather, it is an embedded exclamative of the sort discussed in Grimshaw (1979)—a less-studied construction.

Perhaps the clearest evidence for this involves *very*. As Grimshaw observed, *very* is impossible with *wh*-words in questions, as in (11), but possible in exclamatives, as in (12):

- (11) a. *How very tall is Clyde?
 b. *How very ugly is Floyd?
- (12) a. How very tall Clyde is!
 b. How very ugly Floyd is!

This contrast holds under embedding as well. Embedded clauses that are relatively clearly indirect questions do not admit *very*:

- (13) a. *I wonder how very tall Clyde is.
 b. *Someone asked how very ugly Floyd is.

But embedded exclamatives do:

- (14) a. It is remarkable how very tall Clyde is.
 b. It is surprising how very ugly Floyd is.

Another diagnostic is based on the observation, due to Elliott (1974) and noted by Zanuttini & Portner, that exclamatives do not seem to occur comfortably under negation in declaratives:

- (15) a. I don't (particularly) wonder how tall Clyde is.

- b. No one asked how ugly Floyd is.
- (16) a. *?It isn't remarkable how very tall Clyde is.
- b. *?It isn't surprising how ugly Floyd is.

Zanuttini & Portner observe that curiously, in questions the situation is reversed—exclamatives can occur with negation, as in (17), but not without it, as in (18):

- (17) a. Isn't it remarkable how tall Clyde is?
- b. Isn't it surprising how ugly Floyd is?
- (18) a. *?Is it surprising how ugly Floyd is?
- b. *?Is it remarkable how very tall Clyde is?

So in this respect too, these paraphrases pattern with embedded exclamatives.

Building on the foundation these paraphrases provide, then, we are now led to a semantics for *remarkably* adverbs framed in terms of their corresponding adjectives and embedded exclamatives.

3.3. The Interpretation of Exclamatives

The semantics of exclamatives, though, is murky (at least from a formal-semantic perspective; informal discussions include McCawley (1973), Elliott (1974), and Michealis and Lambrecht (1996)). Still less clear is the semantics of exclamatives under embedding. Zanuttini and Portner (2003), who develop an approach to these issues, will serve here as a guide through this thicket of uncertainty.

Their first move is to observe that exclamatives do not have truth values, and hence should not be analyzed as proposition-denoting. Zanuttini & Portner suggest that instead, exclamatives have denotations of the same type as questions do—sets of propositions (following, for questions, Hamblin (1973); Karttunen (1977); Groenendijk and Stokhof (1984), and others). This reflects quite clearly the deep syntactic parallel between questions and exclamatives. It also sets aside the difference between the two in illocutionary force, which can be reflected in other ways (as they convincingly argue). Adopting the Karttunen (1977) view that a question denotes the set of its *true* answers, they treat exclamatives as likewise denoting a set that includes only true propositions. So, they suggest, an exclamative such as (19a) will denote a set of propositions that might, under the appropriate circumstances involving

discussion of chili pepper consumption, be as in (19b):

- (19) a. What surprising things he eats!
 b. {‘he eats poblanos’, ‘he eats serranos’, ‘he eats jalapeños’}

More generally, then, (19a) will denote the set of true propositions of the form ‘he eats x’ for some (surprising) value of x:

- (20) $\llbracket \textit{What surprising things he eats!} \rrbracket = \{p: p \text{ is true and there is a surprising thing } x \text{ such that } p \text{ is the proposition that he eats } x\}$

Zanuttini & Portner identify two principal ingredients in the semantics of exclamatives. One of them is *factivity*—exclamatives systematically presuppose the truth of a corresponding declarative. While *remarkably* adverbs have a similar property, as these examples show, this will not be a central focus at the moment. The other ingredient, which will figure prominently in the analysis of *remarkably* adverbs proposed here, is *widening* of the domain of quantification of the displaced *wh*-expression. To illustrate how this works, consider a context in which we are discussing what Herman eats. If I say *Herman eats everything*, the domain of quantification of the universal is constrained by a contextual domain restriction, so one would not conclude from my utterance that Herman eats light bulbs or his relatives. It is very probable that what we might expect Herman to eat would be even more constrained than this—assuming the appropriate cultural background, we might also fail to conclude that Herman eats serrano chilies. Zanuttini & Portner propose that exclamatives affect essentially this sort of domain restriction, widening it to include things we otherwise would not have considered. So if what I had uttered instead was the exclamative *What surprising things he eats!*, its effect would be to cause my interlocutors to entertain some possibility they previously had not—say, that Herman eats serranos. The denotation of the exclamative, then, will because of this widening include more propositional alternatives than it otherwise would have. As Zanuttini & Portner observe, this bears a close family resemblance to Kadmon and Landman (1993)’s analysis of what *any* does.

This idea elegantly gathers together several otherwise slippery and elusive intuitions about what exclamatives mean. Among these are the intuition that exclamatives somehow involve an ‘extreme’ value for something, and that exclamatives convey that something is unexpected in a particular way.

