

BOOK CHAPTER DRAFT

# The Lexical Semantics of Adjectives: More Than Just Scales

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This is a draft of a chapter for a book, *Modification*, in preparation for the Cambridge University Press series *Key Topics in Semantics and Pragmatics*. The [full manuscript](#) is also available as a single document on [my website](#), as are some [additional chapters](#). The book is something between a textbook for people who already have a basic background in semantics and a survey of work in the area. For a fuller explanation of its purpose and scope, consult chapter 1 in the full manuscript.

Broken links, marked with ??, are to other chapters not included in this document. (You can avoid this by looking at the full manuscript.) **Comments would be extremely helpful**, so please don't hesitate to [contact me](#) if you have any, even very minor ones.

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## 1 Introduction

If, at virtually any point in the last decade or two, one formed one’s impressions about linguistic theory entirely on the basis of cursory glances at conference announcements—a terrible, terrible idea—one might have concluded that the semantics of adjectives is, above all, the semantics of scales. From a certain perspective, what makes an adjective special, what distinguishes it from a noun or verb, is that it is associated with a scale: *tall* is about the height scale, *ugly* is about the ugliness scale, and so on.

Well, of course, there’s more than a little truth in this. It’s certainly true that scales are a major part of what makes adjectives interesting, and for that reason they have been the object of a great deal of study—and for that reason, too, they will be a major concern throughout the rest of this book.

But to suppose that an adjective has nothing more to offer us than its scale is to do it a grave injustice.

This chapter will strive to vindicate this claim. It's about the lexical semantics of adjectives, but it is **not** about scales. Section 2 presents a typology of adjectives according their effect on the modified noun. Section 3 sketches various theoretical approaches that shed light on that typology. Section 4 begins the exploration of particular analytically-tractable classes of adjectives, focusing on adjectives that interact in interesting ways with their nouns. Section 5 continues the exploration of adjective classes, but shifts the focus to adjectives with surprising scope properties. Finally, section 6 considers additional issues closely linked to the syntax of adjectives, including their relative order and the positions they can occupy.

Two terminological notes. First, throughout this chapter I will, for convenience, use the terms 'adjective' and 'noun' when what I actually mean is 'the maximal projection of an adjective' (AP or DegP, depending on one's syntactic preferences) and 'an appropriate projection of a noun' (NP or perhaps N', depending on one's syntactic preferences). The second point is standard, but needs glossing: I will use 'ATTRIBUTIVE ADJECTIVE' to refer to noun-modifying adjectives (ones attached to a projection of a noun) and 'PREDICATIVE' to refer to the others.

## 2 How adjectives and nouns combine: a typology

### 2.1 *Intersective interpretations*

Not all relationships between an adjective and a noun it modifies are the same. One respect in which they vary is in how much influence the adjective has in the relationship. In some cases, the relationship is fairly equal. In others, the adjective is the dominant—indeed, for some cases one is tempted to say 'abusive'—partner. It will therefore be useful to lay out a basic typology of adjective-noun relationships, one that has become more or less standard. It has its roots early in formal semantics, the evolution beginning roughly with Montague (1970), Parsons (1972) and Kamp (1975) and continuing through Kamp & Partee (1995) and much subsequent work. Many of the empirical observations that underlie it can be found outside of formal semantics, including notably in Bolinger (1967, 1972).

The simplest, most ordinary kind of adjective-noun relationship is a symmetric one. We will linger on this for a moment, because it is only in comparison with these symmetric relationships that the peculiarity of the others stands out. (The discussion in this subsection elaborates the discussion of intersective modification generally in Chapter ??.) One such straightforward case is in (1), in which the adjective and the noun each give

rise to straightforward entailments:

- (1) Floyd is a Canadian surgeon.
  - a. *entails*: Floyd is Canadian.
  - b. *entails*: Floyd is a surgeon.

Importantly, neither of these entailments depends on the other. Each is an independent fact about Floyd.

Indeed, these entailments together are sufficient to characterize the meaning of the sentence. If (and only if) both of them are true, the sentence itself is true:

- (2) Floyd is Canadian.  
Floyd is a surgeon.

---

*therefore*: Floyd is a Canadian surgeon.

A natural way to think about this is in terms of sets. For Floyd to be a Canadian surgeon, he must be a member of two sets: the set of Canadians and the set of surgeons. Equivalently, he must be a member of the intersection of these sets.

So this, the simplest form of adjectival modification, is INTERSECTIVE. If we think of the denotation of an adjective as simply a set of individuals, this can be represented as in (3):

- (3)  $\llbracket \text{Canadian surgeon} \rrbracket = \llbracket \text{Canadian} \rrbracket \cap \llbracket \text{surgeon} \rrbracket$

The set talk is customary in this context but dispensable. One could just as well speak of ‘conjunctive interpretation’ and write something like (4):

- (4)  $\llbracket \text{Canadian surgeon} \rrbracket = \lambda x . \llbracket \text{Canadian} \rrbracket (x) \wedge \llbracket \text{surgeon} \rrbracket (x)$

In (4), the adjective and noun are treated as denoting a simple property (in the extensional sense; type  $\langle e, t \rangle$ ).

All of this follows from a principle of intersective interpretation such as the Predicate Modification rule of Heim & Kratzer (1998), which interprets modifiers in precisely this intersective way (I have taken minor liberties with the formulation):

- (5) PREDICATE MODIFICATION  
If a branching node  $\alpha$  has as its daughters  $\beta$  and  $\gamma$ , and  $\llbracket \beta \rrbracket$  and  $\llbracket \gamma \rrbracket$  are both of type  $\langle e, t \rangle$ , then  $\llbracket \alpha \rrbracket = \lambda x . \llbracket \beta \rrbracket (x) \wedge \llbracket \gamma \rrbracket (x)$ .

That is, the properties denoted by  $\beta$  and  $\gamma$  are combined to yield the property

an individual has iff it satisfies them both. Switching back from function-talk to set-talk, the rule would be as in (6):

- (6) PREDICATE MODIFICATION (in terms of sets)  
 If a branching node  $\alpha$  has as its daughters  $\beta$  and  $\gamma$ , and  $\llbracket \beta \rrbracket$  and  $\llbracket \gamma \rrbracket$  are both sets of individuals, then  $\llbracket \alpha \rrbracket = \llbracket \beta \rrbracket \cap \llbracket \gamma \rrbracket$ .

The similarity between (6) and (3) is presumably apparent, as is the similarity between (5) and (4).

The careful reader will have discerned that nothing interesting has taken place so far in this section. Ideally, this will have lulled her into a false sense of security. Before we move on, though, it's worth perturbing that security at least slightly. An important property of intersective interpretations is that they create flat semantic representations in which adjectives aren't scope-bearing, including with respect to other adjectives, as (7) reflects:

- (7) a.  $\llbracket \text{famous Canadian surgeon} \rrbracket = \lambda x . \mathbf{famous}(x) \wedge \mathbf{Canadian}(x) \wedge \mathbf{surgeon}(x)$   
 b.  $\llbracket \text{Canadian famous surgeon} \rrbracket = \lambda x . \mathbf{Canadian}(x) \wedge \mathbf{famous}(x) \wedge \mathbf{surgeon}(x)$   
 c.  $\llbracket \text{famous Canadian surgeon} \rrbracket = \llbracket \text{Canadian famous surgeon} \rrbracket$

Without further refinements, the prediction is that the relative order of intersective adjectives should never matter semantically. This doesn't seem to be the case (see section 6). Nor does it accord with most people's intuitions about these adjectives. The expressions in (7c) **feel** like they don't actually mean precisely the same thing, somehow, though the difference is hard to articulate. The feeling that adjacent intersective adjectives take scope over each other is so persistent and widespread that one occasionally encounters linguists talking in a way that presupposes that they do. Perhaps this should worry us.

## 2.2 Subsective interpretations

When an adjective and noun combine intersectively, the adjective maintains a kind of truth-conditional independence. It makes its contributions to the truth-conditions without regard to what the noun is doing. This means it is possible (that is, valid) to reason as in (8):

- (8) Floyd is a Canadian surgeon.  
 Floyd is an arsonist.  


---

*therefore*: Floyd is an Canadian arsonist. (valid)

One can freely replace *surgeon* with an arbitrary other noun that also characterizes Floyd and arrive at a true sentence. This is precisely what an intersective interpretation predicts. It allows us to conclude that he is in the set of Canadians because he is a Canadian surgeon, and that if he is also in the set of arsonists, he is a Canadian arsonist (because he is in the intersection of the sets of Canadians and arsonists).

This tidy state of affairs, however, is not the only empirical possibility. Changing the adjective can upend this kind of reasoning:

(9) Floyd is a  $\left. \begin{array}{l} \text{skillful} \\ \text{lousy} \\ \text{experienced} \\ \text{typical} \end{array} \right\}$  surgeon.

If this were true and interpreted intersectively, it should allow us to reason as in (10):

(10) Floyd is a skillful surgeon.  
 Floyd is an arsonist.  
 —————  
*therefore:* Floyd is a skillful arsonist. (invalid!)

But of course this does not actually follow. To be a skillful surgeon, one must be skillful at surgery. To be a skillful arsonist, one must be skillful at arson. For the most part, surgery and arson require different skill sets.

Trying to analyze the situation in intersective terms makes the problem even clearer. To arrive at an intersective interpretation of *skillful surgeon*, we would first have to identify the set of skillful individuals. This is the essence of the problem. It's unclear how to go about this, at least in general. The best one could do would be to identify a set of individuals that are skillful at anything at all—that is, that aren't unskilled at absolutely everything. But that's not what *skillful* actually means. We are only comfortable evaluating it with respect to some particular kind of activity. For similar reasons, we wouldn't be comfortable identifying once and for all the set of the lousy, the experienced, or the typical. In all these cases, more information is required, and—in attributive uses—that information comes from the noun.

So how to make sense of this? There doesn't seem to be a single straightforward answer, or even a consensus about what is going on, so I will for the most part postpone this question until section 3. It would be nice, however, to cling to a simple set-theoretic way of understanding the situation. We still can. On these readings, the meaning of the adjective and noun together is not the intersection of their meanings, but it is still a **subset** of the meaning of the noun. For example, the set of skillful surgeons is a subset of the set of surgeons, and likewise for lousy or experienced arsonists (and so on):

- (11)  $\llbracket \textit{skillful surgeon} \rrbracket \subseteq \llbracket \textit{surgeon} \rrbracket$   
 $\llbracket \textit{lousy arsonist} \rrbracket \subseteq \llbracket \textit{arsonist} \rrbracket$   
 $\llbracket \textit{experienced arsonist} \rrbracket \subseteq \llbracket \textit{arsonist} \rrbracket$

For this reason, these are usually called SUBJECTIVE readings.<sup>1</sup>

The term ‘subjective’ is descriptively convenient, but it’s important to emphasize that it doesn’t lead to an analysis in the way that ‘intersective’ does. Behind the term ‘intersective’ is a single, testable hypothesis about what adjective-noun combinations mean. But there is no such clarity behind the term ‘subjective’. There are many conceivable hypotheses about how adjectives and nouns combine that are consistent with having the combination denote a subset of the noun meaning. Indeed, the intersective interpretation hypothesis is among them, because the intersection of two sets is a subset of both of them. (So all intersective modification is subjective as well, though I will use ‘subjective’ to mean ‘subjective but not intersective’.)

The examples of subjective adjectives so far have been unambiguously subjective. That’s not always the case. Probably the best-known example of such an ambiguity is (12):

- (12) Olga is a beautiful dancer.

Related kinds of subjective adjectives that aren’t always discussed explicitly under the rubric of subjectivity include those in (13):

- (13) a. Floyd is an old friend.  
 b. Floyd is a big idiot.  
 c. Floyd is a religious official.

These differ from e.g. *skillful* in that they give rise to an easily perceptible ambiguity between two readings, one intersective and the other subjective:

- (14) Olga is a beautiful dancer.  
 a. *intersective*: Olga is beautiful and a dancer.  
 b. *subjective*: Olga dances beautifully.

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<sup>1</sup>If one were inclined to be difficult, one might challenge even the relatively weaker claim that subjective adjectives are really subjective. Roger Higgins (in personal communication to Karina Wilkinson cited in von Fintel & Heim 1999) points out examples such as *My chisel is a good screwdriver*, which would superficially seem to suggest that the set of good screwdrivers includes some non-screwdrivers. Another way of understanding this fact is available, though: the adjective might prompt us to widen the extension of *screwdrivers* to include things it otherwise wouldn’t have. Such a coercion operation is precisely what Partee (2007) proposes for e.g. *fake gun*, discussed in section 2.5.

- (15) Floyd is an old friend.  
 a. *intersective*: Floyd is old and a friend.  
 b. *subsective*: Floyd has been a friend for a long time.
- (16) Floyd is a big idiot.  
 a. *intersective*: Floyd is (physically) big and an idiot.  
 b. *subsective*: Floyd is very idiotic.
- (17) Floyd is a religious official.  
 a. *intersective*: Floyd is religious and he is an official (e.g., president of the US).  
 b. *subsective*: Floyd holds a religious office (e.g. the papacy).

As a consequence, it is possible to deny the content of the adjective on one reading while asserting it on the other without contradiction:

- (18) a. That beautiful dancer isn't beautiful.  
 b. That big idiot isn't big.  
 c. Your old friend isn't old.  
 d. That religious official isn't religious. (He's an Anglican bishop. He's only in it for the music and costumes.)

This is impossible for purely intersective adjectives, as in (19a), and—at least without just the right discourse context—for subsective adjectives of the *skillful* class:

- (19) a. ??That Canadian surgeon isn't Canadian.  
 b. ??That skillful surgeon isn't skillful.

The class of subsective adjectives that also have intersective readings is useful as well in that they reveal that the particular choice of noun can be crucial to achieving the subsective reading:

- (20) a. ??That beautiful sunset isn't beautiful.  
 b. ??That big ferret isn't big.  
 c. ??Your old father isn't old.  
 d. ??That religious person isn't religious.

In (20), simply changing the noun eliminated the subsective reading, and thereby rendered the sentences contradictory.

All that said, the term 'subsective reading' almost certainly groups together a number of distinct phenomena, which it may be wise not to tie together too closely. Each of the kinds of examples considered in this section—



*skillful surgeon, beautiful dancer, old friend, religious official* and *big idiot*—raise different analytical issues. We will confront them individually in section 3.

### 2.3 *Apparently subsective intersective interpretations*

There is an important caveat to be issued here. One might think that examples such as (21) (an old chestnut) and (22) (a version of an example in [Kennedy 2007b](#)) are like the subsective adjectives discussed above:

- (21) a. a small elephant  
b. a big mouse

- (22) a. an expensive Honda  
b. a cheap BMW

In (21), the puzzle is, essentially, that small things are smaller than big things, but a small elephant is bigger than a big mouse. An intersective semantics superficially seems incompatible with this fact. On such an interpretation, all we'd have to work with are sets of mice, elephants, small things, and big things. If something is in the small-thing set, everything smaller than it must be, too. Suppose Dumbo is an elephant in the small-thing set and Mickey is a mouse in the big-thing set. Mickey is smaller than Dumbo, so Mickey must be in the small-thing set as well. Mickey is therefore both small and big. That's odd enough, but the reasoning works equally well the other way: Dumbo has to be both small and big too, for similar reasons (he's bigger than a big thing, namely Mickey). If both animals are members of both sets, we should be equally well be able to describe Dumbo as a big elephant and Mickey as a small mouse. But of course, that's not at all how things work. The problem in (22) is perfectly parallel.

Although a simple intersective interpretation seems to yield the wrong result, the actual interpretation is still subsective:

- (23)  $\llbracket \textit{small elephant} \rrbracket \subseteq \llbracket \textit{elephant} \rrbracket$   
 $\llbracket \textit{expensive Honda} \rrbracket \subseteq \llbracket \textit{Honda} \rrbracket$

So one might conclude that these are simply non-intersective subsective adjectives. One would be in excellent company, including [Montague \(1970\)](#) and [Wheeler \(1972\)](#). But, on the prevailing view, things aren't as they seem. With some additional theoretical refinements, these turn out to be intersective after all.

What's really going on ([Kamp 1975](#), [Siegel 1976b,a](#), [Chierchia & McConnell-Ginet 1990](#), [Kamp & Partee 1995](#), [Heim & Kratzer 1998](#), Lar-

son 1999, Landman 2000, Kennedy 2007b) actually has to do with vagueness and how we go about resolving it. In *big mouse*, for example, speakers assume a standard of bigness that is appropriate to the objects being compared: mice. With respect to that comparison class, the standard of bigness might be quite low, and we take *big* to mean something like ‘big for a mouse’. In *big elephant*, speakers assume a standard appropriate to elephants, one that is much higher, and we take *big* to mean something like ‘big for an elephant’. The other examples work similarly. Of course, vagueness is not limited to attributive adjectives. Precisely the same issue arises in predicative positions:

- (24) a. Dumbo is small.  
b. Mickey is big.

Even in attributive positions, vagueness resolution isn’t always determined by the choice of head noun. Other factors can be more consequential:

- (25) a. That  $\left\{ \begin{array}{l} \text{toddler} \\ \text{fraternity} \end{array} \right\}$  built a big snowman.  
(based on Kamp & Partee 1995)
- b. Kyle’s car is an expensive BMW, though it’s not expensive for a BMW. In fact, it’s the least expensive model they make.  
(Kennedy 2007b)

In (25a), the standard for bigness changes depending on who does the building. In (25b), the standard for expensiveness is explicitly divorced from the head noun. The conclusion to draw, then, is not that such adjectives don’t involve intersective interpretations. Rather, it is that in order to talk about adjective meanings in terms of sets, we should first adjust the membership of the set in a contextually appropriate way.

For this to be convincing, it would need to be spelled out more fully. Kennedy (2007b) does this in especially explicit terms. One way of thinking about the issue along these lines (though the general idea dates to at least Wheeler 1972) is that adjectives take a contextually-supplied comparison class as an argument, and that this argument is usually taken to be identical to the noun. This would mean that *big elephant* typically amounts to something like ‘big-for-an-elephant elephant’. Compositionally, things might be as in (26), where  $\mathbf{big}(x)(C)$  indicates that  $x$  is big when compared to the members of the comparison class  $C$ :

$$(26) \quad \llbracket \mathbf{big}_C \text{ elephant} \rrbracket = \lambda x . \llbracket \mathbf{big}_C \rrbracket (x) \wedge \llbracket \text{elephant} \rrbracket (x) \\ = \lambda x . \mathbf{big}(x)(C) \wedge \mathbf{elephant}(x)$$

This is an intersective interpretation. The impression that something else might be going on comes from the fact the value for  $C$  in most discourse contexts is **elephant**, obscuring the adjective’s independence from the noun.<sup>2</sup> That said, this general analytical strategy—smuggling information about the noun into the interpretation of the adjective—need not be restricted to comparison-class arguments, and is therefore potentially of use in analyzing at least some genuinely subsective adjectives as well (see section 3.4).

The crucial point, though, is that in the core cases of subsective modification, simply manipulating comparison classes in this way is insufficient. In *a beautiful dancer*, we can of course set the standard of beauty so that it is appropriate to dancers, but this won’t explain why *a beautiful dancer* can be someone who merely dances beautifully.

In English, prepositions provide a nice way of distinguishing the two phenomena (Siegel 1976a,b):

- (27) a. Olga is beautiful  $\left\{ \begin{array}{l} \text{for} \\ \text{as} \end{array} \right\}$  a dancer.  
 b. Olga is skillful  $\left\{ \begin{array}{l} \text{for} \\ \text{as} \end{array} \right\}$  a surgeon.  
 c. Olga is excellent  $\left\{ \begin{array}{l} \text{for} \\ \text{as} \end{array} \right\}$  a chess player.

*For* provides a way of spelling out comparison classes, and consequently occurs with adjectives that are dependent on a comparison class but not necessarily subsective. *As*, on the other hand, diagnoses subsective interpretations.<sup>3</sup>

#### 2.4 Ordinary non-subsective adjectives

For the non-intersective adjectives we have so far encountered, it was possible to say that they are at least subsective. For other adjectives, however, even this fallback position is unavailable. Among these:

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<sup>2</sup>For convenience, I’m equivocating here between function-talk and set-talk. If the comparison class argument really is to be a set,  $C$  would have to be the characteristic set of **elephant**.

<sup>3</sup>Indeed, it’s possible to combine *for* and *as* phrases together, further demonstrating the independence of these issues:

(i) For an arthritic 90-year-old, Olga is skillful as a surgeon.

$$(28) \quad \text{an} \left\{ \begin{array}{l} \text{alleged} \\ \text{probable} \\ \text{likely} \\ \text{potential} \end{array} \right\} \text{murderer}$$

An intersective interpretation is impossible here: an alleged murderer is not a member of a set of ‘alleged individuals’. There is no entailment along the lines of (29a), and one can’t even make sense of what this non-entailment would mean:

- (29) Olga is an alleged murderer.  
 a. *does not entail*: #Olga is alleged.  
 b. *does not entail*: Olga is a murderer.

Worse, though, (29b)—which is perfectly sensible—is not entailed either. The set of alleged murderers probably contains some actual murderers, but it also contains some innocent people too. So these adjectives aren’t even subsective:

$$(30) \quad \llbracket \text{alleged murderer} \rrbracket \not\subseteq \llbracket \text{murderer} \rrbracket$$

There is a standard conclusion to draw from these cases: because these adjectives aren’t even subsective, and because their meaning can’t be conceptualized as a set, we have no choice but to analyze them as a function that applies to the meaning of the noun (Montague 1970 and many since). It’s hard to see how things could be any other way.

I’ll illustrate this briefly with *alleged*, in a way that broadly parallels Heim & Kratzer (1998). Because *alleged* is inherently modal, it’s necessary to use an intensional semantics. The denotation of *murderer* in (31a) therefore has a possible-world argument:<sup>4</sup>

$$(31) \quad \llbracket \text{murderer} \rrbracket = \lambda x \lambda w . \mathbf{murderer}(x)(w)$$

The denotation of *alleged* applies to this, and yields something of the same type—that is,  $\llbracket \text{alleged} \rrbracket$  is of type  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$ . It quantifies over the set of worlds compatible with what has been alleged (in the evaluation world  $w$ ),

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<sup>4</sup>This is equivalent to having simply written this:

$$(i) \quad \llbracket \text{murderer} \rrbracket = \mathbf{murderer}$$

Throughout the book, I will persist in spelling out the arguments in this strictly-speaking needless fashion essentially just to make the types easier to discern.

represented here as **allegations**( $w$ ).<sup>5</sup> It requires that all such worlds be ones in which the individual is a murderer:

- (32) a.  $\llbracket \textit{alleged} \rrbracket = \lambda P_{(e,st)} \lambda x \lambda w . \forall w' \in \mathbf{allegations}(w) [P(x)(w')]$   
 b.  $\llbracket \textit{alleged murderer} \rrbracket = \llbracket \textit{alleged} \rrbracket (\llbracket \textit{murderer} \rrbracket)$   
 $= \lambda x \lambda w . \forall w' \in \mathbf{allegations}(w) [\mathbf{murderer}(x)(w')]$

This approach, in which the adjective takes a noun as an argument, reflects why it is so hard to make sense of the idea of a set of ‘alleged individuals’. It also correctly predicts that such adjectives don’t occur in predicative positions, where there is no noun for them to apply to:<sup>6</sup>

- (33) #This murderer is  $\left\{ \begin{array}{l} \textit{alleged} \\ \textit{probable} \\ \textit{likely} \\ \textit{potential} \end{array} \right\}$ .

## 2.5 Privative adjectives, which may not exist

For some adjectives, a more striking effect emerges:<sup>7</sup>

- (34) a  $\left\{ \begin{array}{l} \textit{fake} \\ \textit{pretend} \\ \textit{fictitious} \\ \textit{artificial} \end{array} \right\}$  gun

These are PRIVATIVE adjectives, and they are distinguished by entailments (or apparent entailments) like (35c):

- (35) That is a fake gun.  
 a. *entails*: That is fake.  
 b. *does not entail*: That is a gun.  
 c. *entails*: That is **not** a gun.

<sup>5</sup>This abstracts away from several complications, including that allegations themselves are better construed as propositions.

<sup>6</sup>Some of these adjectives can occur predicatively on eventive readings:

- (i) Rain is  $\left\{ \begin{array}{l} \textit{probable} \\ \textit{likely} \end{array} \right\}$ .

<sup>7</sup>Sometimes temporal adjectives like *former* are included in this class. These raise some independent issues, however, so I have set them aside here (see section 4.2 for discussion).

The curious fact about these adjectives is that they seem to negate the meaning of the noun. Not only is it the case that fake guns don't constitute a subset of guns (as (36a) reflects); it's also the case that no fake gun is in the set of guns (i.e., the two sets have an empty intersection), as (36b) reflects:

- (36) a.  $\llbracket \textit{fake gun} \rrbracket \not\subseteq \llbracket \textit{gun} \rrbracket$   
 b.  $\llbracket \textit{fake gun} \rrbracket \cap \llbracket \textit{gun} \rrbracket = \emptyset$

On one level, this seems obvious. On another, perhaps it shouldn't.

There is another difference between privative adjectives and ordinary non-subjective ones. We have no trouble making sense of the inference in (35a)—that a fake gun is fake—and, more striking still, this inference turns out to be an entailment. Privative adjectives (of this class, anyway) behave this way systematically. A corresponding fact is that they happily occur in predicative positions:

- (37) This gun is  $\left. \begin{array}{l} \textit{fake} \\ \textit{pretend} \\ \textit{fictitious} \\ \textit{artificial} \end{array} \right\}$ .

This is surprising. One might have thought privative adjectives would be like modal non-subjective adjectives. They have a similar modal flavor, in that they introduce counterfactual possibilities (e.g., 'this isn't a gun, but it might have been').

Partee (2007) proposes a way of dealing with these facts that initially seems radical, but upon reflection perfectly natural. She argues that privative adjectives as such don't actually exist. Rather, they are simply a species of subjective adjective with a notable additional property: they coerce the noun they modify into a looser interpretation than it otherwise would have received. The idea is that a fake gun is a gun after all, in an appropriately loose sense of *gun*. We occasionally resort to such loose interpretations in any case. One wouldn't be inclined to say something like (38) to a child:

- (38) 'Stop pointing your fake gun at your sister's face, and take your fake dinosaur out of her nose. Put away your fake truck, too.'

Instead, one would just refer to the fake gun as simply a gun, and so on. On this view, the apparent entailment in (35c) that a fake gun is not a gun is a consequence of our unwillingness to coerce unmodified occurrences of *gun* to include fake guns without appropriate contextual support. It's a little trickier to explain the entailment in (35a), that is, that *fake gun* entails *fake*. But if privative adjectives are actually subjective, this entailment would parallel an

inference (not really an entailment) that some other subjective adjectives systematically give rise to in appropriate discourse contexts. If the discourse is specifically concerned with surgery, we will generally conclude from *Floyd is a skillful surgeon* that *Floyd is skillful*. This can't be called an 'entailment', for the reasons that make this class of subjective adjectives difficult in general—namely, that one is not normally simply skillful in general. But at least in this discourse context, the inference goes through in a way that parallels the relevant entailment.

This also sheds light on a potentially deeper problem. Non-subjective adjectives such as *alleged* are impossible in predicative positions, and it is not clear how to even make sense of the notion of an individual being 'alleged'. The idea of an individual being fake is less mystifying. If privative adjectives were like *alleged*, this would be surprising; if they are actually subjective, it's expected. Of course, it's hard to evaluate these ideas without an explicit theory of how subjective adjectives are interpreted. That is the issue to which we will now turn.

### 3 The type of adjectives and the nature of subjectivity

#### 3.1 *How powerful are adjectives?*

If you're a linguistic expression that would like to impose its will on its phrase-structural neighbors, you will want to have a high type. Put another way: if you want to do something to your neighbor, first take that neighbor as an argument. Your argument is your hostage.

In the previous section, we've seen that many adjectives enter into fairly coequal partnerships with their nouns, and are interpreted intersectively (and hence symmetrically). These well-behaved adjectives can have a low type. Indeed, they **must**: to combine intersectively in the standard way, they must denote properties. Other adjectives, such as *alleged*, are not even subjective, and insist on doing things to a noun that preclude this kind of coequal relationship. *Alleged* needs to push the semantic content of its noun across possible worlds, and therefore it needs to access this content directly. Such adjectives need to denote functions from noun meanings to noun meanings—that is, they need to denote PREDICATE MODIFIERS, type  $\langle\langle e, st \rangle, \langle e, st \rangle\rangle$  (or, in extensional form,  $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$ ). This is also sometimes referred to slightly more vaguely as a HIGHER-ORDER adjective meaning because it can't be expressed in first-order predicate logic. The term 'predicate modifier' is simply the name of a type, and, confusingly, is only indirectly related to Heim & Kratzer's (1998) rule of Predicate Modification, which applies only in the **absence** of a predicate modifier denotation.

So, in considering the semantic type of adjectives, we confront a question

of power, or rather two closely related ones. First, are we wrong to think intersective adjectives are really property-denoting? If some adjectives require a higher type, perhaps all adjectives should be given it? This would mean that intersective adjectives in principle have as much power at their disposal as *alleged*, but for some reason (discretion?) choose not to use it. Or is it better to leave intersective adjectives as they are, and have a mixed theory in which different adjectives have denotations of different types? When Hans Kamp referred to ‘two theories of adjectives’ in the title of a widely-cited paper (Kamp 1975), this is part of what he had in mind. It might seem an essentially aesthetic question that hinges on personal preferences in theory design, but interestingly—as we’ll see in the next section—it turns out that it isn’t.

The other question of power is where subsective adjectives fit in. Intuitively, they seem to occupy a middle ground between intersective and non-subsective, more complicated than the former but not as complicated as the latter. But as far as the types themselves are concerned, there is no middle ground to occupy. You denote either a property or predicate modifier.

To make the first question more concrete, it will be necessary to spell out the two possible answers. In doing so, I’ll adopt an intensional system to make *alleged* feel more at home. I’ve taken the liberty of assigning names to the two options, and provided sample denotations:

(39) ADJECTIVE TYPE HETEROGENEITY HYPOTHESIS

Intersective adjectives denote properties ( $\langle e, st \rangle$ ) and are interpreted by a rule of (intensional) intersective interpretation such as Predicate Modification.

$$\llbracket \textit{Canadian} \rrbracket = \lambda x \lambda w . \mathbf{Canadian}(x)(w)$$

(40) ADJECTIVE TYPE HOMOGENEITY HYPOTHESIS

All adjectives, including intersective ones, denote predicate modifiers ( $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$ ).

$$\llbracket \textit{Canadian} \rrbracket = \lambda P_{\langle e, st \rangle} \lambda x \lambda w . \mathbf{Canadian}(x)(w) \wedge P(x)(w)$$

The reference to ‘intensional intersective modification’ in (39) is due solely to adopting an intensional system in general, but the operation is only slightly different from plain extensional Predicate Modification.<sup>8</sup> In (40), of course, there is a sense in which the intersective rule of semantic composition is

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<sup>8</sup>This could be spelled out as:

(i) INTENSIONAL PREDICATE MODIFICATION

If a branching node  $\alpha$  has as its daughters  $\beta$  and  $\gamma$ , and  $\llbracket \beta \rrbracket$  and  $\llbracket \gamma \rrbracket$  are both of type  $\langle e, st \rangle$ , then  $\llbracket \alpha \rrbracket = \lambda x \lambda w . \llbracket \beta \rrbracket (x)(w) \wedge \llbracket \gamma \rrbracket (x)(w)$ .



built into the denotation of the adjective itself. One might regard this as suspicious, a generalization missed—or as an indication that intersectivity is a characteristic of adjective meanings that must, in the end, inevitably be stipulated.

Importantly, both of these hypotheses make precisely the same predictions about the truth conditions of simple attributive adjectives:

(41) Assuming Adjective Type Heterogeneity:

$$\begin{aligned} & \llbracket \textit{Canadian surgeon} \rrbracket \\ &= \lambda x \lambda w . \llbracket \textit{Canadian} \rrbracket (x)(w) \wedge \llbracket \textit{surgeon} \rrbracket (x)(w) \\ & \hspace{10em} \text{(by intensional Predicate Modification)} \\ &= \lambda x \lambda w . \mathbf{Canadian}(x)(w) \wedge \mathbf{surgeon}(x)(w) \end{aligned}$$

(42) Assuming Adjective Type Homogeneity:

$$\begin{aligned} & \llbracket \textit{Canadian surgeon} \rrbracket = \llbracket \textit{Canadian} \rrbracket (\llbracket \textit{surgeon} \rrbracket) \\ &= \lambda x \lambda w . \mathbf{Canadian}(x)(w) \wedge \llbracket \textit{surgeon} \rrbracket (x)(w) \\ &= \lambda x \lambda w . \mathbf{Canadian}(x)(w) \wedge \mathbf{surgeon}(x)(w) \end{aligned}$$

In light of this equivalence, distinguishing the two hypotheses empirically will require us to find other proving grounds.

Before doing so, though, there is an aesthetic point to be made. Famously, in the early years of formal linguistic semantics, Richard Montague introduced a tradition that became known as ‘generalizing to the worst case’. The slightly jokey term reflects work like [Montague \(1973\)](#), in which the proper name *John* ultimately corresponds not as one might expect to an individual, type  $e$ , but a species of intensionalized generalized quantifier, type  $\langle s, \langle \langle s, \langle \langle s, e \rangle, t \rangle \rangle, t \rangle \rangle$  (see [Abbott 2010](#) for an especially clear discussion). The idea was that because at least **some** DP denotations must be of this type, **all** of them should be. Merely looking at the types, it seems perverse to suggest that  $\langle s, \langle \langle s, \langle \langle s, e \rangle, t \rangle \rangle, t \rangle \rangle$  is more elegant than  $e$ . Nevertheless, there is a sense in which this is so. For all its commas and angle-brackets, the higher type made it possible to maintain a fixed correspondence between syntactic category and semantic type. It also meant that a single rule of semantic composition could be used for all members of this syntactic category. The more complicated type was thus the price of a simpler semantics overall. From a present-day perspective, these advantages are less important because we now generally assume a type-driven system with few specific rules of semantic composition and no necessary correspondence between syntactic

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For discussion of questions that arise from the interaction of intensionality and intersective interpretation, see [Musan \(1997\)](#) and [Keshet \(2010\)](#).

category and semantic type. But, given the framework, the reasoning behind the type is almost unimpeachable.

Precisely the same reasoning applies to the choice between the two hypotheses at issue here. Consequently, Montague (1970) (and work contemporary with it including Wheeler 1972 and Lewis 1972) assumed Adjective Type Homogeneity. His adjectives were universally predicate modifiers. This means that the problem of subsective interpretations was easily set aside. If even ordinary intersective adjectives denote predicate modifiers, subsective adjectives would do so too. And if subsective adjectives have access to their nouns in this way, there is relatively little to explain. For *skillful*, for example, one might imagine that the core of the denotation is a predicate **skillful-as**, which is relativized to some role with respect to which one can be skillful:

- (43) a.  $\llbracket \textit{skillful} \rrbracket = \lambda P_{\langle e, st \rangle} \lambda x \lambda w . \mathbf{skillful-as}(P)(x)(w)$   
 b.  $\llbracket \textit{skillful surgeon} \rrbracket = \lambda x \lambda w . \mathbf{skillful-as}(\mathbf{surgeon})(x)(w)$

This formulation doesn't overtly reflect the subsectivity of *skillful*, but one might further imagine that **skillful-as** is defined in a way that would require that its first argument (here, **surgeon**) hold of its second (*x*). Alternatively, one could add this entailment as an additional conjunct, as one would for an intersective adjective. The principal compositional challenge on this view, as Montague recognized, is not what to do with subsective adjectives, but rather what to do with adjectives (subsective or intersective) in predicative positions, as in (44):

- (44) Floyd is  $\left\{ \begin{array}{l} \textit{skillful} \\ \textit{lousy} \\ \textit{Canadian} \\ \textit{buoyant} \end{array} \right\}$ .

Montague's solution—and the natural one in any theory that derives predicative adjectives from attributive ones—was to suppose that these cases involve an unpronounced noun, often a semantically-bleached one such as *entity*. An independent account would have to be provided of why modal adjectives such as *alleged* can't be licensed in predicative positions in this way.<sup>9</sup>

This may seem a bit of a hack, but it has its advantages. For one, depending on the context, different unpronounced nouns might be involved—even contentful ones, such as *surgeon*—which would provide a way to model

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<sup>9</sup>The reason can't be just that modal adjectives are odd with semantically bleached nouns (?*alleged entity*), because at least in the case of *skillful*, it needs to be possible to delete contentful ones too. In a surgeon-oriented discourse, the deleted noun associated with predicative *skillful* would have to be *surgeon*.

sensitivity to discourse context. For another, as [Kennedy \(2012\)](#) points out, some languages genuinely seem to lack predicative adjectives and have, as their analogues to (44), sentences with overt semantically-bleached nouns.

### 3.2 Siegel: The Doublet Theory

So must the choice between the two hypotheses above ultimately be made on aesthetic grounds? [Siegel \(1976a\)](#) convincingly demonstrated that the answer is no. Concrete linguistic facts can be brought to bear on the question, and, viewed the right way, they seem custom-tailored to answer it.

The crucial observations concern a morphological alternation in Russian between two forms of adjective, a ‘long form’ and a ‘short form’:

(45)	RUSSIAN LONG AND SHORT FORM ADJECTIVES			
		‘good’ (fem.)	‘talented’ (fem.)	‘intelligent’ (masc.)
	<i>long:</i>	xorošaja	talantlivaja	umnyj
	<i>short:</i>	xoroša	talantliva	umen

The clearest syntactic difference between the two is that the short forms don’t occur in attributive positions (example from [Matushansky 2008](#)):

- (46) a. xorošaja teorija  
good-LONG theory
- b. \*xoroša teorija  
good-SHORT theory

In predicative positions, both forms are in principle possible (examples from [Siegel 1976a](#)):

- (47) a. Naša molodež’ talantlivaja i trudoljubivaja.  
our youth talented-LONG and industrious-LONG  
‘Our youth is talented and industrious.’
- b. Naša molodež’ talantliva i trudoljubiva.  
our youth talented-SHORT and industrious-SHORT
- (48) Zimnie noči budut dolgimi / dolgi  
winter nights will.be long-LONG / long-SHORT  
‘The winter nights will be long.’