3.4. Interpreting Exclamatives Embedded

The next question relevant to understanding exclamative paraphrases of *remarkably* adverb sentences is what happens when an exclamative is embedded. This presents one slight additional complication, but it eliminates another one. The additional complication is that some assumptions have to be made about the semantics of the embedding predicate—hardly a minor point here, since this embedding predicate is what corresponds to the *remarkably* adverb. Here too, Zanuttini & Portner lead the way. They suggest that *amazing*, which embeds both exclamatives and finite indicatives, can be understood as having two forms, one for each type of complement. The garden-variety form applies to propositions and hence embeds finite indicatives. Its semantics is relatively straight-forward—it predicates of a proposition that it is amazing:⁵

$$(21) \quad \llbracket \textit{amazing}_{\textit{garden-variety}} \rrbracket = \lambda p_{\langle s,t \rangle} . \textit{amazing}(p)$$

The other form of *amazing* applies to sets of propositions and hence embeds exclamatives. It is interpreted as requiring that some proposition in this set be amazing:

$$(22) \quad \llbracket \textit{amazing}_{\textit{exclamative-embedding}} \rrbracket = \lambda E_{\langle \langle s,t \rangle, t \rangle} . \exists p [E(p) \wedge \textit{amazing}(p)]$$

For an exclamative denotation to be amazing, then, it must include a proposition which is amazing. So, supposing that Clyde is 6 feet 4 inches tall, one might utter (23a), and the exclamative will have a denotation like the one indicated schematically in (23b):

- (23) a. It is amazing how tall Clyde is.
 b. $\exists p [p \in \{ \text{'Clyde is 6 feet 1 inch tall'}, \dots, \text{'Clyde is 6 feet 2 inches tall'}, \dots, \text{'Clyde is 6 feet 3 inches tall'}, \dots, \text{'Clyde is 6 feet 4 inches tall'} \} \wedge \textit{amazing}(p)]$

In light of (22), (23a) can be interpreted as requiring that one of the propositions in the set in (23b) be amazing. If it is the case that it is amazing to be 6 foot 4, then, this will be true. More generally, we might assume that embedded exclamatives (at least ones embedded under the relevant sort of predicate) are interpreted in a way that parallels (23).

While in some respect complicating things slightly, this simplifies the situation in another respect. In light of the denotation arrived at for these sorts

of structures, for current purposes, it will be possible to do away with making reference in these denotations to sets of propositions, replacing them with sets of degrees. This is so because asserting (23) amounts to claiming that it is amazing that there is a degree (in a particular set of degrees with the relevant properties) to which Clyde is tall:

$$(24) \quad \text{amazing}(\wedge \exists d[d \in \{6 \text{ feet } 1 \text{ inch, } \dots, 6 \text{ feet } 2 \text{ inches, } \dots, 6 \text{ feet } 3 \text{ inches, } \dots, 6 \text{ feet } 4 \text{ inches}\} \wedge \text{Clyde is } d\text{-tall}])$$

All embedded-exclamative paraphrases of *remarkably* adverbs involve adjectives, so in all of them it will be possible to make this simplifying move, quantifying over degrees rather than over propositions. To capture the meaning of embedded exclamatives, and by extension of sentences containing *remarkably* adverbs, it will also be necessary to say something about what the set of degrees being quantified over is—specifically, it will be necessary to capture the effect of domain widening.

3.5. Brief Interlude: Some Assumptions About Adjectives

Before proceeding further, though, it may be helpful to briefly lay out some background assumptions about the interpretation of adjectives. First, a degree is an interval on a scale abstractly representing measurement (Kennedy (1997); Schwarzschild and Wilkinson (2002)). A scale is a dense, linearly ordered set of points. Second, a gradable adjective denotes a relation between an individual and a degree—a relatively standard assumption (Seuren (1973), Cresswell (1976), von Stechow (1984), Bierwisch (1989), Klein (1991), Rullman (1995), Kennedy and McNally (2004)). In a sentence like (25), then, *tall* relates Clyde to some degree of height, here one measuring six feet:

$$(25) \quad \begin{array}{l} \text{a. } \llbracket \textit{tall} \rrbracket = \lambda x \lambda d . \text{tall}(x)(d) \\ \text{b. } \llbracket \textit{Clyde is six feet tall} \rrbracket = \exists d[\text{tall}(\text{Clyde})(d) \wedge \text{the measure in feet of } d \text{ is } 6] \end{array}$$

If no overt measure phrase is present, the adjective will be interpreted with respect to a contextually-supplied standard degree of tallness. In (26), for example, *tall* relates Clyde and the standard for tallness $s_{\textit{tall}}$ provided by the context of utterance:

$$(26) \quad \llbracket \textit{Clyde is tall} \rrbracket = \exists d[\text{tall}(\text{Clyde})(d) \wedge d \geq s_{\textit{tall}}]$$

What (26) requires is that Clyde be tall to some degree and that this degree meet or exceed the standard s_{tall} .