There are a few further restrictions, but they aren’t immediately relevant.

These morphological and syntactic facts on their own—without even touching on the semantics—have a bearing on the two hypotheses on the

table. Clearly, there is a language with a systematic contrast in adjectives that is related to the predicative-attributive distinction, a distinction that is in turn related to the choice between property and predicate-modifier denotations. If we were to assume Adjective Type Heterogeneity, we would have an independently-motivated tool relevant to accounting for the difference. If, on the other hand, we assumed Adjective Type Homogeneity, it would be necessary to find some other theoretical mechanism to account for these facts.

Beyond Adjective Type Heterogeneity, there at least two further discoveries to be made here:

- Because short-form adjectives are exclusively predicative, they seem the natural choice for a simple property denotation. The long-form would then be predicate modifiers. Given a standard modern semantics with a rule of intersective interpretation, this wouldn't yet explain why short-form adjectives are impossible in attributive positions. A property-denoting short form could simply combine intersectively with property-denoting noun. Eliminating that rule, though, would render the two property-denoting expressions unable to combine, bringing about a type clash and thereby explaining the ungrammaticality. So this suggests—surprisingly, and interestingly—that a rule of intersective interpretation might not, in fact, be desirable after all.
- The situation in predicative positions is different. Here, the property-denoting short forms would be expected, consistent with the facts. The predicate-modifier-denoting long forms, though, would not, because there is no adjacent noun to modify. Yet the long forms are possible in this position too. This would seem to be evidence for the idea independently broached earlier by [Montague \(1970\)](#) and others that there may be an unpronounced nominal in certain predicative positions. Such an unpronounced nominal would provide the long-forms with a noun to modify, thereby licensing them.

All of these conclusions follow from distinctly linguistic, empirical arguments, not from a-priori aesthetic judgments. That's significant in itself. But notably, the conclusions so far arose before any reference to the semantics. Even if both forms of adjective meant precisely the same thing, this line of reasoning would present itself.

As it turns out, however, the two forms may not be semantically indistinguishable, in a way that bears on the question of how subsectivity works. Siegel reports a contrast in how long and short forms of 'intelligent' are interpreted:

- (49) Studentka umna / umnaja.  
 student intelligent-SHORT / intelligent-LONG  
 ‘(The) student is intelligent.’  
 a. *short form*: ‘the student is generally intelligent’  
 b. *long form*: ‘the student is intelligent as a student’

The short-form interpretation in (49a) is a simple intersective one, in which the content of the adjective can be disentangled from the noun. If we take these facts at face value, the reading in (49b) would be a subsective one, in that it involves sensitivity to additional information provided by the head noun. It ascribes only academic intelligence to the student, and not, say, social intelligence.

Here, however, a caveat needs to be issued. The contrast in (49) may be absent for some speakers, perhaps even for many.<sup>10</sup> Luca Sbordone (p.c.) reports that one speaker he consulted characterized the contrast as something that might be found in a grammar more than in actual speakers. I don’t know what to make of this, and it’s not a task for this book to resolve it. (This might be a interesting area for research, though.) For the sake of conveying Siegel’s argument, though, let’s assume the contrast is present.

The connections between the short-form/long-form distinction and the intersective/subsective distinction run even deeper. In English, an out-of-the-blue predicative use of a subsective adjective of the *skillful* class would tend to elicit raised eyebrows:

- (50) Olga is skillful.

Without appropriate discourse support, this leaves the addressee adrift, uncertain about the nature of the skillfulness. Skillful at what? There is, marginally, a fallback option: skillful in general. English lacks a short-form/long-form distinction, so both the subsective skillful-at-what reading and the intersective skillful-in-general reading are possible, at least in principle. In light of that, the behavior of the Russian adjectives in (51) seems familiar:

- (51) Oleg umen / umnyj.  
 Oleg intelligent-SHORT / intelligent-LONG  
 ‘Oleg is intelligent.’  
 a. *short form*: ‘Oleg is intelligent in general’  
 b. *long form*: ‘Oleg is intelligent as a . . . what?’

Out of the blue, the short form is perfectly natural. It’s intersective, and doesn’t send us searching for a skillful-at-what argument. The long form,

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<sup>10</sup>Thanks to Luca Sbordone and Vladislav Poritski for bringing this to my attention.

however, is subsective, and does exactly that. There is no common noun to suggest the nature of Oleg's intelligence, and we are left uncertain just as in (50).

The conclusion, then, seems to be not only that we should assume Adjective Type Heterogeneity, but also that the two types of adjectives correlate with the intersective/subsective distinction, with intersective adjectives denoting properties and subsective ones denoting predicate modifiers. Again, in this case the connection was not made on purely conceptual grounds—asking what type we need in order to write a plausible denotation for a subsective adjective—but rather on empirical ones. Siegel discovered an independent morphological way of identifying the semantic type of adjectives, and found that this distinction correlated with the intersective-subsective distinction. In that respect, this is independent evidence for the view that subsective adjectives have higher-order denotations.

What, then, to conclude about adjectives outside of Russian? As one might expect, Siegel's suggestion is that the semantic facts are essentially the same, but that in English and most other languages the morphology doesn't overtly reflect them. Many English adjectives would then exist in two forms—'doublets', she calls them—that happen to be homophonous. This explains why some adjectives, such as *beautiful* in *beautiful dancer*, give rise to an intersective/subsective ambiguity. It becomes simply a lexical ambiguity between two senses of the word *beautiful*, of precisely the same character as the lexical ambiguity in e.g. *bank* (side of river versus financial institution).

It might seem a rather grand accident that vast numbers of adjectives in English should happen to be ambiguous in precisely the same way. But that's probably the wrong way to think about it. First, for some purely intersective adjectives, Siegel proposes an independent transformational mechanism that would license them in attributive positions without needing to stipulate a distinct predicate-modifier form. Second, non-subsective adjectives are never ambiguous in this way. Third, some adjectives that one might have expected to be ambiguous happen not to be. *Remiss*, for example, turns out to lack an attributive use (*\*a remiss surgeon*), even though it's quite easy to imagine what a subsective interpretation would mean (that is, what it would mean to be remiss as a surgeon). That suggests that there really is some irregularity here that must inevitably be stipulated in the lexicon.

Irrespective of the substantive claims about adjectives in the dissertation, though, the most memorable insight might be the methodological one: the elegant way in which linguistic facts are brought to bear on an issue that one might have thought couldn't be settled empirically.

### 3.3 Larson: events inside the nominal extended projection

There are, it seems to me, at least two difficulties facing the Doublet Theory, which tend to support an overall view of subsectivity advanced in Larson (1999).<sup>11</sup> First, because the doublet theory groups all subsective readings with predicate-modifier denotations, it unites subsective and modal adjectives into a single class. But empirically, they do seem to be distinct. The clearest respect in which this is so has to do with gradability. The biggest classes of subsective adjectives are gradable, while modal adjectives generally aren't:<sup>12</sup>

- (52) a. the  $\left\{ \begin{array}{l} \text{more} \\ \text{most} \\ \text{very} \end{array} \right\}$  beautiful dancer  
b. our  $\left\{ \begin{array}{l} \text{older} \\ \text{oldest} \\ \text{very old} \end{array} \right\}$  friend
- (53) \*the  $\left\{ \begin{array}{l} \text{more} \\ \text{most} \\ \text{very} \end{array} \right\}$  alleged murderer

This complicates any account of gradability. If the extended projections of gradable adjectives were all of the same type, the theory of gradability would have to simply ensure that this is the type that emerges once degree morphemes combine with adjectives. But it's not clear how such a theory could ensure that a single degree morpheme would yield a property when combining with some adjectives and a predicate modifier when combining with another. (One possible solution would be massive systematic two-way homophony extending across the full class of degree morphemes. Another would be a type shift for which there is no independent evidence. Neither of these is appealing.)

Second, the Doublet Theory predicts that the relative order of attributive adjectives should have no bearing on the availability of subsective interpretations. But there does seem to be a contrast between (54) and (55):

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<sup>11</sup>Larson provides a simple independent counterargument to the Doublet Theory based on its prediction that attributive adjectives should never be ambiguous between subsective and intersective readings, as they are in English. For the Russian speakers available to me, though, this prediction goes through. Thanks to Pasha Koval and Vladislav Poritski for bringing this to my attention.

<sup>12</sup>One notable exception to this is *probable: the most/very probable killer*. The interaction of modality and degree modification has only relatively recently become an area of active research (Portner 2009, Lassiter 2010, 2011b,a, Klecha 2012). See section ?? for more discussion.

- (54) an ugly beautiful dancer  
 a. a person who is ugly and dances beautifully  
 b. \*a person who is beautiful and dances in an ugly way
- (55) a beautiful ugly dancer  
 a. \*a person who is ugly and dances beautifully  
 b. a person who is beautiful and dances in an ugly way

In both these examples, it is the higher adjective that receives the intersective reading and the lower one that receives the subsective one. In another context, Larson & Cho (2003) note a similar difference between *John's new old car* and *John's old new car*.

Larson (1998, 1999) argues that such facts as these show that the intersective-subsective distinction must be disentangled from the distinction between properties and predicate modifiers. He proposes instead that both intersective and subsective adjectives are property-denoting, and that the origin of subsective readings is fundamentally different. To appreciate the analytical intuition behind his idea, it helps to indulge in a momentary digression about manner adverbs. As a class, they have an odd characteristic: they all seem to be subsective (Bennett 1974), because of the failure of inferences such as (56) (see sections ?? and ??):

- (56) Olga danced beautifully.  
 Olga sang.  
 \_\_\_\_\_  
*therefore:* Olga sang beautifully. **(invalid!)**

This, of course, mirrors the invalid reasoning behind concluding that Floyd is a skillful arsonist because he is an arsonist and skillful surgeon (in (10) above), rather than the valid reasoning behind concluding that he is a Canadian arsonist because he is an arsonist and Canadian surgeon (in (8)). One might take this to show that manner adverbs, just like subsective adjectives, have to have predicate-modifier denotations.

But, as McConnell-Ginet (1982) notes, this is not the only way to prevent this inference from going through. The standard view is now that the source of the problem is entirely different: it is that manner adverbs are not predicates of individuals, but rather of Davidsonian events (Davidson 1967; see section ??). Thus instead of a subsective predicate-modifier denotation as in (57a), the adverb receives an intersective property interpretation as in (57b) (starting with (57b), I'll adopt an extensional framework for this section):



- (57) Olga danced beautifully.  
 a. **beautifully(danced)(Olga)**  
 b.  $\exists e[\mathbf{dance}(e) \wedge \mathbf{agent}(e) = \mathbf{Olga} \wedge \mathbf{beautiful}(e)]$

The interpretation in (57a) involves a predicate modifier **beautifully** operating on **dance**, whereas the one in (57b) simply says that there was an event of dancing, that Olga was its agent, and it was beautiful.<sup>13</sup> Apart from being more explanatory, this explains the failure of the inference in (56). If there was a dancing event by Olga that was beautiful and a singing event by Olga, it doesn't follow that the singing event must have been beautiful.

Larson's core insight is that adjectival subsectivity might arise from precisely the same source: an event argument. In what follows, I will sketch a way of implementing this idea in a simplified framework that is likely to be more familiar for most readers. This requires significantly reformulating his analysis, though the essential analytical insight is, I hope, preserved. I'll note the important differences once all the cards are on the table.

The first step is to observe that *dancer* can be understood very naturally in terms of events. A dancer is someone who habitually dances. This notion of 'habitually dancing' can be expressed with a generic quantifier **GEN** (Krifka et al. 1995, Chierchia 1995; a.o.):

- (58) Olga dances.  
 a. **GEN**  $e$  [**dance**( $e$ )(Olga)]  
 b. **GEN**  $e$  : **relevant** <sub>$c$</sub> ( $e$ ) [**dance**( $e$ )(Olga)]

What (58a) says is that the generic or typical event is a dancing by Olga. This is too strong. Rather, what we really want is something closer to (58b), which says that the generic event among the ones relevant in the discourse context  $c$  is a dancing by Olga. Of course, what counts as 'relevant' might vary dramatically from one discourse to another, but the crucial thing is that, under the relevant circumstances, Olga typically dances.

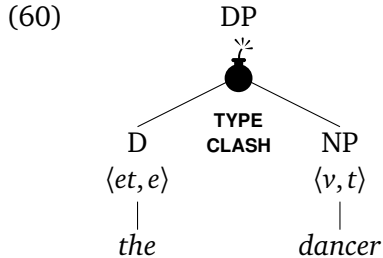
The next step is to incorporate this into the denotation of the noun *dancer* itself. This can be done by treating *dancer* as simply a property of dancing events:

- (59)  $\llbracket \mathit{dancer} \rrbracket = \lambda e . \mathbf{dance}(e)$

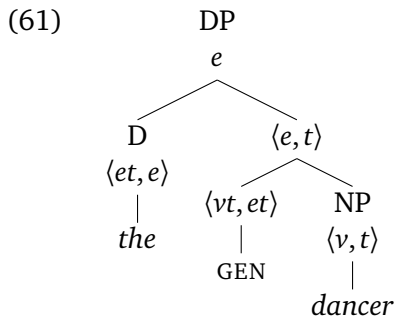
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<sup>13</sup>I have 'severed' the external argument from the predicate **dance** in the style of Kratzer (1996)—that is, rather than introducing Olga directly as an argument (i.e., **dance**( $e$ )(Olga)), I've introduced her using the thematic-role predicate **agent**, which maps events to their agents. (See sections ?? and ?? for discussion.) This is not crucial for the most immediate point, but I will rely on it in my adaptation of Larson (1998, 1999) below.

This looks more like a denotation for the verb *dance*, and it's not of the right type to occur in a nominal position, because it's a property of events (type  $\langle v, t \rangle$ ) rather than of individuals ( $\langle e, t \rangle$ ). If a determiner such as *the* were to combine with this directly, a type clash would occur:



So there are two tasks in need of doing: a generic quantifier must be introduced, and this type clash must be avoided. One way of accomplishing this is to suppose that this quantifier is introduced by a node in the tree (corresponding to a functional head or perhaps reflecting the effect of a Partee 1987-style type shift):



The denotation of this morpheme will be as in (62):

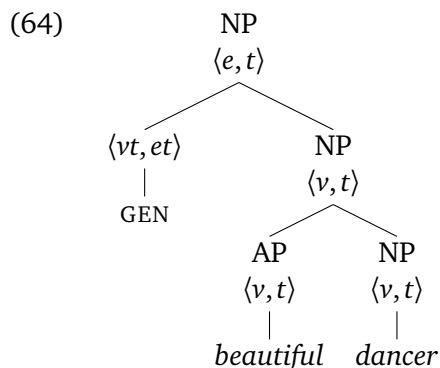
$$(62) \quad \llbracket \text{GEN} \rrbracket^c = \lambda f_{\langle v, t \rangle} \lambda x . \mathbf{GEN} e : \mathbf{relevant}_c(e) [f(e) \wedge \mathbf{agent}(e) = x]$$

This applies to a property of events and yields a property of individuals, one that holds of an individual iff, for the generic event of the relevant type, the individual is the agent of that event and the event meets the description provided by the NP. The next step (henceforth I will omit the superscript  $c$ ):

$$(63) \quad \begin{aligned} \llbracket \text{GEN} \text{ dancer} \rrbracket &= \llbracket \text{GEN} \rrbracket (\llbracket \text{dancer} \rrbracket) \\ &= \lambda x . \mathbf{GEN} e : \mathbf{relevant}_c(e) [\llbracket \text{dancer} \rrbracket (e) \wedge \mathbf{agent}(e) = x] \\ &= \lambda x . \mathbf{GEN} e : \mathbf{relevant}_c(e) [\mathbf{dance}(e) \wedge \mathbf{agent}(e) = x] \end{aligned}$$

A dancer, then, is someone who is the agent of the typical dancing event (of the relevant sort).

The crucial issue here is how adjectives fit into this picture. The answer is straightforwardly. The only necessary wrinkle is that adjectives with both subjective and intersective readings like *beautiful* must be able to apply to either individuals or events. If the adjective occurs below GEN, as in (64), it will receive an event-based—and therefore subjective—reading:

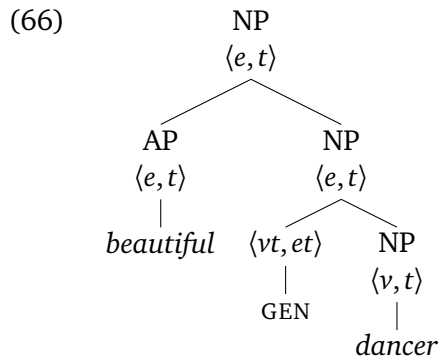


The adjective can now be interpreted intersectively with the noun:

- (65) a.  $\llbracket \textit{beautiful dancer} \rrbracket = \lambda e . \llbracket \textit{beautiful} \rrbracket (e) \wedge \llbracket \textit{dancer} \rrbracket (e)$   
 $= \lambda e . \mathbf{beautiful}(e) \wedge \mathbf{dance}(e)$
- b.  $\llbracket \text{GEN } \textit{beautiful dancer} \rrbracket = \llbracket \text{GEN} \rrbracket (\llbracket \textit{beautiful dancer} \rrbracket)$   
 $= \lambda x . \mathbf{GEN } e : \mathbf{relevant}_c(e) \left[ \begin{array}{l} \llbracket \textit{beautiful dancer} \rrbracket (e) \wedge \\ \mathbf{agent}(e) = x \end{array} \right]$   
 $= \lambda x . \mathbf{GEN } e : \mathbf{relevant}_c(e) \left[ \begin{array}{l} \mathbf{beautiful}(e) \wedge \mathbf{dance}(e) \wedge \\ \mathbf{agent}(e) = x \end{array} \right]$

On this reading, a beautiful dancer is someone who is the agent of the typical event that is beautiful and a dancing.

To achieve the intersective reading, the adjective simply has to occur higher in the tree, above GEN:



The resulting interpretation would interpret *beautiful* intersectively with GEN *dancer*:

- (67) a.  $\llbracket \text{GEN dancer} \rrbracket$   
 $= \lambda x . \mathbf{GEN} e : \mathbf{relevant}_c(e) [\mathbf{dance}(e) \wedge \mathbf{agent}(e) = x]$
- b.  $\llbracket \text{beautiful GEN dancer} \rrbracket$   
 $= \lambda x . \llbracket \text{beautiful} \rrbracket (x) \wedge \llbracket \text{GEN dancer} \rrbracket (x)$   
 $= \lambda x . \mathbf{beautiful}(x) \wedge$   
 $\mathbf{GEN} e : \mathbf{relevant}_c(e) [\mathbf{dance}(e) \wedge \mathbf{agent}(e) = x]$

This is the ordinary intersective reading. It requires simply that an individual be beautiful and a dancer.

This analysis naturally accounts for the adjective ordering facts. Just as the facts dictate, intersective readings are possible higher than subsective readings. It also assimilates subsective readings to intersective ones rather than to non-subsective ones, which better accords with the intuition that the two senses of *beautiful* have more in common with each other than either has with e.g. *alleged*. Indeed, because *beautiful* need not be lexically ambiguous at all, there is no danger that the account of subsective readings will interfere with the account of its gradability.