3.6. The Interpretation of *Remarkably* Adverb Sentences

Returning to the main thread of the discussion, it is now possible to propose an interpretation for exclamative paraphrases of *remarkably* adverbs in the spirit of Zanuttini & Portner, and thereby one for the corresponding *remarkably* adverb sentences as well. Given what has already been said, a sentence such as the now-familiar (27a), along with its exclamative paraphrase (27b), might (in a particular circumstance) receive an interpretation such as (27c):

- (27) a. Clyde is remarkably tall.
 b. It is remarkable how tall Clyde is.
 c. remarkable($\wedge \exists d[d \in \{6 \text{ feet } 1 \text{ inch, ..., } 6 \text{ feet } 2 \text{ inches, ..., } 6 \text{ feet } 3 \text{ inches, ..., } 6 \text{ feet } 4 \text{ inches} \} \wedge \text{Clyde is } d\text{-tall }]$)

So, as before supposing that Clyde is 6 foot 4, (27a) might assert that it is remarkable that Clyde is tall to a degree in the set indicated schematically in (27c). To spell things out a bit more precisely, a means of representing domain restrictions will be needed. One way of doing this, though not the path taken by Zanuttini & Portner, is to make use of resource domain variables (von Stechow (1994), Westerståhl (1985)). Just as a resource domain variable can be used to reflect contextual domain restrictions on determiner and adverbial quantification, it can also be used to reflect contextual domain restrictions on quantification inside the extended AP. The denotation of *Clyde is tall* in (26) can be thus elaborated with the addition of a resource domain variable C , which will restrict an existential quantifier over degrees as in (28):

$$(28) \quad \llbracket \text{Clyde is tall}_C \rrbracket = \exists d[d \in C \wedge \text{tall}(\text{Clyde})(d) \wedge d \geq s_{tall}]$$

The resource domain variable C has as its value a contextually-salient set of degrees; (28) requires that the degree quantified over be in this set. It is a fairly significant step, and one that will be crucial here, to suppose that quantification over degrees is contextually restricted in the way that quantification over individuals or events (or situations) is. But since domain restrictions seem to be a general property of natural language quantification, this is a natural assumption.

With this in place, the widening effect of *remarkably* adverbs can now be represented fairly straightforwardly. As a first step, without yet reflecting the effect of widening in the denotation, we can take (29a) to have the denotation in (29b):

- (29) a. Clyde is remarkably tall.
 b. $\llbracket \text{Clyde is remarkably tall}_C \rrbracket$ (not final)
 $= \text{remarkable}(\wedge \exists d[d \in C \wedge \text{tall}(\text{Clyde})(d) \wedge d \geq s_{\text{tall}}])$

This merely predicates remarkable-ness of the proposition expressed by *Clyde is tall*, yielding a meaning that might be paraphrased ‘it is remarkable that Clyde is tall’ (which is an inadequate paraphrase for reasons discussed in section 3.1). To introduce the effect of domain widening, we might modify (29b) by existentially quantifying over a domain larger than the contextually-supplied domain provided by the resource domain variable C :

- (30) $\llbracket \text{Clyde is remarkably tall}_C \rrbracket$ (not final)
 $= \text{remarkable}(\wedge \exists d \exists C'[C' \supset C \wedge d \in C' \wedge \text{tall}(\text{Clyde})(d) \wedge d \geq s_{\text{tall}}])$

This amounts to loosening the requirement that a degree of Clyde’s tallness be among the contextually salient degrees, permitting it instead to be either among these degrees or in some larger domain C' that includes these degrees.

Still, this is not yet quite adequate, because *remarkably* adverbs, like exclaimatives, contribute domain widening in a particular sense that (30) does not reflect. Unlike the variety of widening that Kadmon and Landman (1993) argue *any* involves, exclaimatives and *remarkably* adverbs impose the further requirement that the degree quantified over *not* be in the unwidened portion of the domain. For Clyde to be remarkably tall, it is not sufficient that he be tall to a degree that is among the contextually salient ones. Rather, Clyde has to be tall to some degree that is not among the degrees already contextually salient—he must be tall to a degree that has been added to the domain by widening, as (31) reflects:

- (31) $\llbracket \text{Clyde is remarkably tall}_C \rrbracket$
 $= \text{remarkable}(\wedge \exists d \exists C'[C' \supset C \wedge d \in C' - C \wedge \text{tall}(\text{Clyde})(d) \wedge d \geq s_{\text{tall}}])$

This requires that there be a degree to which Clyde is tall which exceeds the standard and that it is in the portion of the widened domain C' that excludes the original domain C .

This denotation seems to be an adequate representation of the meaning of *Clyde is remarkably tall*. It reflects that this sentence involves a claim that something is remarkable, and that what is remarkable is not merely that Clyde is tall or even that there is some particular degree such that it is remarkable that he is tall to that degree. Rather, what is claimed to be remarkable is that Clyde's height is so great that it exceeds all the heights one would otherwise have entertained. In this way, this denotation reflects the same sort of domain-widening that an embedded exclamative would contribute, thereby explaining the semantic correlation with the embedded exclamative paraphrase. The factivity entailment that is also characteristic of both *remarkably* adverbs and exclamatives is predicted here, too, because this denotation requires that there be a degree to which Clyde is tall that exceeds the standard for tallness. Maintaining this requirement of exceeding the standard is crucial to capturing the factivity entailment—the requirement of widening the domain on its own would not suffice, since it would not rule out the possibility that Clyde is tall to a degree *smaller* than any in the domain, and that what is remarkable about his height is how small it is.⁶ Other *remarkably* adverb sentences can be given interpretations analogous to this one.