This approach also has the advantage of scaling up: many forms of subsectivity can be understood in this way. But a crucial step, and one many people find somewhat less plausible, is introducing event arguments to nominals that don't wear their deverbal origins on their sleeve, as *dancer* does. For example, to accommodate the subsective reading of *old friend*, it's necessary to construe *friend* as having internal structure involving friendship states. Likewise, for the subsective reading of *just king*, *king* would have to be decomposed into an eventuality predicate of some kind (kingship states or reigning events). The analysis may also scale up so well as to overgenerate. Friendships can be rocky or brief or unfortunate, but there seem to be no subsective readings for *#rocky/#brief/unfortunate friend*. Nor is it clear how

to extend this approach to e.g. *big idiot* or *religious official*. Then again, these may both represent a fundamentally different kind of subsectivity in any case. Nevertheless, the larger picture that emerges is lovely and deeply explanatory: subsective readings are not an accident of the lexicon but rather a reflection of previously hidden aspects of the architecture of the extended nominal projection.

As noted earlier, I have taken the liberty of recasting Larson’s analysis into a framework more consistent with the assumptions generally made elsewhere in this book. This has entailed some significant changes, though I hope the spirit of the proposal remains. It’s worth flagging the biggest differences, though. First, Larson’s proposal is cast in a framework in which the interpretation function itself is replaced by an interpretation relation, so that a single linguistic expression can correspond to multiple denotations (Larson & Segal 1995). In this case, any adjective-noun combination is related to both an intersective/individual and subsective/event meaning. This arguably allows for a simpler syntax-semantics mapping. To the extent that this is so, it is an argument for this alternative framework. The second major difference has to do with the denotations themselves. Broadly in the spirit of Heim (1982), Larson adopts assumptions under which certain regions of trees can be mapped onto bits of a semantic representation by specialized rules of composition. This allows him to make a neat connection to how quantification in the verbal domain works. On the Mapping Hypothesis of Diesing (1990), the higher regions of the verbal extended projection are mapped onto the restrictor of a quantifier, and lower ones to its nuclear scope. Larson proposes that something similar happens in nominal extended projection, and that adjectives can wind up either in the restrictor or the nuclear scope of the generic quantifier. His actual denotation for the subsective reading of *beautiful dancer* is therefore closer to (68a):

- (68) a.  $\lambda x . \text{GEN } e : \text{relevant}_c(e) \wedge \text{dance}(e) \wedge \text{agent}(e) = x$   
[beautiful(e)]  
 b.  $\lambda x . \text{GEN } e : \text{relevant}_c(e) \wedge \text{dance}(e) \wedge \text{agent}(e) = x$   
[beautiful(e)  $\wedge$  dance(e)  $\wedge$  agent(e) = x]

Because (68a) is equivalent to (68b), the difference between (68a) and the denotation provided here isn’t as great as it initially appears. Indeed, because the contextually-provided notion of relevance is quite flexible (notoriously so), it would be difficult to tease apart empirically whether the additional conjuncts in the restrictor are actually necessary or could be provided contextually via the predicate **relevant**. Either way, the broader connection to the Mapping Hypothesis isn’t reflected in this adapted version.

### 3.4 The implicit argument approach

Von Stechow & Heim (1999), Landman (2001), Schäfer (2004, 2005) point out yet another analytical alternative that would, like Larson’s, reduce subsective readings to intersective ones, even without accepting Larson’s deeper explanation.

One could simply suppose that subsective adjectives do in fact have an additional argument position, but that this position is saturated within the extended projection of the adjective itself. The existence of *as* phrases makes this especially appealing. The denotation of *skillful*, for example, could be as in (69) as suggested in section 3.1, but the first argument could be provided not by the noun, but by an *as*-phrase:

$$\begin{aligned}
 (69) \quad a. \quad \llbracket \textit{skillful} \rrbracket &= \lambda P_{\langle e, st \rangle} \lambda x \lambda w . \textbf{skillful-as}(P)(x)(w) \\
 b. \quad \llbracket \textit{skillful as a surgeon} \rrbracket &= \llbracket \textit{skillful} \rrbracket (\llbracket \textit{as a surgeon} \rrbracket) \\
 &= \lambda x \lambda w . \textbf{skillful-as}(\llbracket \textit{as a surgeon} \rrbracket)(x)(w) \\
 &= \lambda x \lambda w . \textbf{skillful-as}(\textbf{surgeon})(x)(w)
 \end{aligned}$$

In the attributive use, one might speculate that this *as*-phrase is implicit, so that *skillful surgeon* actually looks like (70) and is interpreted intersectively:

$$\begin{aligned}
 (70) \quad \llbracket \textit{skillful as-a surgeon surgeon} \rrbracket & \\
 &= \lambda x \lambda w . \llbracket \textit{skillful as-a surgeon} \rrbracket (x)(w) \wedge \llbracket \textit{surgeon} \rrbracket (x)(w) \\
 &= \lambda x \lambda w . \textbf{skillful-as}(\textbf{surgeon})(x)(w) \wedge \textbf{surgeon}(x)(w)
 \end{aligned}$$

So long as the value of the implicit argument matches the noun, the resulting reading will be subsective. If its value is provided by context in some other way, an intersective reading should result. This all parallels the analytical move made for comparison classes in section 2.3, and in that respect harkens back to Wheeler (1972) and others who leveled the distinction between sensitivity to comparison classes and to ‘tasks’ or ‘roles’. Indeed, the talk of an ‘implicit *as*-phrase’ could more plausibly be replaced by a simple free variable in the tree, matching that discussion even more closely.

On its own, this sketch doesn’t account for the full range of facts—one might like an explanation for why subsective readings occur lower, for example—but it demonstrates that a commitment to assimilating subsective adjectives to intersective ones can be maintained even without committing to the Larson analysis.

### 3.5 How much power is too much?: Impossible adjectives

The available analytical options seem to converge on accepting the Adjective Type Heterogeneity Hypothesis. It seems that predicate-modifier denotations should, in fact, be reserved only for adjectives that really need them. If substantive adjectives can be assimilated to intersective ones, this would be very few indeed.

This has led von Stechow & Heim (1999) and Landman (2001) to feel some unease about predicate-modifier denotations in general. The worry is that such denotations are too powerful in principle. Suppose, for example, I were to attempt to coin an adjective *residentialous*, with the predicate-modifier denotation in (71):

$$(71) \quad \llbracket \textit{residentialous} \rrbracket = \lambda P_{\langle e, st \rangle} \lambda x \lambda w . \exists y \left[ \begin{array}{l} P(y)(w) \wedge \\ \mathbf{reside-in}(y)(x)(w) \end{array} \right]$$

Thus a *residentialous city* is a resident of a city, and a *residentialous condo* is a resident of a condo:

$$(72) \quad \begin{array}{l} \text{a. } \llbracket \textit{residentialous city} \rrbracket = \lambda x \lambda w . \exists y \left[ \begin{array}{l} \mathbf{city}(y)(w) \wedge \\ \mathbf{reside-in}(y)(x)(w) \end{array} \right] \\ \text{b. } \llbracket \textit{residentialous condo} \rrbracket = \lambda x \lambda w . \exists y \left[ \begin{array}{l} \mathbf{condo}(y)(w) \wedge \\ \mathbf{reside-in}(y)(x)(w) \end{array} \right] \end{array}$$

In purely formal terms, the denotation in (71) is beyond reproach. Yet we recoil in horror at this adjective. Clearly, this is not a possible adjective meaning. I've found that eliciting this judgment from speakers, irrespective of the language, often leaves them somehow indignant, outraged at the very suggestion that there should be such an adjective. Speakers rarely feel their judgments so viscerally.

But what could account for the outrage? One possibility would be to simply stipulate a constraint—perhaps crosslinguistic—that would prohibit such meanings. This may be the best we can do. It's roughly the course Landman charts. The theoretical status of this constraint would be a little unclear, but perhaps it's analogous to the (apparent) crosslinguistic ban on nonconservative determiners (Barwise & Cooper 1981, Keenan & Faltz 1985, Keenan & Stavi 1986, Keenan 2002). There is, however, an appealing alternative, which remains just out of reach: eliminating predicate-modifier adjective denotations from the grammar entirely. Such a categorical ban might do justice to the intuition. Although one would still confront the issue of how to implement such a ban theoretically—that is, precisely what kind of a rule can say this sort of thing—it would at least be the case that the ban would be a straightforward one involving possible semantic types

for a syntactic category. But to my knowledge, no one has been able to reconcile such a ban with the existence of apparently unavoidably higher-order adjectives such as *alleged*.

## 4 The menagerie of adjectives

### 4.1 A word about adjective classification

McNally (to appear) distinguishes between ENTAILMENT-BASED typologies of modifiers of the sort discussed so far and NOTIONALLY-BASED typologies based on a modifier's descriptive content. Our next aim is to explore a handful of such notional adjective classes, ones distinguished by a coherent set of analytically tractable semantic characteristics. This task will be divided between this section and the next (section 5), which will focus on classes that give rise to a particular compositional problem in which an adjective appears to be interpreted outside the nominal.

What I will not do is provide a survey of adjective classes in general. There is considerable diversity among adjective classification schemes and in the terminology associated with them, and it's not always clear whether these classifications match those that formal semantic investigation would lead to. That said, work on the syntax of adjectives, especially on their relative order and typological properties, often frames adjective categories in semantic terms. For example, it is useful even for purely syntactic purposes to distinguish between evaluative adjectives such as *nice*, size adjectives such as *big*, shape adjectives such as *round*, and color adjectives.<sup>14</sup> Across languages, these tend to appear in that order when prenominal (that is, evaluative < size < shape < color); postnominally, they tend to occur either in the same order or in its mirror-image. For more on classifications of adjectives driven by syntactic goals, see Cinque (2010), a general, book-length investigation of the topic, or shorter work including Sproat & Shih (1988), Cinque (1994), Laenzlinger (2000), Scott (2002), Valois (2007), Demonte (2008), Truswell (2009) and Svenonius (2008b). For classifications driven by typological considerations, particularly what concepts various languages lexicalize with adjectives, see Hetzron (1978), Dixon (1982) and Dixon & Aikhenvald (2004). This syntactic and typological/descriptive work could serve as a good starting point for anyone interested in charting new empirical directions in the formal semantics of adjectives. The connection between such work and formal semantics has traditionally been undesirably remote, and it is distinctly uncomfortable that stating essentially syntactic

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<sup>14</sup>Color adjectives have interesting semantic properties as well (see Kennedy & McNally 2010 and references cited there).



ordering restrictions should require reference to natural classes that sound fundamentally semantic.

#### 4.2 *Temporal-ordering adjectives*

For a few years after the 2008 United States presidential election, there was an acrimonious political dispute about whether (73) is true:

(73) The president was born in the United States.

One empirically well-founded argument against the truth of (73) was, to my knowledge, never made: the president is far too large to fit in a human birth canal.<sup>15</sup>

This would have convinced no one, but it's worth reflecting on why. The infant born in Hawaii to Barack Obama's parents was not president at the time of his birth. The past tense in (73) shifts the time associated with *born* into the past, but *president* remains resolutely anchored in the present. It's a neat design feature of language that we can refer to this infant with a definite description whose descriptive content could not in principle hold of it at the time. It might have been otherwise. One might imagine a language like English in which one has to say (74):

(74) The **future** president was born in the United States.

This leads to two observations.

First, nouns are often interpreted with respect to a time at which they hold, and this time need not correspond to event time of the sentence (Bach 1968, Kamp 1971, Enç 1981, Engdahl 1986, Musan 1995, Kusumoto 1999, 2005, Tonhauser 2002, 2005a,b, 2006). Other examples of this sort include (75):

(75) a. Due to the crash, all the passengers are dead.  
b. Many fugitives are now in jail. (Musan 1995)

The corpses in (75a) are no longer passengers, and the prisoners in (75b) are no longer fugitives.

The second observation is that there are adjectives like *future* that manipulate the time associated with a noun. Others include (76):

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<sup>15</sup>This example has the faint echo of Kamp (1971)'s *A child was born that {will be/would become} king*.

$$(76) \quad \text{your} \left\{ \begin{array}{l} \text{former} \\ \text{present} \\ \text{erstwhile} \\ \text{previous} \\ \text{old} \end{array} \right\} \text{spouse}$$

These are what might be called TEMPORAL ORDERING ADJECTIVES. There is another class of adjectives which could also be characterized as ‘temporal’ from which they should be distinguished. Those have come to be known as FREQUENCY ADJECTIVES:

$$(77) \quad \text{a(n)} \left\{ \begin{array}{l} \text{quick} \\ \text{occasional} \\ \text{regular} \\ \text{daily} \end{array} \right\} \text{cup of coffee}$$

Frequency adjectives pose some intricate compositional problems that temporal-ordering adjectives don’t, so I’ll address that class separately in section 5.2.

The analysis of temporal ordering adjectives hinges partly on how the temporal sensitivity of nouns comes about. This is an issue beyond the scope of this book (though see Musan 1995, Kusumoto 1999, Tonhauser 2002, 2006). Most of the analytical options, though, would leave these adjectives as denoting predicate modifiers of one type or another. Dowty et al. (1981) proposed a denotation that, in its general outlines, has stood the test of time. For them, *former* asserts that the noun does not hold of its individual argument at the evaluation time, but does at some time prior to it. They implemented this in a framework in which worlds and times are treated as indices on the interpretation function and manipulated together as pairs. Another way of achieving this with a more recent flavor would be to replace references to possible worlds with Kratzerian situations (Kratzer 1989), which are parts of worlds. Situations can have a temporal location, so one situation can precede another. I’ll represent this ordering with  $<_{time}$ , the ‘temporally precedes’ relation:

$$(78) \quad \begin{array}{l} \text{a. } \llbracket \textit{former} \rrbracket = \lambda P_{\langle e, st \rangle} \lambda x \lambda s . \exists s' [s' <_{time} s \wedge P(x)(s') \wedge \neg P(x)(s)] \\ \text{b. } \llbracket \textit{former president} \rrbracket = \llbracket \textit{former} \rrbracket (\llbracket \textit{president} \rrbracket) \\ \quad = \lambda x \lambda s . \exists s' \left[ \begin{array}{l} s' <_{time} s \wedge \mathbf{president}(x)(s') \wedge \\ \neg \mathbf{president}(x)(s) \end{array} \right] \end{array}$$

Thus a former president in a situation is an individual that is not president in it, but was in an earlier one. The use of situations actually necessitates some

further refinements, but for our purposes (78) will suffice.<sup>16</sup>

There is a twist here, however. In the presence of a possessive, an additional reading emerges (Larson & Cho 2003 and Partee & Borschev 2003):

- (79) Mary's former mansion (Partee & Borschev 2003)
- a. something of Mary's that was formerly a mansion (but could now be a ruin)
  - b. something that was formerly Mary's mansion (and now is someone else's)

The denotation in (78) would predict the reading in (79a):

$$(80) \quad \text{a. } \llbracket \textit{former mansion} \rrbracket = \llbracket \textit{former} \rrbracket (\llbracket \textit{mansion} \rrbracket)$$

$$= \lambda x \lambda s . \exists s' \left[ \begin{array}{l} s' <_{\textit{time}} s \wedge \mathbf{mansion}(x)(s') \wedge \\ \neg \mathbf{mansion}(x)(s) \end{array} \right]$$

$$\text{b. } \llbracket \textit{Mary's former mansion} \rrbracket$$

$$= \lambda x \lambda s . \llbracket \textit{Mary's} \rrbracket (x)(s) \wedge \llbracket \textit{former mansion} \rrbracket (x)(s)$$

$$= \lambda x \lambda s . \mathbf{Mary's}(x)(s) \wedge \exists s' \left[ \begin{array}{l} s' <_{\textit{time}} s \wedge \\ \mathbf{mansion}(x)(s') \wedge \\ \neg \mathbf{mansion}(x)(s) \end{array} \right]$$

But the reading (79b) remains a mystery. Larson & Cho (2003) and Partee & Borschev (2003) both pursue accounts in which, intuitively, the possessive relation is placed under the scope of *former*. On the Larson & Cho analysis, this is taken as evidence that underlyingly, the structure is closer to (81a):

$$(81) \quad \text{a. } \llbracket \textit{mansion of Mary's} \rrbracket = \lambda x \lambda s . \mathbf{mansion}(x)(s) \wedge \mathbf{Mary's}(x)(s)$$

$$\text{b. } \llbracket \textit{former} \rrbracket (\llbracket \textit{mansion of Mary's} \rrbracket)$$

$$= \lambda x \lambda s . \exists s' \left[ \begin{array}{l} s' <_{\textit{time}} s \wedge \\ \mathbf{mansion}(x)(s') \wedge \mathbf{Mary's}(x)(s') \wedge \\ \neg [\mathbf{mansion}(x)(s) \wedge \mathbf{Mary's}(x)(s)] \end{array} \right]$$

As (81b) reflects, this yields the desired interpretation.

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<sup>16</sup>The necessary additional refinements are reflections of general complexities situations bring with them. For example, this denotation would actually be true if *s* were in a world in which *x* is president at the time of *s* after all, but *x* happened not to be part of *s*. See Kratzer (1989, 2008) for discussion of such issues. Alternatively, one could simply treat the situation variable *s* as standing for a world-time pair in the spirit of Dowty et al.; or replace it with a time variable (and thereby ignore the world argument, since it's not relevant here); or treat nouns as having independent world and time arguments. This is of course in addition to going down **precisely** the path Dowty et al. go down, which is to treat world-time pairs as parameters provided to the interpretation function itself (i.e.,  $\llbracket \cdot \rrbracket^{w,t}$ ).

From this perspective, one might worry about the contrast in (82):

- (82) a. Mary's former Japanese car  
b. Mary's Japanese former car

Only (82a) has the reading on which Mary's ownership is in the past; (82b) has only the reading on which the object's carhood is in the past. If the possessor-based readings arise because the possessor is actually interpreted quite low, this is unexpected. If, on the other hand, the possessor is interpreted high, above *Japanese*, but just below *former*, the correct result would follow. It's an interesting question what syntactic or semantic principle could ensure that the structure that is interpreted has this shape. It's part of a larger set of questions about the relative order of adjectives, which we will return to in section 6.

An advantage of the predicate-modifier denotation for *former* is that it immediately accounts for its impossibility in predicative positions:

- (83) #That president is  $\left\{ \begin{array}{l} \text{former} \\ \text{erstwhile} \\ \text{previous} \end{array} \right\}$ .

Given the predicate-modifier type, adjectives of this class will always require a noun as an argument. Of course, if one adopts the Montague (1970) view that predicative adjectives apply to unpronounced nouns first, (83) would remain a problem, just like the impossibility of modal adjectives such as *alleged* in this position.

The particular situation-based implementation I've pursued here might feel vaguely familiar in light of the discussion of Larson (1998, 1999) in section 3.3. Situations and events are closely related, and one might imagine paraphrases of some of these meanings in terms of events. A former president, for example, is someone whose 'presidenting' events are in the past, and a former mansion is one whose mansion states are in the past. It would be a worthy enterprise to attempt to use these facts to provide an analysis of temporal-ordering adjectives in the Larson style. Among the major problems one would confront is the fact that *former* seems to be privative; that it's not clear what role a generic quantifier would play here; and that *former* is impossible in predicative positions.

#### 4.3 Classificatory/relational adjectives

As section 3 noted, it may be both possible and desirable to assimilate many subjective adjectives to intersective ones. This project confronts a challenge

in adjectives such as those in (84):

- (84) a. religious official
- b. legal conflict
- c. moral infraction
- d. technical architect

These are subsective (a legal conflict is a conflict), but they aren't straightforwardly intersective (a legal conflict is not simply something that's legal and a conflict). Nor is it clear how any of the ideas already raised could cope with this. In the spirit of Larson (1998), one might attempt to think of *religious official* as someone whose office-holder state is religious or who does their 'officialing' religiously, but that seems to be skating over dangerously thin ice. Or one could consider implicit argument analysis, pursuing an analogy to 'an official who is religious as an official'. A possibility, perhaps, but again: thin ice. But what other options are there? Should we surrender to the higher-type denotation?

McNally & Boleda Torrent (2003) make the case for resisting this impulse. Following Bally (1944), they refer to this class as RELATIONAL ADJECTIVES (see also Bosque & Picallo 1996, Giorgi & Longobardi 1991, Demonte 2008).<sup>17</sup> Another term—possibly a more transparent one—for this general class is CLASSIFICATORY ADJECTIVES (Cinque 2010, Lin 2008, Morzycki 2004, 2005a, Rutkowski & Progovac 2005), though some authors reserve this term for a subclass of relational adjectives (Bosque & Picallo 1996, Arsenijević et al. to appear). Other terms floating around in this general lexical field include 'associative adjectives' (Giegerich 2005) and 'pseudo-adjectives' (Alexiadou & Stavrou 2011).

McNally & Boleda Torrent observe that this class of adjectives has a number of characteristics that suggest they get a property interpretation. First, in Catalan they occur postnominally as in (85), a position from which predicate-modifier-denoting adjectives like *presumpte* 'alleged' are banned:

- (85) a. arquitecte tècnic  
      architect technical  
      'technical architect'
- b. una malaltia pulmonar  
          a disease pulmonary  
          'a pulmonary disease'

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<sup>17</sup>The term 'relational' isn't optimal, in that it suggests these adjectives should denote relations. It's also uncomfortably close to 'relative adjective', which has a number of other uses. See its glossary entry for details.

- (86) a. un presumpte assassí  
           ‘an alleged murderer’  
       b. #un assassí presumpte

Relational adjectives also occur predicatively, again contrasting with *presumpte*:

- (87) a. El domini del Tortosa va ser només territorial.  
           ‘The dominance of the Tortosa [soccer team] was only territorial.’  
       b. Aquest congrés és internacional.  
           ‘This conference is international.’  
       c. El conflicte és polític.  
           ‘The conflict is political.’

- (88) #L’assassí era presumpte.  
       the murder is alleged

Finally, they point out that relational adjectives can occur on their own, with no overt noun:

- (89) a. Els joves van venir.  
           ‘The young ones came.’  
       b. \*Els presumptes van venir.  
           ‘The alleged ones came.’

They don’t say this, but in this last characteristic they may have discovered a novel diagnostic for distinguishing adjective classes even in English, as the contrasts between *The young are foolish* and #*The alleged were indicted* reflects. One shouldn’t put much weight on English in this context, though, because English is fairly restrictive in where it allows this phenomenon (essentially, in descriptions of humans, as Pullum 1975’s term ‘people deletion’ suggests).

The challenge, then, is to provide these adjectives with a property denotation while capturing the fact that they lack the basic intersective entailment (from e.g. *Floyd is a technical architect* to *Floyd is technical*). McNally & Boleda Torrent’s idea is that the key to the puzzle is that these adjectives really aren’t about ordinary individuals. Rather, they are about kinds (Carlson 1977). In a nutshell, a kind is an abstract sort of individual that, in English, is named by bare plurals like *dogs* or *screwdrivers*. Ordinary individuals (‘objects’) can be realizations of a kind. It’s certainly true that an object of which the description *technical architect* holds is not itself technical, but the **kind** of architect that it instantiates is.

McNally & Boleda Torrent capture this by supposing that all nouns actually denote relations between kinds and individuals that realize them, as

in (90a), and relational adjectives denote properties of kinds, as in (90b) (kind and object variables are distinguished with subscripts; similar ideas about a kind level within NP occur in [Zamparelli 1995](#)):

- (90) a.  $\llbracket \textit{architect} \rrbracket = \lambda x_k \lambda y_o . \mathbf{realizes}(x_k)(y_o) \wedge \mathbf{architect}(x_k)$   
 b.  $\llbracket \textit{technical} \rrbracket = \lambda x_k . \mathbf{technical}(x_k)$

These combine through the invocation of a new rule of semantic composition specialized for this purpose, and the kind argument is saturated with a contextually-supplied value ( $k_k$ ), yielding (91):

- (91)  $\llbracket \textit{technical architect} \rrbracket = \lambda y_o . \mathbf{realizes}(k_k)(y_o) \wedge \mathbf{architect}(k_k) \wedge \mathbf{technical}(k_k)$

One might resist the idea that all nouns have both an object and a kind argument, and that they all therefore lexically encode the realization relation, but the basic analysis could be maintained even without this. One could also adopt a theory without a construction-specific semantic composition rule and still maintain the basic analysis. I'll sketch what that might look like. First, nouns could denote properties of kinds, as in (92a); they could then combine intersectively with a relational adjective, as in (92b):

- (92) a.  $\llbracket \textit{architect} \rrbracket = \lambda x_k . \mathbf{architect}(x_k)$   
 b.  $\llbracket \textit{technical architect} \rrbracket = \lambda x_k . \mathbf{architect}(x_k) \wedge \mathbf{technical}(x_k)$

At this point, some means of shifting this type to a property of objects is necessary. This could be done by positing a type shift ([Partee 1987](#)). Alternatively, a null morpheme could do this work. It would apply to a property of kinds, and yield something that is true of an object iff it realizes a kind of which the property holds:

- (93) a.  $\llbracket \text{REALIZE} \rrbracket = \lambda P_{(k,t)} \lambda x_o . \exists y_k [P(y_k) \wedge \mathbf{realize}(y_k)(x_o)]$   
 b.  $\llbracket \text{REALIZE } \textit{technical architect} \rrbracket$   
 $= \lambda x_o . \exists y_k \left[ \mathbf{architect}(y_k) \wedge \mathbf{technical}(y_k) \wedge \mathbf{realize}(y_k)(x_o) \right]$

Thus (93b) denotes a property of objects that realize a technical-architect kind. A more sophisticated implementation of this variant of the approach might make use of the specialized type shifts of [Chierchia \(1984, 1998\)](#), which are designed specifically for manipulating kinds. One way or another, [McNally & Boleda Torrent's](#) core idea remains: that kinds play a role low in the nominal projection and that relational adjectives are predicates of kinds.

There seems to be some unclarity around whether adjectives of this class can occur predicatively:

- (94) a. a medical doctor  
b. ??That doctor is medical.
- (95) a. an electric razor  
b. That razor is electric.

The crucial issues in ruling out predicative uses would be whether an adjective can apply either to kinds or objects, and whether the subject DP is kind-denoting. See McNally & Boleda Torrent for discussion.

One useful feature of this analysis is that it might explain certain otherwise mysterious effects of adjective order. Svenonius (1994) observes a truth-conditional difference in (96):

- (96) a. dead dangerous animal  
b. dangerous dead animal

A dead squirrel may well be a *dangerous dead animal* by virtue of being riddled with disease, but it is clearly not a *dead dangerous animal* because it isn't a *dangerous animal* at all (unlike, say, a lion). Neither of these adjectives is scope-bearing, so the contrast isn't expected. On the kind-based analysis, these might have the structures and denotations in (97):

- (97) a. dead [ REALIZE [ dangerous animal ] ]  
b.  $\llbracket \text{dangerous animal} \rrbracket = \lambda y_k . \mathbf{dangerous}(y_k) \wedge \mathbf{animal}(y_k)$   
(interpreted intersectively)
- c.  $\llbracket \text{REALIZE} \rrbracket (\llbracket \text{dangerous animal} \rrbracket)$   
 $= \lambda x_o . \exists y_k \left[ \mathbf{dangerous}(y_k) \wedge \mathbf{animal}(y_k) \wedge \mathbf{realize}(y_k)(x_o) \right]$
- d.  $\llbracket \text{dead} [ \text{REALIZE} [ \text{dangerous animal} ] ] \rrbracket$   
 $= \lambda x_o . \exists y_k \left[ \mathbf{dangerous}(y_k) \wedge \mathbf{animal}(y_k) \wedge \mathbf{realize}(y_k)(x_o) \right] \wedge \mathbf{dead}(x_o)$   
(interpreted intersectively)
- (98) dangerous [ dead [ REALIZE animal ] ]  
a.  $\llbracket \text{REALIZE animal} \rrbracket = \lambda x_o . \exists y_k [\mathbf{animal}(y_k) \wedge \mathbf{realize}(y_k)(x_o)]$   
b.  $\llbracket \text{dead} [ \text{REALIZE animal} ] \rrbracket = \lambda x_o . \exists y_k [\mathbf{animal}(y_k) \wedge \mathbf{realize}(y_k)(x_o)] \wedge \mathbf{dead}(x_o)$



- c.  $\llbracket \text{dangerous} [ \text{dead} [ \text{REALIZE animal} ] ] \rrbracket = \lambda x_o .$   
 $\exists y_k [ \mathbf{animal}(y_k) \wedge \mathbf{realize}(y_k)(x_o) ] \wedge \mathbf{dead}(x_o) \wedge$   
 $\mathbf{dangerous}(x_o)$

The lower occurrence of *dangerous* in (97) would thus be predicated of a kind, and the higher one in (98) of an object. Throughout, *dangerous* and *dead* are simply intersective. I don't know whether McNally & Boleda Torrent would endorse this analysis of *dangerous*, but the effect in (98) is just the sort of thing one might expect in light of their analysis.

#### 4.4 *The trouble with stone lions*

There is a better known puzzle that may be related, if indirectly, because it too may be amenable to a kind-based analysis. It is reflected in NPs like those in (99), of which the first the most famous example:

- (99) a. stone lion (Kamp & Partee 1995)  
 b. paper plane  
 c. porcelain ferret

The puzzle is that strictly speaking, these modifiers are privative: a stone lion is not a lion. Yet the clarity of that judgment melts away upon reflection: 'it isn't a lion, not **really**, but then again it sort of is, in a way, because it's, you know, pretty liony'. The puzzle is, primarily, how to compose the two elements semantically to get an appropriate result, and, second, how to do it in a way that does justice to this intuition.

Before we move on, let's take a moment to be pedantic. It's conventional in discussions of *stone lion* and its kin to refer to *stone* as an adjective. This is eminently understandable. There are adjectives that behave in the relevant way (*wooden* is one), and in any case the syntactic category of *stone* isn't crucial to the discussion. All that's crucial is that it is some sort of adnominal modifier. It nevertheless warrants pointing out that *stone* is not actually an adjective, at least not yet, not in most people's grammars. Standard diagnostics for adjectives all fail:

- (100) a. \*That lion seems stone.  
 b. \*  $\left. \begin{array}{l} \text{more stone} \\ \text{stoner} \end{array} \right\}$  than Clyde  
 c. \*a very stone lion  
 d. \*the stoneness of the lion

If this isn't an adjective, what is it? The obvious answer is that it's precisely what it looks like: a noun. What we need to explain is why it can occur in

that position and how it's interpreted there. One possibility is to analyze these expressions as noun-noun compounds. I'm skeptical of this route too, though, for reasons that include the very un-compound-like predictability of their meanings (Morzycki 2004, 2005a). So there is actually an interesting analytical problem here, and in referring to these expressions simply as 'adjectives', we obscure it. A better term—more syntactically accurate but otherwise analytically-neutral—is 'attributive noun'. All that said, for many speakers some of these modifiers seem to be on their way to becoming adjectives, and *plastic* may already have gotten there.

The standard reference on *stone lion* and its kin is Kamp & Partee (1995). They suggest that the driving force behind the interpretation of such expressions is a principle that they establish on other grounds. Their paper advocates an inherent-vagueness/supervaluation approach to vagueness (see section ?? for extensive discussion). This provides a convenient and flexible way of thinking about how context affects the meaning of linguistic expressions. Normally, we would think of *lion* as having a single extension—the set of all lions—and any given individual is either in the set or it isn't. On a supervaluation approach, *lion* has two extensions: a positive extension, the set of things that are clearly lions, and a negative extension, the set of things that clearly aren't. Borderline cases are in neither. To see how this can help with *stone lion*, it helps to first consider a more prosaic example like *small elephant* (also discussed in section 2.3). On a naïve view, one might imagine *small elephant* would have nothing in its positive extension because no elephants are small. But of course, that's not how things work. Rather, Kamp & Partee suggest, we construe *small* in a way that's adapted to *elephant* by 'calibrating' it so that it has elephants in both its positive and negative extension. The principle driving this is (101):

(101) NON-VACUITY PRINCIPLE

In any given context, try to interpret any predicate so that both its positive and negative extension are non-empty.

This independent principle might guide us in how we construe *stone lion*. As with *small elephant*, one might imagine *stone lion* would have nothing in its positive extension because no actual lions are made of stone. But this is precisely what the Non-Vacuity Principle prohibits. In this case, for reasons that are slightly mysterious, it is the noun rather than its modifier that gets recalibrated (the more common term is 'coerced'). The process is otherwise the same. *Lion* is construed so as to include some stone things in its positive (and presumably negative) extension.

It's worth reflecting on the relationship between this form of coercion and the one posited by Partee (2007) for *fake gun* (see section 2.5).

While the framework they propose is spelled out very explicitly overall, the process by which we recalibrate *lion* is not spelled out in detail. In one respect, that seems natural. The conceptual machinery that allows us to work out how to extend the concept ‘lion’ to include stone things may not even be linguistic. In another, it’s an unsatisfying place to wind up. There might, however, be a way of coping with this problem with the right tool, one that could equally well model linguistic and non-linguistic cognitive processes. As [Oliver \(2012\)](#) points out, Optimality Theory ([Prince & Smolensky 1993](#)) is just such a tool. At heart, Optimality Theory is an explicit way of modeling how language—or anything—resolves competing goals. In phonology, for example, language strives both to avoid complex consonant clusters and to avoid deleting sounds. These goals may conflict, and the grammar of a particular language can be construed as a ranking of such goals according to which should prevail when a choice between them must be made. [Oliver](#) proposes an account of how the coercion in *stone lion* works in Optimality-Theoretic terms, in which the competing goals to be resolved are preserving different elements of the meaning of *stone* and *lion*, such as animacy, being lion-shaped, or being made of stone. [Hogeweg \(2012\)](#) approaches the problem in a similar spirit, building on psycholinguistic facts about the processing of metaphor.

#### 4.5 *The attributive-with-infinitive construction*

One of strategies for dealing with subsectivity—explored in section 3.4—was to provide adjectives with an implicit argument whose value is typically identical to the modified noun. If this idea is on the right track, we might expect to find cases in which the presence of an **overt** argument creates an interpretive effect precisely analogous to subsective readings.

[Fleisher \(2008a,b, 2011\)](#) examines a phenomenon that might have just this property, which he calls the ATTRIBUTIVE-WITH-INFINITIVE CONSTRUCTION (AIC). He doesn’t actually make this claim, and the phenomenon is interesting for independent reasons; nevertheless, it would seem to be just such a case:

- (102) a. He’s a [good \_\_] person [to talk to].  
b. That is a [smart \_\_] sofa [to buy].

In both these examples, the bracketed infinitive is an argument of the adjective, displaced from the complement position indicated with ‘\_\_’. Both examples also give rise to a subsective but not intersective interpretation:

(103) He's a [good \_\_] person [to talk to].  
*entails*: He's a person.  
*does not entail*: He's good.

(104) That is a [smart \_\_] sofa [to buy].  
*entails*: That is a sofa.  
*does not entail*: That [sofa] is smart.

Just as the implicit argument analysis would lead us to expect, the subjective reading depends on the argument. In its absence, only an intersective reading is available:

(105) He's a good person.  
*entails*: He's a person.  
*entails*: He's good.

(106) That's a smart sofa.  
*entails*: That is a sofa.  
*entails*: That [sofa] is smart.

This may not be all good news for an implicit-argument analysis of subjective adjectives. Such an analysis might also lead us to expect that the infinitive itself could be unpronounced, and that the subjective reading would be available in (106) as well. One might avoid this by simply stipulating that the infinitive can't be left implicit in this way. For this to be convincing, of course, it would help to provide a general theory of the circumstances under which arguments of subjective adjectives can be implicit. Formulating such a theory strikes me as a worthwhile enterprise.

Fleisher distinguishes two flavors of this construction. One, the clausal AIC, is exemplified above. It differs from nominal AIC in that nominal AICs give rise to a sense of 'inappropriateness' and are possible with adjectives that don't independently license infinitive complements:

(107) a. *Middlemarch* is a long book to assign.  
b. That is a well-made car to sell for scrap.

Neither *long* nor *well-made* take infinitival complements:

(108) a. \*It is long to assign *Middlemarch*.  
b. \*It is well-made to sell that car for scrap.

In (107a), there is the sense that it is inappropriate to assign as long a book as *Middlemarch*; in (107b), that the car is too well-made to sell for scrap. The two constructions pose slightly different analytical problems.

I won't present Fleisher's analysis, but it's worth noting one of its most striking features: the inappropriateness flavor is derived from independently-motivated assumptions about the modality associated with infinitival relative clauses.

#### 4.6 *Adnominal degree modifiers*

Among the classes of subjective adjectives introduced in section 2.2 were examples like those in (109):

- (109) a. Floyd is a  $\left\{ \begin{array}{l} \text{big} \\ \text{huge} \\ \text{colossal} \end{array} \right\}$  idiot.  
b. Floyd is a(n)  $\left\{ \begin{array}{l} \text{utter} \\ \text{complete} \\ \text{absolute} \end{array} \right\}$  idiot.

These are subjective in slightly different ways. Size adjectives such as those in (109a) are ambiguous between intersective readings involving physical size and subjective readings involving the degree to which the predicate expressed by the noun holds. By contrast, expressions such as those in (109b) sometimes lack an intersective reading entirely, and it's not even clear conceptually what an intersective reading would look like—that is, what it would mean for an individual to 'be utter' or 'be absolute'.

The size adjective uses have begun to attract analytical attention (Morzycki 2005b, 2009, Sassoon 2007, 2013, de Vries 2010, Xie 2010, Constantinescu 2011). The other uses have been noted as examples of subjective interpretations since at least Siegel (1976a) and as examples of obligatorily attributive adjectives since at least Bolinger (1972) (and one suspects earlier), but they have attracted less attention (apart from Morzycki 2012 and Constantinescu 2011). The broader issue they both raise is actually as much about nouns as about adjectives, and about gradability. A great deal is known about gradability in adjectives, but in nouns it is more mysterious.

Because the analysis of these expressions unavoidably involves reference of scales and degrees—either explicitly in the semantics or else at some broader conceptual level—I won't discuss them in earnest in this chapter, which attempts to sidestep scalar issues. The main discussion of these puzzles is to be found in section ???. That said, even without too much further inspection, these modifiers suggest at least two broad conclusions relevant to the issues at hand.