4. Assembling the Pieces

The previous section arrived at a model of the interpretation of *remarkably* adverb sentences, but nothing has so far been said about how this interpretation is assembled compositionally. It will emerge in this section that the familiar means of semantically combining an adverb and an expression it modifies are not adequate for the task that needs to be performed here—and that a further examination of the syntax suggests another path to take.

4.1. The Trouble with the Usual Options

The most basic means of interpreting a modifier is intersectively, by a rule like Heim and Kratzer (1997)'s Predicate Modification. There is no straightforward way of doing this for *remarkably* adverbs. The principal difficulty is that for two expressions to be interpreted intersectively they must be of the same semantic type. In order to implement an intersective interpretation for *remarkably* adverbs and the adjectival projections they modify, it will thus

be necessary to find a single type for the denotations of both the *remarkably* adverb and its sister. But what could this type be?

One possibility that seems initially appealing is that both the *remarkably* adverb and its sister denote properties of degrees. This, though, is problematic, and at a minimum requires complicating the ontology of degrees significantly. To begin with, it would be necessary to find a way to construe the *remarkably* adverb itself as a property of degrees. Given denotations like the one arrived at above, it is at best highly unclear how this might be done. Of course, one might conclude from this that there is something severely wrong with these denotations. It could in principle be that *remarkably* adverbs are interpreted simply by predicating them directly of degrees. This has the appeal of simplicity, but, among other difficulties, such an approach would have to be spelled out far more before it could be made sense of. Certainly, if a degree is simply an interval on a scale as assumed here (following Kennedy (1997) and Schwarzschild and Wilkinson (2002)), predicating of this interval that it is remarkable or surprisingly or disappointing or strange would at a minimum fail to make obvious predictions, and at worst might be as irredeemably incoherent as a claim like ‘12 is remarkable’.

Another, perhaps less serious but non-trivial difficulty is what one might do with the type that would result when a *remarkably* adverb and its sister are interpreted—if this type is itself a property of degrees, as would result from an intersective interpretation, an account would have to be provided of how this can ultimately be predicated of individuals. Certainly, there are ways in which this can be done, both by altering syntactic assumptions or semantic ones. One interesting semantic approach toward this problem may be available if degrees are formalized, as Faller (2000) proposes, as vectors in a Vector Space Semantics (Zwarts (1997); Zwarts and Winter (2000); Winter (2001)). In this sort of framework, there are independently necessary type shifts that map properties of vectors (qua degrees) to properties of individuals. Any approach in which a *remarkably* adverb is predicated directly of a degree also faces the problem of explaining what the relationship is between predicating a *remarkably* adverb of a degree and predicating its adverbial or adjectival cognates of individuals and propositions (and perhaps eventualities). One can certainly claim that *remarkably* simply denotes a property of remarkable degrees, and *remarkable* a property of remarkable individuals—but this merely conceals the problem behind the metalanguage predicate ‘remarkable’.

When an intersective denotation for a modifier is not possible, one usu-

ally simply adopts a higher, predicate-modifier type denotation—construing it as a function that applies directly to the modified expression. But for *remarkably* adverbs, this road too has dangerous pitfalls. If *remarkably* adverbs were predicate modifiers, they would presumably denote functions from AP denotations to AP denotations—given the assumptions here, expressions of type $\langle\langle e, dt \rangle, \langle e, dt \rangle\rangle$. This would certainly help with the problems noted in the previous section, since the *remarkably* adverb could now ‘have access’ to the adjectival denotation in a way that would make it possible to build up a denotation like the one arrived at in section 3. But this is inconsistent with the syntactic behavior of these expressions. As we have already seen (in (5)–(6)), *remarkably* adverbs project further structure:

- (32) a. Clyde is [[quite remarkably] tall].
 b. Floyd is [[rather surprisingly] ugly].
 c. Many voters are [[pretty horribly] conservative].

In light of this, it is not the *remarkably* adverb itself but rather the extended AdvP in which it occurs which must have the higher-type denotation. But to achieve this, barring some complicated, previously unattested type shift, it would be necessary to assume that other elements of the adverbial extended projection—including comparative morphology, *very*, and all other Degr—are systematically ambiguous between their regular denotations and ones that yield this very high AP-modifying type. This would be an exceptionally implausible and costly assumption at best.

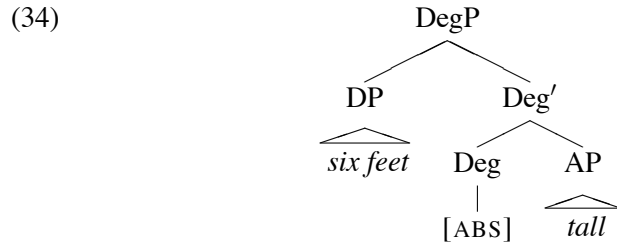
4.2. Building Up More Syntax: Analogy to Measure Phrases

If, as the previous section argued, *remarkably* adverbs cannot be interpreted intersectively or as predicate modifiers, how *should* they be interpreted? A closer examination of the syntax suggests an answer.

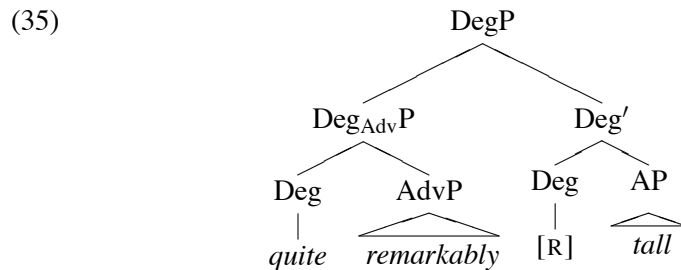
One especially clear aspect of the syntax of these expressions is that they resemble nominal measure phrases—they occur in the same linear position, and they are in complementary distribution with overt degree words modifying the APs in which they occur:

- (33) a. Floyd is {six feet/remarkably} tall {*six feet/*remarkably}.
 b. Floyd is {*six feet/*remarkably} very tall.

It seems reasonable, then, to pursue a parallel syntactic analysis. I will assume that APs with absolute adjectives and measure phrases have a structure like the one in (34), in which the measure phrase occupies the specifier position of a Deg(ree) head (Abney (1987), Corver (1990), Grimshaw (1991), Kennedy (1997)):



Under other circumstances, the Deg head can be spelled out overtly as a comparative morpheme (or other degree morpheme) or as a degree word. With absolute adjectives, it cannot be overtly spelled out; in these cases, Kennedy (1997) suggests the Deg head is instead occupied by a null degree morpheme [ABS]. In light of the similarities, it is natural to assign *remarkably* adverbs a similar structure, in which their phrasal projections likewise occupy the specifier position of DegP:⁷



Proposals of roughly this form for degree adverbs in general—by which is typically meant any true adverbs in AP—have been made before. Abney (1987) suggests a structure similar to (35), with adverbs in a specifier position, and the structures Jackendoff (1977) has in mind would have ones like (35) among their contemporary analogues.

Kennedy's [ABS] has in (35) been replaced with a similar feature [R]. Although a stronger reason to distinguish these will emerge shortly, there are at least two other, purely syntactic reasons this distinction may be useful. One of these is that [ABS] licenses a DP in its specifier, so it is Case-licensing.

Remarkably adverbs, on the other hand, have no need to check Case. Another consideration here is a slight difference in distribution—measure phrases, unlike *remarkably* adverbs, are possible in comparatives:

(36) Clyde is {two feet/**remarkably*/**surprisingly*} taller than Floyd.

It will be necessary, then, to distinguish the ability to license measure phrases and *remarkably* adverbs in order to reflect that certain Degs may license one but not the other. In light of this independent necessity, there would not be any advantage to uniting the ability to license measure phrases and *remarkably* adverbs in one Deg, [ABS].

This sort of structure has a number of syntactic advantages. It can account for the complementary distribution of measure phrases and *remarkably* adverbs, since these both occupy the same structural position. It can account for why *remarkably* adverbs are obligatorily left of the adjective. And it can account for why they are in complementary distribution with overt Degs, since they require a particular (null) Deg to license them.⁸

4.3. Putting the Syntax and Semantics Together

With these syntactic structures in place, it is now possible to look on the semantic compositionality puzzle with a fresh eye. For measure-phrase structures like (34), Kennedy suggests that the semantics is assembled as in (37):

(37) $\llbracket \text{Clyde is six feet [ABS] tall} \rrbracket =$
 $\llbracket \text{[ABS]} \rrbracket (\llbracket \text{tall} \rrbracket) (\llbracket \text{six feet} \rrbracket) (\llbracket \text{Clyde} \rrbracket)$

The Deg [ABS] yields a property of individuals as the denotation of the DegP. It does the semantic work of relating the AP and the measure phrase. Given the parallels, it is natural to suppose that semantic composition works similarly in (35). The [R] feature can be taken to be interpretable, and paralleling [ABS], to be what relates the AP and the *remarkably* adverb semantically:

(38) $\llbracket \text{Clyde is remarkably [R] tall} \rrbracket =$
 $\llbracket \text{[R]} \rrbracket (\llbracket \text{tall} \rrbracket) (\llbracket \text{remarkably} \rrbracket) (\llbracket \text{Clyde} \rrbracket)$

This means of putting the pieces together, via the mediation of [R], will be the key to solving the compositionality problem and arriving at the desired interpretation.