First, they are a further indication of the diversity of the class of subjective modifiers. Whatever is going on in these cases, it seems quite different

from the other cases we've seen. Of course, one could always treat these as denoting predicate modifiers without worrying about what precisely their lexical content is. The moment one starts worrying about the details, though, it becomes clear that the degree readings involved here are quite unlike any of the other readings we've seen.

Second, they raise a question that the *stone lion* examples also raise: are all such adnominal modifiers actually adjectives? Just as *stone* doesn't seem to pass standard diagnostics for adjectives (and is in fact a noun), so too *utter* seems to fail them:

- (110) a. \*That idiot seems utter.  
 b. \*a  $\left. \begin{array}{l} \text{more utter} \\ \text{utterer} \end{array} \right\}$  idiot than Clyde  
 c. \*a very utter idiot  
 d. \*the utterness of the idiot

*Absolute* patterns similarly, and *complete* loses its degree reading in these cases.

## 5 Adjectives where they have no right to be: adverbial readings

### 5.1 A scope puzzle

One of the few things the underlined expressions in (111) have in common is that they are each interpreted with either clausal or VP scope:

- (111) a. Occasionally, a sailor strolled by.  
 b. Floyd had a cup of coffee quickly.  
 c. On average, an American has 2.3 children.  
 d. It's not known which hotel Solange stayed in.  
 e. The ferret was wholly submerged.

In (111a), for example, *occasionally* combines with *a sailor strolled by*; in (111b), *quickly* with *had a cup of coffee*; and so on. The precise way these expressions combine with their phrase-structural neighbors is not immediately relevant here. The crucial thing is what they combine with. In light of that fact, it should come as a surprise that the meanings of these expressions can also be expressed with attributive adjectives:

- (112) a. An occasional sailor strolled by.  
 b. Floyd had a quick cup of coffee.  
 c. The average American has 2.3 children.

- d. Solange stayed in an unknown hotel.
- e. The whole ferret was submerged.

The adjectives in (112) are embedded inside NPs. Yet they somehow give rise to meanings in which they seem to be interpreted elsewhere, as the paraphrases in (111) reflect. Put another way, to achieve their actual meanings, these adjectives would apparently have to combine with a much larger syntactic expression than their surface syntax would suggest, and—more troubling still—one in which they are deeply embedded. This is thoroughly bizarre behavior. It's as though these adjectives haven't been notified of how compositionality works.

These are called ADVERBIAL READINGS of adjectives because, in the prototypical cases, they give rise to paraphrases that involve an adverb (Stump 1981). The term originally referred only to a reading of frequency adjectives such as *occasional*, but, as the examples in (112) demonstrate, the overall phenomenon is more general. Indeed, it might be more general than this, extending to *same* and *different*, so perhaps the term NON-LOCAL READING (found in Schwarz 2005, 2006) is preferable. Each of the classes of adjectives that have this property is usually analyzed separately, and they typically aren't discussed under the single rubric of adverbial readings.

This section will explore some of the adjective classes that give rise to this puzzle. They may be bound together only by one thin empirical strand, their unexpected apparent scope. A more interesting hypothesis, though, is that their unexpected scope has a common cause. One reason to suspect that this might be so is that their unexpected scope correlates with two other facts that are logically independent. First, these readings often affect how the determiner is interpreted. Second, adverbial readings seem to be available only to adjectives in higher positions in the tree. The former property is widely noted, though not usually as a property of all these adjective classes together. The latter is often noted for e.g. *occasional*, but otherwise usually seems to escape attention.

## 5.2 *Frequency adjectives: the facts*

The first corner of the grammar in which these problems were recognized was FREQUENCY ADJECTIVES, noted initially (rather offhandedly) in Bolinger (1967).<sup>18</sup> Stump (1981) divided the readings of these adjectives

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<sup>18</sup>Sometimes 'infrequency adjectives' (e.g., *infrequent*) are treated as a separate class. A similar phenomenon also received attention fairly early on. Hall (1973) observed that the work of P.G. Wodehouse is full of examples such as *He uncovered the fragrant eggs and I pronged a moody forkful* and *Somebody had opened a tentative window or two*, in which an adjective appears to get some sort of adverbial reading.

into three classes. Perhaps the least startling one is the INTERNAL READING:

- (113) a. Floyd is an occasional sailor.  
‘Floyd is someone who sails occasionally.’  
b. Floyd is a frequent contributor.  
‘Floyd is someone who contributes frequently.’  
c. Floyd spoke to his daily visitor.  
‘Floyd spoke to someone who visits him daily.’

Schäfer (2007) observed that this reading arises only with nouns that name a participant. It’s less mysterious than the other readings in that this one involves no scope acrobatics. But, to give it its due, there is still something to explain here. It’s unlikely to be an accident that all these paraphrases involve an adverb, and simply saying that on this reading, the adjective denotes a property of individuals wouldn’t seem to do that justice.

The second reading is the ADVERBIAL READING. ‘External reading’ might be a better term, since (113) also involves adverbial paraphrases.<sup>19</sup> This is the scopally acrobatic reading:

- (114) a. The occasional sailor strolled by. (Bolinger 1967)  
‘Occasionally, a sailor strolled by.’  
b. A periodic investigation would turn up a few new leads.  
(Stump 1981)  
‘Periodically, an investigation would turn up a few new leads.’  
c. The monotony of North Dakota was interrupted by a sporadic billboard.  
‘Sporadically, the monotony of North Dakota was interrupted by a billboard.’

An adjective can get this reading even in the absence of an appropriate adverbial counterpart (*The odd sailor strolled by*; Larson 1999 attributes this observation to Ed Keenan). This reading can also give rise to scope ambiguities (Stump 1981):

- (115) Every tourist saw an occasional sailor.

This can mean either that occasionally, every tourist saw a sailor, or that every tourist occasionally saw a sailor.

There is a third reading whose status is more unclear: the GENERIC READING (the examples are from Stump):

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<sup>19</sup>Bolinger (1967) proposed the colorful term ‘stroboscopic’, after a device similar to a strobe light used to observe certain types of repetitive motion.



- (116) An occasional cup of coffee helps keep John awake.  
 a. ‘Having a cup of coffee occasionally helps keep John awake.’  
 b. \*‘Occasionally, a cup of coffee helps keep John awake.’
- (117) Larry could tolerate an infrequent visit to the dentist.  
 a. ‘Visiting the dentist infrequently is something Larry could tolerate.’  
 b. \*‘Infrequently, Larry could tolerate a visit to the dentist.’
- (118) A periodic checkup never hurts.  
 a. ‘A checkup that takes place periodically never hurts.’  
 b. \*‘Periodically, a checkup never hurts.’

As the (b) examples reflect, these readings can’t be paraphrased the way adverbial readings can. Instead, Stump observed, they involve reference to kinds (in the sense of [Carlson 1977](#)), just as bare plurals like *bears* do. *An occasional cup of coffee*, for example, is a kind of thing that keeps John awake. This reading is oddly intermediate between the other two. On the one hand, it resembles the adverbial reading in that it doesn’t involve reference to a particular object. On the other, it resembles the internal reading in that it gives rise to paraphrases that involve an adverb within the NP. For this reason, there is a certain impulse to assimilate the generic reading to one of the others. [Gehrke & McNally \(2010\)](#) treat it as a special case of the adverbial reading. I won’t linger on it further, but for more discussion see also [Stump \(1981\)](#), [Schäfer \(2007\)](#) and [DeVries \(2010\)](#).

Two important additional observations need to be made about adverbial readings. First, they impose a curious requirement on the determiner that it be either *the*, *a*, or semantically-bleached *your* (i.e., the colloquial-register *your* that means roughly ‘the’; the % below indicates the absence of the adverbial reading):

- (119)  $\left. \begin{array}{l} \text{The} \\ \text{An} \\ \text{Your} \\ \% \text{This} \\ \% \text{Every} \\ \% \text{Any} \end{array} \right\} \text{occasional sailor strolled by.}$

Moreover, the meaning of the sentence doesn’t seem to change depending on which of the three licit determiners is chosen—somehow, the differences among them are leveled. Second, adverbial readings don’t occur if the adjective is not adjacent to the determiner:

- (120) %A well-dressed occasional sailor strolled by.

To be sure, strings like *a very infrequent visit* or *a relatively unknown hotel* are possible, but not on the adverbial reading.

### 5.3 *The adverbial reading of frequency adjectives*

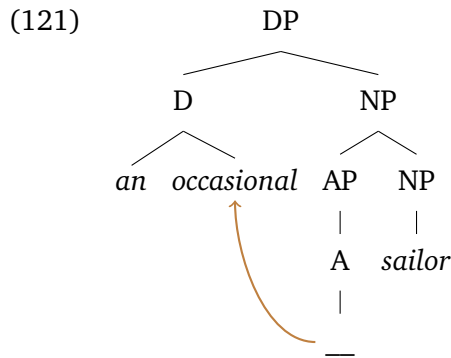
There is one obvious answer to why some adjectives seem to be interpreted in adverbial positions: movement. One might imagine that the adjective simply moves out of the DP to adjoin to the VP or clause, and that it has an adverbial denotation. This would address some parts of the problem, but the consensus is that it's unlikely. There is no independent evidence for such movement. It's also not clear how the semantics would cope with the resulting structure. The moved adjective might leave behind an individual-denoting trace, as is standard in movement of this type (Heim & Kratzer 1998). But this would lead to a type clash. An individual can of course combine with a property, but the result—a truth value (or proposition)—isn't an appropriate denotation for an NP. Alternatively, the moved adjective might leave behind a trace with the same type as it has. Presumably, this trace would have to simply be ignored by the semantics. The need to stipulate an additional mechanism to do that—in addition to stipulating a movement operation for which there is no independent evidence—leads to an analysis most find unappealing.<sup>20</sup>

Spurred on by the correlation between adverbial readings and odd interactions with the determiner, a number of people have taken the adjective-determiner relationship to be the heart of the problem instead. Analyses of this sort include Stump (1981), Larson (1998), Zimmermann (2000) and Zimmermann (2003). They all have in common that a 'complex determiner' is formed. This can be brought about by having the adjective syntactically incorporate into the determiner, in the same way objects can incorporate into verbs (Baker 1988):<sup>21</sup>

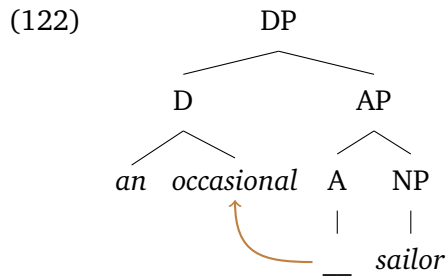
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<sup>20</sup>One exception, in a very loose sense, is Barker (2007), who as we'll see posits something like this for *same*. He argues that, if something along these lines is implemented in Type Logical Grammar, the approach is more appealing.

<sup>21</sup>For convenience, I assume here that head movement doesn't leave a trace.



It's worth pointing out that there's something odd about this incorporation. It involves not head-to-head movement in a way that observes normal constraints on the process—that is, movement into the head of a phrase from the head of its complement—but rather movement from the head position of an adjunct. This could be remedied by assuming an [Abney \(1987\)](#) syntax of attributive adjectives, in which adjectives take NPs as complements:



This syntax, however, poses a number of major semantic problems, including how a common semantics could be provided for such adjectives and predicative adjectives and how degree morphemes should fit into this picture. There is independent overt evidence for movement of this kind. *Another*, for example, is a determiner that seems to have its historical origins in the incorporation of *other* into *an*. (See [Svenonius 1994](#) for more subtle but systematic evidence from Norwegian.)

Once formed, the complex determiner can have access to clause-level material in the same way quantificational determiners generally can. Here is one way to implement this idea, roughly along the lines proposed by [Zimmermann \(2003\)](#) but radically simplified. First, it will be convenient to assume that a VP like *strolled by* denotes a relation between an individual stroller and the strolling event, as in (123a). The denotation of the complex determiner, then, can be as in (123b), which makes use of a special quantifier

**OCCASIONAL**. This leads to a sentence denotation as in (123c):<sup>22</sup>

- (123) a.  $\llbracket \textit{strolled by} \rrbracket = \lambda x \lambda e . \textbf{strolled-by}(x)(e)$   
 b.  $\llbracket \textit{an-occasional} \rrbracket$   
      $= \lambda P_{\langle e,t \rangle} \lambda f_{\langle e,vt \rangle} . \textbf{OCCASIONAL } e[\exists x[P(x) \wedge f(x)(e)]]$   
 c.  $\llbracket \textit{an-occasional} \rrbracket (\llbracket \textit{sailor} \rrbracket)(\llbracket \textit{strolled by} \rrbracket)$   
      $= \textbf{OCCASIONAL } e[\exists x[\textbf{sailor}(x) \wedge \textbf{strolled-by}(x)(e)]]$

Of course, much hinges on the nature of the novel **OCCASIONAL** quantifier. Roughly, though, one can think it as holding if there are sufficiently many events suitably distributed in time that satisfy its nuclear scope. Thus (123c) says that occasional events were ones of a sailor strolling by. One drawback of such an analysis is that it can't straightforwardly be extended to the generic readings. Indeed, Stump (1981) proposed a separate account of those cases.

It does, however, have the advantage of naturally accounting for both of the determiner-related properties of adverbial readings: that the adjective is obligatorily adjacent to the determiner and that the determiner doesn't get its usual interpretation. The adjacency follows from the incorporation. The abnormal determiner interpretation follows from the fact that on this view the determiners created by incorporation are simply different from the ordinary ones, with a distinct (by stipulation) denotation.

Gehrke & McNally (2010), building in part on Schäfer (2007), pursue a fundamentally different approach that doesn't rely on special determiners. They propose instead that adverbial readings of frequency adjectives are fundamentally about kinds—not just ordinary kinds of individuals, but also kinds of events (see also Gehrke 2011, Landman & Morzycki 2003, Landman 2006, Anderson & Morzycki 2012, Rett 2011). This ultimately leads to denotations like (124):

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<sup>22</sup>This implementation is also simplified in how the denotation of *strolled by* arises. This can be seen in cases in which *occasional sailor* is interpreted in an object position. In that case, the structure would involve binding the trace of the nominal's vacated position and creating via movement a lambda abstract with which it can combine (Heim & Kratzer 1998):

- (i) Floyd saw an occasional sailor.  
 a.  $\llbracket_{\langle \langle e,vt \rangle, t \rangle} \textit{an-occasional sailor} \rrbracket \llbracket_{\langle e,vt \rangle} \lambda x_1 \llbracket_{\langle v,t \rangle} \textit{Floyd saw } x_1 \rrbracket \rrbracket$   
 b.  $\llbracket \lambda x_1 \llbracket_{\langle v,t \rangle} \textit{Floyd saw } x_1 \rrbracket \rrbracket = \lambda x_1 \lambda e . \textbf{saw}(x_1)(\textbf{Floyd})(e)$   
 c.  $\llbracket \textit{an-occasional sailor} \rrbracket (\llbracket \lambda x_1 \llbracket_{\langle v,t \rangle} \textit{Floyd saw } x_1 \rrbracket \rrbracket)$   
      $= \llbracket \lambda f_{\langle e,vt \rangle} . \textbf{OCCASIONAL } e[\exists x[\textbf{sailor}(x) \wedge f(x)(e)]] \rrbracket$   
      $\quad\quad\quad (\lambda x_1 \lambda e . \textbf{saw}(x_1)(\textbf{Floyd})(e))$   
      $= \textbf{OCCASIONAL } e[\exists x[\textbf{sailor}(x) \wedge \textbf{saw}(x)(\textbf{Floyd})(e)]]$

Even in this more articulated structure, there are problems. Binding off the event variable, for example, can lead to problems further up the tree. See the more worked-out version in Zimmermann for details.

- (124) An occasional sailor strolled by.  
 $\exists x_k \exists e_k [\mathbf{occasional}(\mathbf{sailor})(x_k) \wedge \mathbf{strolled-by}(e_k)(x_k)]$

The subscripts indicate whether a variable ranges over individuals ( $e$ ) or kinds ( $k$ ). What (124) says is that there is an individual-kind whose realizations are sailors distributed in time in an appropriately intermittent way, and that this kind participated in the event-kind of strolling by. Of course, much hinges on what it means for a kind to stroll by. Kinds, after all, can't **actually** stroll by in the ordinary sense—only their realizations can. To accommodate this fact, Gehrke & McNally define the **strolled-by** predicate so that, when it applies to kinds, the correct entailments follow about what this means for individual realizations of the kind. This means the compositional machinery is elegantly straightforward and requires no special tricks.<sup>23</sup>

- (125) a.  $\llbracket \textit{occasional} \rrbracket = \lambda P_{\langle e, t \rangle} \lambda x_k . \mathbf{occasional}(P)(x_k)$   
 b.  $\llbracket \textit{an occasional sailor} \rrbracket$   
 $= \lambda f_{\langle e, vt \rangle} . \exists e_k \exists x_k \left[ \mathbf{occasional}(\mathbf{sailor})(x_k) \wedge \right.$   
 $\left. f(x_k)(e_k) \right]$   
 c.  $\llbracket \textit{strolled by} \rrbracket = \lambda x \lambda e . \mathbf{strolled-by}(x)(e)$   
 d.  $\llbracket \textit{an occasional sailor} \rrbracket (\llbracket \textit{strolled by} \rrbracket)$   
 $= \exists e_k \exists x_k \left[ \mathbf{occasional}(\mathbf{sailor})(x_k) \wedge \right.$   
 $\left. \mathbf{strolled-by}(x_k)(e_k) \right]$

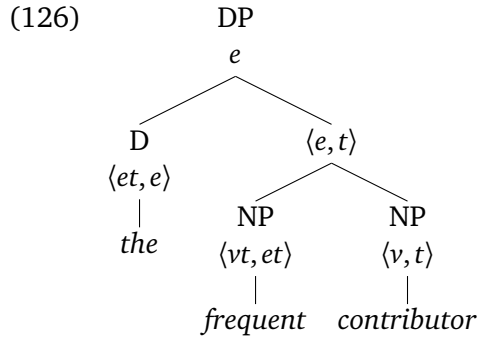
It's less clear on this approach what explains the adjective's obligatory proximity to the determiner on adverbial readings. DeVries (2010) points out another problem a denotation along these lines must grapple with: the sailor-kind must be not only occasionally realized, but occasionally realized in strolling events (and not, say, runnings).