It is now possible to suppose that the denotation of *remarkably* is identical to that of the adjective *remarkable*. To illustrate this, though, it will be useful to make two simplifying assumptions purely for exposition. First, I will omit the degree argument in the denotation of both *remarkably* adverb and their corresponding adjectives. Second, I will for the moment suppose that these corresponding adjectives denote properties of propositions rather than, say, ordinary individuals. Both *remarkably* and *remarkable* can thus be taken to have the denotation in (39):

$$(39) \quad \llbracket \textit{remarkable} \rrbracket = \llbracket \textit{remarkably} \rrbracket = \lambda p . \textit{remarkable}(p)$$

This is a very simple denotation, and reflects only the barest, most minimal lexical core of the meaning of these expressions. It is a long way from the making the semantic contribution that was attributed to *remarkably* adverbs in section 3. But the challenge of getting from one to the other can now be met straightforwardly—the additional semantic work that needs to be done can be attributed not to the adverb itself, but rather to the [R] feature in Deg that licenses it. Just as the adverb itself can now have as its denotation only the irreducible essence of its lexical semantics, so too the [R] can now have as its denotation only those aspects of meaning that characterize the class of *remarkably* adverbs generally, independent of the particular choice of adverb:

$$(40) \quad \llbracket [R] \rrbracket = \lambda A_{\langle e, \langle d, t \rangle \rangle} \lambda R_{\langle st, t \rangle} \lambda x . R(\wedge \exists d \exists C' [C' \supset C \wedge d \in C' - C \wedge A(x)(d) \wedge d \geq_{s_A}])$$

This denotation reflects exactly the semantic properties identified in section 3 as characteristic of *remarkably* adverbs—among the more prominent ones, domain widening. It also serves as a kind of semantic glue, helping hold together type-theoretically the adjective and adverb denotations. These pieces fit together in a way that yields the desired result:

$$(41) \quad \begin{aligned} & \llbracket \textit{Clyde is remarkably [R] tall} \rrbracket \\ &= \llbracket [R] \rrbracket (\llbracket \textit{tall} \rrbracket) (\llbracket \textit{remarkably} \rrbracket) (\llbracket \textit{Clyde} \rrbracket) \\ &= \textit{remarkable}(\wedge \exists d \exists C' [C' \supset C \wedge d \in C' - C \wedge \textit{tall}(\textit{Clyde})(d) \wedge d \geq_{s_{\textit{tall}}}] \end{aligned}$$

This is exactly the denotation ultimately arrived at in section 3 in (31).

4.4. Problems Averted

This division of labor avoids the problems raised by the alternative approaches to introducing *remarkably* adverbs into semantic composition. The problems associated with an intersective interpretation do not arise here because this approach does not impose the requirement that the adverb and its sister be of the same type. Consequently, we are not forced into any uncomfortable further assumptions to sustain these types. In particular, there is no analytical pressure on this view to treat *remarkably* adverbs as properties of degrees. Rather, the denotation of a *remarkably* adverb is ultimately predicated of a proposition, as seems most natural. The problems associated with a predicate modifier denotation are avoided as well. On the current account, the type of the *remarkably* adverb and its projections remains very simple, and more important, the same as the corresponding adverb. So it is no surprise—and indeed, expected—that *remarkably* adverbs should support their own degree words and project the full adverbial extended projection. It will not be necessary to assume either massive systematic ambiguity of Degs or any novel otherwise unmotivated type-shifts, because the types of all elements of the adverbial projection will be exactly the same as they would otherwise be.

5. Relation to Clausal Counterparts

What has now been introduced is a kind of decomposition—the apparent meaning of *remarkably* adverbs has been split into two parts, one associated with the *remarkably* adverb itself and one associated with its position. Among the chief advantages of having done things this way is that it provides a simple theory not only of the relation to the corresponding adjectives, but also of the relation to clause-modifying uses. Given the same denotation for *remarkably* proposed in (39), the right interpretation for its clause-modifying use in (42) will follow:

- (42) a. $\llbracket \text{Clyde is tall}_C \rrbracket = \exists d[d \in C \wedge \text{tall}(\text{Clyde})(d) \wedge d \geq s_{\text{tall}}]$
 b. $\llbracket \text{Remarkably, Clyde is tall}_C \rrbracket = \text{remarkable}(\wedge \exists d[d \in C \wedge \text{tall}(\text{Clyde})(d) \wedge d \geq s_{\text{tall}}])$

The denotation in (42) requires only that it be remarkable that Clyde is tall, which seems to reflect what the clause-modifying use of *remarkably* means.

6. Approaching Ad-Adjectival Subject-Oriented Adverbs

This approach is certainly not a comprehensive theory of ad-adjectival adverbial modification. It addresses only one class of adverbs that occur in the extended AP—but there are others. Among them is a class, to which I now turn, that bears some resemblance to subject-oriented adverbs in VP and hence takes us one step closer to the most basic broader questions about adverbial modification. These AP-modifying adverbs include some of the canonical examples of subject-oriented adverbs, which seem to contribute roughly their usual interpretation:⁹

- (43) Clyde seemed {intentionally/deliberately/accidentally/willingly} reliant on Herman.