#### 5.4 *The internal reading of frequency adjectives*

The less challenging of the readings, the internal one, generally doesn't get as much attention, but a major step in the direction of an account is provided in Larson (1999). As we saw in section 3.3, he proposes that there are events at play in the internal semantics of the NP, and that certain adjectives can be predicated of these events as if they were adverbials. That alone helps explain the connection between the internal reading and NP-internal adverbial paraphrases. But it's possible to push the connection deeper. On Larson's analysis, the nominal event argument is quantified over by a

<sup>23</sup>Strictly speaking,  $\llbracket \textit{occasional} \rrbracket$  should apply to an intensional property, type  $\langle e, st \rangle$ , not  $\langle e, t \rangle$ .

generic quantifier. Frequency adverbials rather resemble quantificational adverbs such as *occasionally* and *frequently* (see section ??), so it wouldn't be unreasonable to think that on the internal reading, frequency adjectives also contribute a quantifier, one that binds the noun's event argument. Thus one might imagine a structure as in (126), with the denotation in (127):



- (127)
- $\llbracket \textit{frequent} \rrbracket = \lambda f_{\langle v, t \rangle} \lambda x . \mathbf{MANY} e [f(e) \wedge \mathbf{agent}(e) = x]$
  - $\llbracket \textit{contributor} \rrbracket = \lambda e . \mathbf{contribute}(e)$
  - $\llbracket \textit{frequent} \rrbracket (\llbracket \textit{contributor} \rrbracket)$   
 $= \lambda x . \mathbf{MANY} e [\mathbf{contribute}(e) \wedge \mathbf{agent}(e) = x]$

So a frequent contributor is someone who is the agent of many relevant contribution events.<sup>24</sup> This approach would also explain the contrast in (128):

- (128)
- Olga is an occasional beautiful dancer.
  - Olga is a beautiful occasional dancer.

Normally, (128a) gets a reading in which Olga occasionally dances beautifully; in (128b), it is Olga that is beautiful. This would follow from this sort of Larsonian analysis. If subsecutive readings of *beautiful* arise from being interpreted below an event quantifier, and *occasional* contributes an event quantifier, *beautiful* should only be able to receive the subsecutive reading when below *occasional*. This is only a sketch of an analysis but it does hint at further evidence that event arguments are involved in nominal semantics. That said, this approach doesn't fully resolve the issue of how could such

<sup>24</sup>One could avoid using the **MANY** quantifier by making more sophisticated assumptions about plurality in events:

(i)  $\lambda x . \exists e [\mathbf{contribute}(e) \wedge \mathbf{agent}(e) = x \wedge |e| \geq \mathbf{standard}_c(\mathbf{many})]$

This says that there is a (plural) event of  $x$  contributing that is made up of a number of subevents that exceeds the contextually-supplied standard for counting as 'many'. See section ?? for a more fully-developed implementation.

adjective denotations be unified with the meaning of these adjectives on their other readings. Perhaps they don't need to be, but it seems a desirable goal.

### 5.5 *Average Americans and parasitic scope*

There is a certain stripe of linguist—Noam Chomsky being a notable example—that is skeptical of the entire enterprise of formal semantics. The reasons for this skepticism typically involve philosophical convictions about the nature of language, the proper aims of linguistic theory, and the relation between linguistic meaning and the world. This discussion sometimes takes place at such a level of abstraction that the connection to concrete linguistic observations seems remote. There is, however, at least one place where these rarified debates touch very directly on a grammatical issue, one relevant here: the semantics of *average*.

On the classical view in formal semantics (though by no means the only one), the model that underlies the semantics is not a representation of the world; it **is** the world. This implies that whenever we claim that a linguistic expression denotes an object—an individual, an event, a property, whatever—we commit ourselves to the existence of that object in the mind-external world.<sup>25</sup> But Chomsky observes that there are certain linguistic expressions which don't seem to refer to anything in the real world:

(129) The average American has 2.3 children. (Carlson & Pelletier 2002)

There are two problems here. First, what does *the average American* denote? Which individual is the average American? Even if we could find some particular American—say, Steve—that is the most typical, it still seems strange to say *the average American* denotes Steve, and that every property Steve has is a property of the average American. Second, what does *2.3 children* denote? We're quite happy to judge (129) true without committing ourselves to the idea that there are fractional children.

There are various ways of responding to this concern (see Carlson & Pelletier 2002). Perhaps the most appealing on purely linguistic grounds is just to examine the grammar of the sentence more carefully. This impulse is what animates Kennedy & Stanley (2009, 2008). They observe that *average* has an adverbial paraphrase:

(130) On average, an American has 2.3 children.

It's therefore natural to assimilate this problem to those we have already

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<sup>25</sup>See Bach (1989) for a particularly elegant exposition of another way of thinking about the issue.

encountered in this section. With Larson (1999) and others, they assume that *average* incorporates into the determiner. This is consistent with the fact that other adjectives can't intervene between *average* and *the* (without getting a nonrestrictive reading; Carlson & Pelletier 2002), and the curious sense that *an average American* and *the average American* mean the same thing. (Indeed, *your average American* also means this, paralleling the frequency adjective facts.)

At this point, things get slightly complicated. This is in part because the syntax-semantics of number terms is more complicated than it seems, and in part because averaging isn't as simple as it seems. Let's begin with the latter. If you were a survey-taker tasked with computing an average, you would need two pieces of information. First, you'd need to know who to direct your questions to. In this case, the answer is 'Americans'. Second, you'd need to know what to ask them. In this case, it's 'how many children do you have?'. You would then write down answers, a list of pairs of people and the number of their children: ⟨Floyd, 2⟩, ⟨Greta, 3⟩, ⟨Clyde, 19⟩, and so on. This structure—a set of pairs—is something one can think of as a relation between individuals and numbers, which we might call **have-children**. Thus: **have-children(Floyd)(2)**, **have-children(Greta)(3)**, **have-children(Clyde)(19)**.<sup>26</sup>

The function for computing averages is like this census-taker. It needs two arguments: a property that indicates who or what the average is about, and a relation that reflects the information that's being averaged. To match the content of the sentence, this function, **average**, would need to behave as in (131):

$$(131) \quad \mathbf{average}(\mathbf{American})(\mathbf{have-children}) = 2.3$$

This isn't the only way an **average** function could work, of course, and this isn't an actual definition of this function, but it will suffice.<sup>27</sup>

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<sup>26</sup>A more elegant way to think about it might treat this predicate as a function from individuals to the number of their children (a function of this type is called a 'measure function'; see section ??). My reasons for not going down this road will become clear below.

<sup>27</sup>It could be defined this way:

$$(i) \quad \mathbf{average} \stackrel{\text{def}}{=} \lambda P_{(e,t)} \lambda f_{(e,nt)} \cdot \frac{\sum_{P(x)} \mathbf{max}\{n : f(x)(n)\}}{|P|}$$

Where the type of real numbers is  $n$ ;  $|P|$  is to be read as 'the number (cardinality) of individuals that satisfy the function  $P$ '; and the **max** operator applies to a set and yields its maximal element (in this case the largest number; this is necessary because anyone that has 3 children also has 2, but these shouldn't be counted separately in the average). Thus if  $P = \mathbf{American}$  and  $f = \mathbf{have-children}$ , this sums the number of children each American has and divides that by the number of Americans (in other words, it just calculates a mean). See Kennedy &



Here, then, is a simplified version of [Kennedy & Stanley](#)'s account. The denotation of *the-average*, the complex determiner created by incorporating *average* into *the*, will be (132), where  $n$  is a variable over (real) numbers as well as their type (ultimately, they should probably be treated as degrees; see section ??):

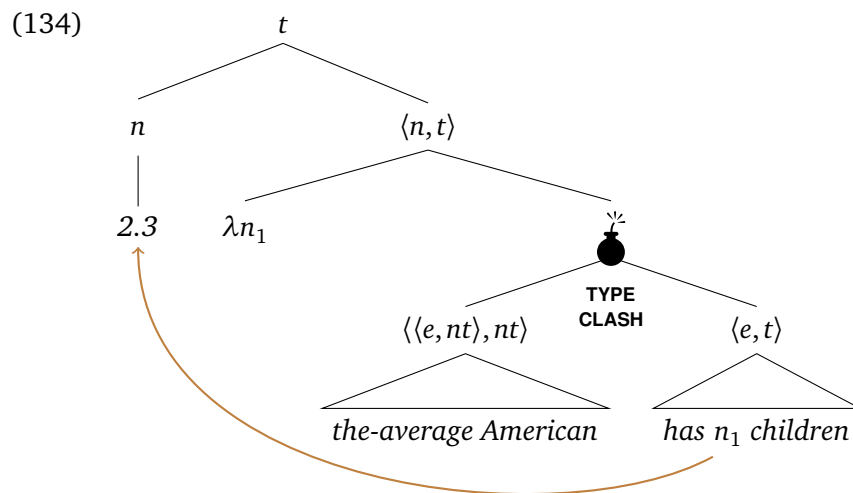
$$(132) \quad \llbracket \textit{the-average} \rrbracket = \lambda P_{\langle e,t \rangle} \lambda f_{\langle e,nt \rangle} \lambda n . \mathbf{average}(P)(f) = n$$

To yield the sentence denotation we're aiming at in (131), this will need to combine first with a property. That's easy enough: the complement to *the-average* is *American*, so the full DP will be as in (133):

$$(133) \quad \llbracket \textit{the-average American} \rrbracket = \llbracket \textit{the-average} \rrbracket (\llbracket \textit{American} \rrbracket) \\ = \lambda g_{\langle e,nt \rangle} \lambda n . \mathbf{average}(\mathbf{American})(g) = n$$

The next point is more difficult: how to provide this with the **have-children** predicate it desires?

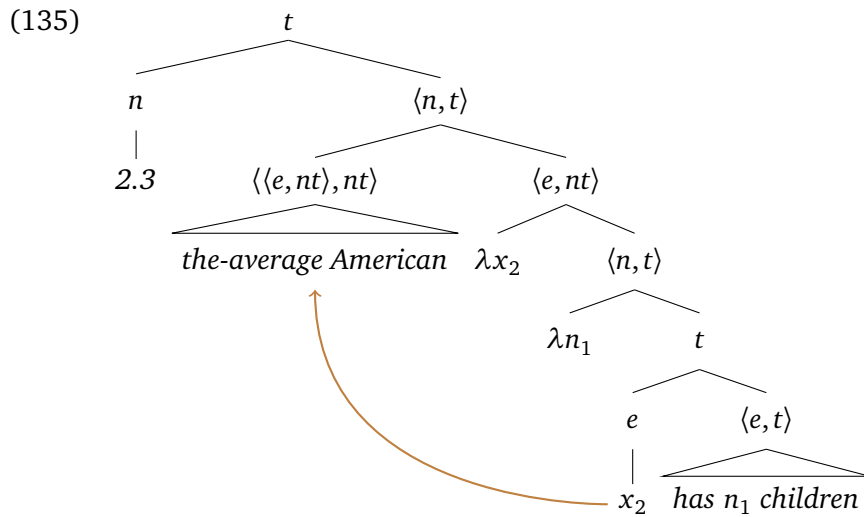
This is a syntactic question, and this is where the next layer of complexity arises. For [Kennedy & Stanley](#), two steps are involved. First, the number term *2.3* moves out of its base position by Quantifier Raising, just as a quantified nominal like *every student* would have. That creates the structure in (134):



*The-average American* will now have to move, due to a type clash. But in order to find itself next to a node of the right type, it will have to move to an unusual place: between *2.3* and the lambda its movement introduced:

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Stanley (2009) for a full implementation.



In moving to between 2.3 and its lambda, *the-average American* itself creates a lambda, the  $\lambda x_2$  in (135). This variety of movement, in which an expression with a high type moves to a position that was itself created by movement of another expression, has been dubbed ‘PARASITIC SCOPE’ by Barker 2007. It turns out that there is independent evidence that such movement is necessary in a number of other contexts (Sauerland 1998, Bhatt & Takahashi 2007, 2011, and Matsui & Kubota 2012). Indeed, as we’ll see in section 5.6, Barker proposed it in another context still (though his preferred implementation is in a distinct framework, Type Logical Grammar, in which there is no need to achieve its compositional effects through movement as such).

It’s now possible to interpret (135). It will be easier to use English as a metalanguage for the first step:

- (136) a.  $\llbracket \text{has } n_1 \text{ children} \rrbracket = \lambda x . x \text{ has } n_1 \text{ children}$   
 b.  $\llbracket x_2 \text{ has } n_1 \text{ children} \rrbracket = \llbracket \text{has } n_1 \text{ children} \rrbracket (\llbracket x_2 \rrbracket)$   
 $= x_2 \text{ has } n_1 \text{ children}$   
 c.  $\llbracket \lambda x_2 \lambda n_1 x_2 \text{ has } n_1 \text{ children} \rrbracket = \lambda x_2 \lambda n_1 . x_2 \text{ has } n_1 \text{ children}$

This denotes a relation between an individual and the number of children that individual has. This is precisely our **have-children** relation above, so:

(137)  $\llbracket \lambda x_2 \lambda n_1 x_2 \text{ has } n_1 \text{ children} \rrbracket = \mathbf{have-children}$

This is also of the type that *the-average American* is looking for, so semantic composition can proceed:

- (138) a.  $\llbracket \textit{the-average American } \lambda x_2 \lambda n_1 x_2 \textit{ has } n_1 \textit{ children} \rrbracket$   
           =  $\llbracket \textit{the-average American} \rrbracket (\llbracket \lambda x_2 \lambda n_1 x_2 \textit{ has } n_1 \textit{ children} \rrbracket)$   
           =  $\llbracket \textit{the-average American} \rrbracket (\mathbf{have-children})$
- b.  $\llbracket \textit{the-average American } \lambda x_2 \lambda n_1 x_2 \textit{ has } n_1 \textit{ children} \rrbracket (\llbracket 2.3 \rrbracket)$   
           =  $\llbracket \textit{the-average American} \rrbracket (\mathbf{have-children})(2.3)$   
           =  $\mathbf{average(American)(have-children)} = 2.3$

The result is the one we sought.

The compositional machinery here is complicated, and it's possible to miss the analytical forest for the syntactic trees. With respect to the big-picture discussion about the foundations of semantics, the important point is that [Kennedy & Stanley](#) have provided an analysis of this sentence without making any exotic metaphysical commitments. The issue of whether there is a particular individual that is the average American doesn't arise, because *the average American* simply doesn't refer to an individual and nothing in its semantics entails the existence of such an individual. This is analogous to the question of what individual *no student* denotes. The answer, of course, is that this is the wrong question to ask because *no student* denotes a generalized quantifier, not an individual. To make the insight emerge, it was necessary to work out the semantics of *average* in some detail. This revealed that it is, indeed, complicated—but the complications are grammatical, not ontological. These complications are not specific to *average* alone. They are ones that play an independent role in the grammar. We've already seen that adjectives can be complicated in just this way.

This is not to say that similar theoretical challenges won't arise with other linguistic expressions. For example, [Kennedy & Stanley](#) don't provide an analysis of why *the average American* can introduce discourse referents (i.e., antecede subsequent pronouns: *The average American has 2.3 children. He votes infrequently.*), or extend their analysis to expressions like *Joe Sixpack*. Both of those are fertile ground for future research, and, as [Kennedy & Stanley](#) demonstrate, may be tractable with sufficiently careful linguistic examination.

With respect to the more immediate question of how adjectives work and how they acquire wider-than-expected scope, several things have been achieved. First, we've examined an especially vexing additional example of the phenomenon. Second, we've encountered more evidence that incorporation into a determiner may be necessary to a general account of adverbial readings. Third, a new analytical tool has been put on the table: parasitic scope. A natural question to ask, then, is where else this tool might prove helpful.

## 5.6 *Sameness and difference*

A cottage industry has arisen around the semantics of *same* and *different*. It includes Nunberg (1984), Heim (1985), Carlson (1987), Keenan (1992), Moltmann (1992), Beck (2000), Lasersohn (2000), Majewski (2002), Alrenga (2006, 2007a,b), Barker (2007), and Brasoveanu (2011). Rather than trying to do it all justice, I will merely highlight the basic readings these adjectives receive and sketch a highly simplified analysis of one of them that, following Barker (2007), relies on parasitic scope. This entails sidestepping what these expressions reveal about plurals, reciprocals, discourse structure, imprecision, quantification, and other interesting issues.

Beck (2000) distinguishes three readings of *different*, two of which are also available for *same*. The first is the DISCOURSE ANAPHORIC READING (alternatively, ‘deictic’ or ‘sentence-external’ reading):

- (139) a. Floyd read a different book.  
b. Floyd read the same book.

The only way to interpret (139a) is as asserting that the book Floyd read is not the same as some book that was already present in the discourse, and (139b) is analogous. For slightly more complicated sentences, there is an NP-DEPENDENT READING (alternatively, ‘internal reading’; Carlson 1987), so called because of a dependence on a preceding NP:

- (140) a. Floyd and Clyde read a different book.  
b. Floyd and Clyde read the same book.

The most natural way to construe (140a) is as (roughly) denying that the book Floyd read was the same as the one Clyde read. Finally, *different* also has a RECIPROCAL READING, which can be discerned in (141):

- (141) Floyd read different books.

Unless there is a plurality of books already salient in the discourse, the natural way to interpret (141) is as claiming that Floyd read a number of books that are different from each other (note the ‘each other’; hence ‘reciprocal reading’). This reading doesn’t seem to be available for *same*. On such a reading, *Floyd bought the same cars* should be able to mean ‘Floyd bought cars that are the same (as each other; e.g., both Hondas)’.

The most relevant reading for current purposes is the NP-dependent internal one. Here, again following Barker, I’ll focus on *same*. The compositional challenge is a little harder to perceive here, since there is no obvious adverbial paraphrase, though *in common* is in the right ballpark:

(142) Floyd and Clyde read a book in common.

One can also get a sense of the scope problem by considering the range of expressions that make this reading possible, including plurals as in (143a), quantified nominals as in (143b), adverbs as in (143c), and even coordinated verbs as in (143d):

- (143) a. The students read the same book.  
 b. Every student read the same book.  
 c. Floyd read the same book twice.  
 d. Floyd praised and criticized the same book.

Accounting for all of these would take us far afield, but they reflect that *same* is sensitive to properties of the sentence that extend beyond the nominal in which it's located. The core case we'll concentrate on is (143a). Here, the problem in a nutshell is that *same* needs to know about not just books, but also and independently about the students, the ones who are similar in their book-reading. (See Barker for a complete exposition, or Keenan 1992 for an explicit proof.)