That these do in fact have the agentive semantics that is a signature of subject-orientation in VP is clear from the counterpragmatic inferences they create in an environment like (44):

- (44) #When he was served to his hungry Martian overlords,
Clyde seemed {defiantly/unapologetically/rudely} raw on the inside.

This sentence leads us to suppose Clyde had some control over his being raw on the inside, in a way that we would not if the adverb were absent. Another distinguishing feature of (VP-)subject-oriented adverbs is focus-sensitivity, a characteristic ordinary manner adverbs do not have (Wyner (1994), Geuder (2000)). These adverbs pattern with subject-oriented VP adverbs in this respect, too, as the non-synonymy of (45a) and (45b) reflects:

- (45) a. Greta seemed rudely reliant on HERMAN to clean up after her.
b. Greta seemed rudely reliant on Herman to CLEAN UP after her.

But despite this evidence for thinking these adverbs are in a meaningful sense subject-oriented, there is a fundamental problem here. Adjectives by their very nature are stative; subject-orientation by its very nature requires agentive or voluntary eventualities, which states cannot in principle be.

There is another difficulty as well, a compositional one similar to the one *remarkably* adverb gave rise to: If these adverbs are essentially subject-oriented, how can they compose with an (extended) AP denotation? As before, a simple intersective interpretation does not lead very far here. It is very unclear at best how an adequate denotation for the adverb could be

framed in the appropriate way. Subject-oriented adverbs may denote properties of events, but—even setting aside the sortal difficulty about states versus events—there is no obvious place to plug such a thing into the structure of an AP. Moreover, an intersective interpretation is inherently symmetrical, which makes the prediction that (46a) should feel redundant, which it does not, and that (46b) should be a contradiction, which it is not:

- (46) a. Clyde seems both rudely vocal and vocally rude.
 b. Clyde didn't seem rudely vocal; rather, he seemed vocally rude.

Perhaps it might be possible to swat this sort of observation away by appeal to pragmatics. This does not seem implausible, but it is definitely swimming against the empirical current.

Naturally, the alternative of simply assigning these adverbs predicate modifier denotations remains. This is, in fact, how Wyner (1998) treats subject-oriented adverbs (in VP), proposing that they denote functions from properties of events to properties of events. This sort of approach, though, presents the same problem with respect to further AdvP structure encountered above with *remarkably* adverbs. If these adverbs denoted predicate modifiers, they would not be compatible with degree word denotations. But adverbs of this sort occur with degree words quite readily:

- (47) Clyde appeared {rather rudely/quite thoughtlessly/very cleverly} indifferent to others.

The puzzle this leaves us with is an echo of the one *remarkably* adverb presented. It seems only natural, then, to consider applying the same tools here.

The model of the interpretation of *remarkably* adverbs developed above, in which the adverb can enter semantic composition through the mediation of a Deg that stitches things together type-theoretically and makes its own particular semantic contribution, can help address both of these problems. To illustrate this fact about the semantic combinatorics, it will be necessary to sidestep the extremely important and obviously relevant but still rather murky issue of what exactly the semantics of subject-orientation is. I thus will adopt the toy semantics—certainly inadequate—in (48), in which *deliberately* and *deliberate* both simply denote properties of events:¹⁰

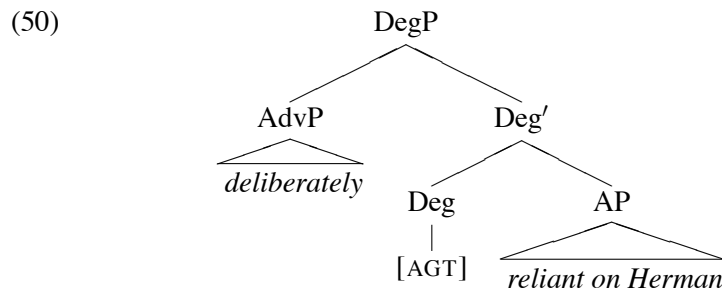
- (48) $\llbracket \textit{deliberately} \rrbracket = \lambda e . \textit{deliberate}(e)$

Accepting this, it seems plausible that a sentence such as (49a) might receive an interpretation like (49b):

- (49) a. Clyde is deliberately reliant on Herman.
 b. $\llbracket \text{Clyde is deliberately reliant on Herman} \rrbracket =$
 $\exists s \exists e \exists e' [\text{reliant-on-Herman}(\text{Clyde})(s) \wedge \text{deliberate}(e) \wedge$
 $\text{agent}(e)(\text{Clyde}) \wedge \text{cause}(e)(e') \wedge \text{become}(e')(\text{Clyde})(\text{reliant-on-Herman})]$

What (49) means, then, is that Clyde was the agent of a deliberate event that caused an event of Clyde becoming reliant on Herman. The claim that underlies this is that a subject-oriented adverb in the extended AP is interpreted with respect to an event that stands in a particular (causal) relation to the state associated with the adjective.

Because these adverbs and *remarkably* adverbs have apparently the same distribution inside AP, the syntax from which this sort of denotation will be built can mirror the one proposed for *remarkably* adverbs above:



The price to be paid here is that in order to build (49), a distinct Deg [AGT] will have to be posited. With that done, though, the composition is relatively straightforward, and proceeds along the same lines as Kennedy's for measure phrases and the one for *remarkably* adverbs above:

- (51) $\llbracket \text{Clyde is deliberately [AGT] reliant on Herman} \rrbracket =$
 $\llbracket [\text{AGT}] \rrbracket (\llbracket \text{reliant on Herman} \rrbracket) (\llbracket \text{deliberately} \rrbracket) (\llbracket \text{Clyde} \rrbracket)$

The additional agentive meaning, and the additional events that underlie it, will be introduced by [AGT]:

- (52) $\llbracket [\text{AGT}] \rrbracket = \lambda A \lambda s \lambda x \lambda s . \exists e \exists e' [A(x)(s) \wedge S(e) \wedge \text{agent}(e)(x) \wedge$
 $\text{cause}(e)(e') \wedge \text{become}(e')(x)(A)]$

- (53) $\llbracket \text{[AGT]} \rrbracket (\llbracket \text{reliant on Herman} \rrbracket) (\llbracket \text{deliberately} \rrbracket) (\llbracket \text{Clyde} \rrbracket) =$
 $\lambda s \exists e \exists e' [\text{reliant-on-Herman}(\text{Clyde})(s) \wedge \text{deliberate}(e) \wedge$
 $\text{agent}(e)(\text{Clyde}) \wedge \text{cause}(e)(e') \wedge$
 $\text{become}(e')(\text{Clyde})(\text{reliant-on-Herman})]$

So the same theoretical architecture that provided an account of *remarkably* adverbs above seems to provide solutions to both of the problems this section began with. The compositional issue is solved exactly as before—the adverb is interpreted as an argument of degree morphology, which does the essential compositional work. And the problem of relating subject-orientation, which is a notion bound up with events, and the semantics of the extended AP, which is stative, is solved as well: the degree head contributes a semantics that makes available to the adverb a causing event of which it can be predicated. As before, the adverb can have a simple, first-order denotation that (plausibly) remains constant across its uses in various positions.

Though no substantive proposal will be offered here of how ad-adjectival uses of subject-oriented adverbs relate to subject-oriented uses in VP, it is worth noting that elements of the account suggested here bear a surprising resemblance to the model of subject-orientation that Wyner (1998) constructs. He argues that a verbal functional head, a ‘volitional’ form of the passive auxiliary *be*, is crucial in explaining why the interpretation of subject-oriented adverbs can be affected by passivization. Both this element and [AGT] occupy functional heads in the extended projection of the modified expression, and both contribute an agentivity inference to the interpretation of subject-oriented adverbs.

7. A Final Word

The principal argument here has been that the syntactic and semantic architecture of at least one and perhaps two classes of AP-modifying adverbs involves precisely the same semantics for the adverb itself as in other positions, with additional, specifically ad-adjectival meaning arising through its interaction with a degree morpheme that introduces it. For *remarkably* adverbs, this additional semantics seems to involve widening the domain of degrees; for subject-oriented ad-adjectival adverbs, it seems to involve some notion of agentivity. That this ‘factoring-out’ approach proved useful in both cases may suggest that it may be fruitfully applied more widely, perhaps in some

form to more prototypical adverbials as well. But one way or another, these AP-modifying adverbs offer a novel perspective on familiar larger questions about adverbial modification.

Notes

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1. The term here is intended in the sense of Ernst (2002); see also Rawlins (2003), and under different names, Bartsch (1976); Moltmann (1997).
2. If the adverb receives parenthetical intonation, it can receive the same reading it receives in clause-modifying positions.
3. Many of the sentences starred here are possible as metalinguistic comparatives (like e.g. *?Floyd is less surprisingly ugly than he is a minor annoyance*).
4. This is essentially the same ambiguity as in Russell (1905)'s *Your yacht is larger than I thought it is*.
5. This is not precisely their formalism, but the content is (intended to be) the same.
6. This presupposes that the standard will always be in the domain of quantification—an assumption natural at least, and perhaps unavoidable.
7. I use Deg_{Adv}P here to distinguish the degree projection of the adjective and that of the adverb.
8. This structure also predicts that it should not be possible to stack *remarkably* adverbs, but that it should be possible to introduce them recursively. That is, while exactly one *remarkably* adverb phrase can occur for each AP, a *remarkably* adverb phrase can itself contain a *remarkably* adverb (e.g. *[[surprisingly [terrifyingly]] ugly]*).
9. 'Subject-oriented' is an especially unfortunate term in this context, but I stick with it for its familiarity. Many of the examples in this section have their roots in a collection of naturally-occurring examples gathered by Tom Ernst.
10. Attempts to address the semantics of subject-orientation in earnest include McConnell-Ginet (1982), Wyner (1994, 1998), Geuder (2000), Ernst (2002) and Rawlins (2003).

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