A very rough representation of the truth conditions of (143a) is in (144):

(144)  $\exists z[\forall y \in \mathbf{the-students}[\mathbf{book}(z) \wedge \mathbf{read}(z)(y)]]$

This says that there is a book such that every individual that is a member of the plurality 'the students' read it. The notion of sameness is reflected here, crudely, in the wide-scope existential. This on its own doesn't remotely do it justice.<sup>28</sup> In keeping with the previous sections, I'll assume that *same* incorporates into the determiner (an assumption Barker doesn't make). The result is (145):

(145)  $\llbracket \mathbf{the-same} \rrbracket = \lambda P_{\langle e,t \rangle} \lambda R_{\langle e,et \rangle} \lambda x . \exists z[\forall y \in x[P(z) \wedge R(z)(y)]]$

The question, then, is how to provide this denotation with the arguments it needs. The first argument is straightforward:

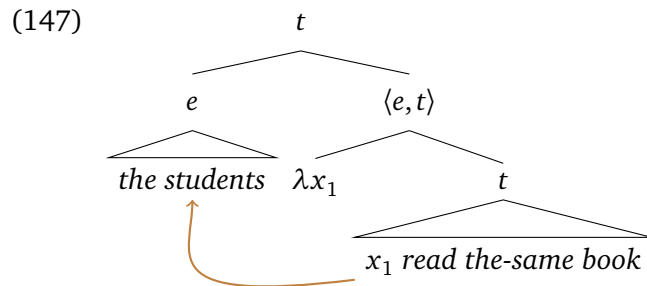
(146)  $\llbracket \mathbf{the-same\ book} \rrbracket = \llbracket \mathbf{the-same} \rrbracket (\llbracket \mathbf{book} \rrbracket)$   
 $= \lambda R_{\langle e,et \rangle} \lambda x . \exists z[\forall y \in x[\mathbf{book}(z) \wedge R(z)(y)]]$

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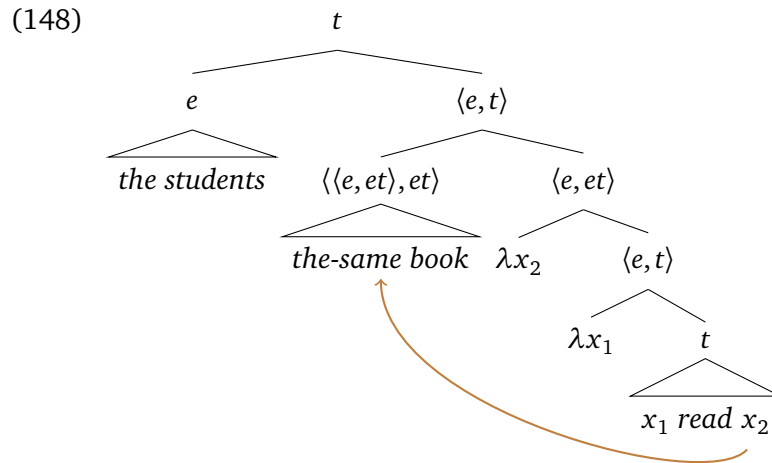
<sup>28</sup>Barker uses a choice function instead. A choice function is a way of picking an individual from a set, and can be used to model the effect of indefinites: *A student died* could be thought of as saying roughly 'there is a choice function that picks from the set of students one that died' (or, alternatively, 'I have in mind a choice function that ...'). See Reinhart (1997), Winter (1997), Kratzer (1998), Matthewson (1998).

In the simple case of (143a), the composition can in principle proceed with equal simplicity past this point, because *read* could denote a relation  $\langle\langle e, et \rangle\rangle$ , which is precisely what  $\llbracket \textit{the-same book} \rrbracket$  is looking for. But what if *read* has an event argument, for example, and therefore a type like  $\langle e, \langle e, vt \rangle \rangle$ ? Or what if *the-same book* were not in object position?

It is for such cases that a more complicated tool—Barker’s parasitic scope—is necessary. First, *the students* will move out of its base position by Quantifier Raising:



Next, *the same book* will move, thereby avoiding a possibility of a type clash. It will land in the only place where it can be interpreted: between *the students* and its lambda:



In moving, *the-same book* creates its own lambda, as (148) reflects. The interpretation will proceed as in (149) (with the the event argument omitted):

(149) a.  $\llbracket \lambda x_2 \lambda x_1 x_1 \textit{read } x_2 \rrbracket = \lambda x_2 \lambda x_1 . \mathbf{read}(x_2)(x_1)$

- b.  $\llbracket \text{the-same book} \rrbracket (\llbracket \lambda x_2 \lambda x_1 x_1 \text{ read } x_2 \rrbracket)$   
 $= \lambda x . \exists z \left[ \forall y \in x \left[ \mathbf{book}(z) \wedge \llbracket \lambda x_2 \lambda x_1 x_1 \text{ read } x_2 \rrbracket (z)(y) \right] \right]$   
 $= \lambda x . \exists z [\forall y \in x [\mathbf{book}(z) \wedge \mathbf{read}(z)(y)]]$
- c.  $\llbracket \text{the students the-same book} \lambda x_2 \lambda x_1 x_1 \text{ read } x_2 \rrbracket$   
 $= \llbracket \text{the-same book} \lambda x_2 \lambda x_1 x_1 \text{ read } x_2 \rrbracket (\llbracket \text{the students} \rrbracket)$   
 $= \llbracket \text{the-same book} \lambda x_2 \lambda x_1 x_1 \text{ read } x_2 \rrbracket (\mathbf{the-students})$   
 $= \exists z [\forall y \in \mathbf{the-students} [\mathbf{book}(z) \wedge \mathbf{read}(z)(y)]]$

This is the desired result. Again, then, two ingredients added up to a theory of this adverbial reading of an adjective: incorporation into a determiner and parasitic scope. In light of that, some of the vexing behavior of *same* can be viewed as a special case of a wider problem.

### 5.7 Other adverbial readings and the bigger picture

Before moving on, it's worth briefly noting three other classes of adverbial readings of adjectives. First, *whole* and *entire* have an adverbial reading (Moltmann 1997, 2005, Morzycki 2002):

- (150) a. The  $\left\{ \begin{array}{l} \text{whole} \\ \text{entire} \end{array} \right\}$  ferret was submerged.  
 b. The ferret was  $\left\{ \begin{array}{l} \text{wholly} \\ \text{entirely} \end{array} \right\}$  submerged.

The principal accounts of this rely either on tools used to account for distributive readings of plurals (Morzycki) or on situations (Moltmann). I won't elaborate, other than to observe that, once again, apparent incorporation into the determiner correlates with unexpected adverbial scope. The adverbial reading is lost when the adjective is not adjacent to the determiner as in (151a), or when the determiner is *every* as in (151b):

- (151) a. The furry whole ferret was submerged.  
 b. Every whole ferret was submerged.

In both cases, the only reading possible is a non-adverbial one that means roughly 'structurally intact'.

Another class seems to consist of just one word, *wrong* (Larson 2000, Schwarz 2006):

- (152) They arrested the wrong person.

The first thing to notice is the definite determiner. There are countless people that they shouldn't arrest, so we might expect that *a* would be obligatory. Yet *the* is felicitous—again, unexpected determiner behavior. The other crucial point is that no one can be said to be, once and for all, the wrong person. Rather, it involves 'people that it was wrong for them to arrest'. To get build this meaning, though, the adjective must combine with a clausal denotation—indeed, that of the very clause in which it is embedded. There is no adverbial paraphrase, but the effect of combining with a clause is similar.

The third class of adjectives that have adverbial readings is the EPISTEMIC ADJECTIVES of [Abusch & Rooth \(1997\)](#):

- (153) a. Dick Cheney is hiding at an undisclosed location.  
b. You'll be staying at an an unspecified hotel.

For a few years, (153a) was a kind of standing half-joke because the location became known primarily for being undisclosed. But of course, 'being undisclosed' is not really a characteristic of a place, and if at a moment of unusual candor Cheney were to reminisce fondly about his secret special place, he would be unlikely to say he misses how very undisclosed it was. Rather, the *undisclosed* says something about what information has been, well, disclosed: in (153a), something like 'Dick Cheney is hiding at a location, and it has not been disclosed what location he is hiding at'. Like *wrong*, these adjectives don't have adverbial paraphrases, but as this paraphrase reflects, they do require that the adjective combine with a clausal denotation. [Abusch & Rooth](#) propose an account of these facts couched in Discourse Representation Theory ([Kamp 1981](#)). Again, I won't elaborate.

A few words about where all this leaves us. First, incorporation of adjectives into determiners seems to be the clearest mechanism by which adverbial readings can be achieved. But why should it be possible at all, given that it can't be performed by ordinary head-to-head movement?<sup>29</sup> Second, what characterizes the class of determiners that allow this incorporation, and how does it vary from one adjective to another? Finally, a broader questions: I've grouped a number of adjective classes together under the rubric of 'adverbial readings', but they aren't normally treated as a single problem. This might be simply a historical accident. On the other hand, it's also possible—if, in my estimation, less likely—that these are genuinely unrelated puzzles, with no need for a unified theory. At the moment, all of these questions remain unresolved.

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<sup>29</sup>Normally, movement of a head out of an adjunct isn't possible. This wouldn't be an issue if adjectives weren't adjuncts, as in [Abney \(1987\)](#).



## 6 Adjective position and syntactic issues

### 6.1 *Attributive vs. predicative, prenominal vs. postnominal*

We've already encountered a number of ways in which the relative order of adjective has semantic consequences and a few differences between attributive and predicative adjectives. The aim of this section is to briefly address some additional issues in this domain.

The principal point that needs to be further explored is an essentially syntactic one: the fundamental difference between attributive and predicative adjectives. First, many adjectives in English and in numerous other languages are exclusively attributive. This effect goes beyond cases where this would be expected on semantic grounds such as *alleged*. Here are some examples from Bolinger (1967), a pathbreaking paper on this topic:

- (154) a. the main reason  
b. \*The reason is main.
- (155) a. a crack salesman  
b. \*The salesman seems crack.
- (156) a. a total stranger  
b. \*The stranger is total.

In some of these cases, one might wonder whether these are truly adjectives at all. For example, (154) might be better analyzed as some sort of attributive noun, though of course it's not obvious what the theoretical content of such a claim could be. (A simple compounding analysis is less plausible, since there is a genuine noun-noun compound *crack salesman*, but it means 'dealer of crack cocaine'. Unlike (155), the compound also has initial stress, a distinguishing characteristic of English compounding.) In (156), the alternative non-adjectival analysis might follow the lines of Morzycki (2009, 2012) (see section 4.6 and ??).

Other adjectives are exclusively predicative. In English, this includes a class of adjectives that all begin with *a-*:

- (157) a. \*an  $\left\{ \begin{array}{l} \text{asleep} \\ \text{alive} \end{array} \right\}$  student  
b. That student is  $\left\{ \begin{array}{l} \text{asleep} \\ \text{alive} \end{array} \right\}$ .
- (158) a. \*an aloft plane.  
b. That plane is aloft.

- (159) a. \*some akimbo arms  
 b. Her arms were akimbo.

Others still have essentially unrelated meanings on their attributive and predicative uses:

- (160) a. that poor man  
 b. That man is poor.

This amounts to saying that these are two different homophonous adjectives.

It is a terminologically inconvenient fact of English that it often allows adjectives that are obligatorily predicative to be used in attributive positions so long as they are to the right of the noun:

- (161) a. every student  $\left\{ \begin{array}{l} \text{alive} \\ \text{awake} \end{array} \right\}$   
 b. every plane aloft

This postnominal position is otherwise unavailable to English adjectives unless they have a complement (e.g. \**a man proud* vs. *a man proud of his daughter*). The explanation for the apparent oddity of (161) may be that some such cases are derived by reduction of a relative clause (e.g. *every student ~~that~~ is alive*), a process Ross (1967) memorably dubbed ‘whiz-deletion’ (‘wh-word + is’; see also Smith 1961, 1964, Sproat & Shih 1988, Kayne 1994, Larson 1999, 2000, Alexiadou 2001, Larson & Marušič 2004, Shimoyama 2011).

That said, there are a few exceptional adjectives in English that are unexpectedly content postnominally even without a complement (e.g. *every firefighter available*, *every star visible*). Across languages—and especially in Romance—whether an adjective is pre- or postnominal correlates with its semantic properties in interesting ways.

There is substantial syntactic work in this area. In addition to work cited in section 4.1, this includes Crisma (1993), Alexiadou (2001), Bouchard (2002), Larson & Marušič (2004), Teodorescu (2006), Valois (2007), Vander Klok (2009), Aljović (2010), Centeno-Pulido (2010), and Kim (to appear), and historically-oriented work including Fischer (2006) and Haumann (2010). Semantic or semantically-oriented work that takes adjective-position observations as a starting point includes Truswell (2004, 2005), Champollion (2006), Katz (2007), and Morzycki (2008) (see section ?? for discussion of some of this).

## 6.2 Indirect modification

The attributive-predicative distinction is so fundamental that some languages seem to lack either attributive or predicative adjectives entirely. Baker (2003) provides some examples. A language with only attributive adjectives is Vata (Niger-Congo; Baker cites Koopman 1984):

- (162) a. kO! Kad-Ò  
man old  
'a big man, old man'  
b. \*Wa (lÈ) kad-Uà  
they PRED old

A predicative-only language is Slave (an Athabaskan language, English pronunciation [slɛrvi]); Baker cites personal communication from Karen Rice and Rice 1989):

- (163) a. Yenene (be-gho) sho                    hji  
woman 3-of        proud/happy 3-is  
'The woman is happy/proud (of him/her).'
- b. \*yenene sho  
woman proud/happy  
'a proud/happy woman'

Japanese may also be such a language, though there is controversy on this point. (See Shimoyama 2011 for discussion and an argument against this claim.)

In light of facts like these, it's reasonable to ask how to translate a predicative adjective into Vata, or an attributive one into Slave. The answer, it turns out, is with additional grammatical equipment. Focusing on the Slave attributive case, Baker says the solution is a relative clause—that is, something like 'a woman that is proud'.<sup>30</sup>

This demonstrates a larger point, one first articulated by Sproat & Shih (1988): there are two ways of achieving adnominal modification. One of them, which they call DIRECT MODIFICATION, involves simple structures such as attributive adjectives. The other, INDIRECT MODIFICATION, involves additional structure layered on top of a predicative modifier so it can be used attributively. This typically takes the form of a relative clause, or a structure that could plausibly be analyzed as a reduced relative clause (of the sort mentioned in section 6.1 immediately above). Sproat & Shih provide examples in Mandarin:

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<sup>30</sup>Baker doesn't include the relevant Slave example itself.

- (164) a. fang-de xiao-de zhuo-zi  
 square-DE small-DE table  
 ‘small square table’  
 b. \*fang xiao zhuo-zi  
 square small table

The presence of the additional morpheme *de* is required to approximate the effect of the direct modification attempted in (164b). This characterization abstracts away from a number of complications, one of which bears calling attention to. In fact, some direct modification **is** possible in Mandarin. Reversing the order of the adjectives in (164b) fixes the problem:

- (165) xiao fang zhuo-zi  
 small square table

What seems to be happening is that indirect modification provides a way of sidestepping restrictions on the relative order of attributive adjectives. Normally, size adjectives must precede shape adjectives, as in (165). But this holds only of truly attributive adjectives. Ones suffixed with *de* are not subject to the restriction. The ability to sidestep such restrictions may be a feature of indirect modification in general. For further discussion of these issues across a number of languages, see Larson & Takahashi (2007), Vander Klok (2009), Cinque (2010), Shimoyama (2011), and Kim (to appear).

### 6.3 Stage-level/individual-level contrasts

One of the more striking effects of adjective position in English was initially observed by Bolinger (1972). It’s most apparent in the few adjectives that can freely occur postnominally:

- (166) a. the stars visible  
 b. the visible stars  
 (167) a. the rivers navigable  
 b. the navigable rivers  
 (168) a. the responsible individuals  
 b. the individuals responsible

These mean subtly different things. *The stars visible*, for example, are those we can see at a particular moment. *The visible stars* can mean this too, but it can also refer to those that are visible in principle, even if at the moment they are obscured by a cloudy night. The effect is similar in (167) and (168). It’s

especially clear in (168) because *irresponsible* is an antonym on only one of the relevant readings: one can be responsible or irresponsible as a character trait; with respect to any particular act, though, one can be responsible but not irresponsible.

Larson (1999) observed that this seems to be a contrast between STAGE-LEVEL and INDIVIDUAL-LEVEL predicates. (In a nutshell, a stage-level predicate is one that holds at a particular time, such as *drunk*, *hungry*, or *clothed*. An individual-level predicate such as *tall*, *Bolivian*, or *smart* characterizes an individual in general with no particular reference to time. Many constructions are sensitive to the distinction. See Carlson 1977, Kratzer 1995, and Jäger 1999 for an overview.) He also observed a similar effect of adjective order. If the same adjective is used twice, they are read in the two distinct senses. More strikingly, one has the intuition that the higher adjective is the stage-level one:

- (169) a. the visible visible stars  
b. the responsible responsible individuals

Thus (169a) characterizes the stars that are visible in principle and actually visible at the moment. For the same reason, there is a clear contrast in (170) (Larson attributes this observation to Barbara Citko):

- (170) a. the invisible visible stars  
b. the visible invisible stars

If some clouds are obscuring stars that would normally be visible, they can be described with (170a), but certainly not with (170b).

The outline of an analysis is provided by Larson's theory of event arguments inside the nominal projection (see section 3.3). The core idea is that there is generic quantifier inside the extended NP. Individual-level properties can be construed as ones that hold generically (Chierchia 1995). If this quantifier binds off event arguments below it, we might expect that individual-level readings would be available only in its scope and therefore lower in the NP, near the noun. The stage-level readings would be available above it, and therefore higher in the NP. In a broadly similar spirit, one might also consider deriving stage-level adjectives from an underlying reduced relative clause source (i.e., from *visible stars that are visible*).

#### 6.4 A focus position?

When adjectives occur in a non-canonical order, one doesn't normally have a clear-cut sensation of unacceptability. Rather, the result is just awkward. That's the case in (171b) and (171c):

- (171) a. ugly big red ball  
b. ??big ugly red ball  
c. ??red ugly big ball

In some measure, the feeling is that there should be some kind of truth-conditional difference here (even though all these adjectives are intersective and consequently don't scope with respect to each other). One might account for this by supposing that some of the lower adjectives are kind-modifying and the higher ones aren't (Zamparelli 1995, McNally & Boleda Torrent 2003, Truswell 2004, Demonte 2008, Svenonius 2008a).

But that, while plausible, doesn't seem to suffice. Examples such as (171) most resemble sentences that, in a language with relatively free word order, have been scrambled (i.e., rearranged) without sufficient pragmatic justification. It's possible to get a taste of this in English in e.g. *To the store, Floyd walked quickly*. The sentence is certainly not ungrammatical, but it requires a special context to be felicitous and would be odd out-of-the-blue.

So how to make sense of the similarity between pragmatically unmotivated scrambling and the effects in (171)? A number of researchers (those cited above, in fact) have suggested that what's going on is about focus.<sup>31</sup> On this view, adjectives that occur higher than the canonical order would dictate are simply focused—perhaps by occupying a specialized focus projection high in the extended NP—and as a consequence, are only felicitous in discourses in which it makes sense for the adjective to be focused. This would also account for why the odd sentences in (171) improve considerably if the first adjective is pronounced with focus intonation.

### 6.5 *What is it to be an adjective?*

A few words are in order about what it is to be an adjective. This is oddly ambiguous between being a syntactic and a semantic question. 'Adjective' is, after all, a syntactic category, whatever its semantic properties might be. Yet it would not have been possible for this chapter to concern itself with the semantics of adjectives if there were no correlation between the syntax and the semantics.

Ideally, any answer to the question of what it is to be an adjective would need to extend across languages, so we might look across languages in search of such an answer. As it turns out, there is some controversy over whether adjectives are even present in all languages at all—and the controversy is

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<sup>31</sup>Focus is the phenomenon that gives rise to truth-conditional differences primarily (in English) via prosodic prominence, in e.g. *Greta only TOUCHED Floyd*. vs. *Greta only touched FLOYD*. (See Rooth 1996 for an overview.)

complicated by uncertainty about the very issue we're trying to address (Dixon 1982, Déchaine 1993, Jelinek 1995, Demirdache & Matthewson 1996). It's hard to form a consensus on the distribution of adjectives across languages without a crosslinguistic definition of one.

It is here that it's natural to look to the semantics. This calls for great caution. The problem of whether the definitions of syntactic categories can legitimately make reference to semantic questions is an old one, and one that has been a bone of contention since before the 20th century (Newmeyer 1980). Even so, one might be tempted to throw caution to the wind and conjecture that adjectives can be defined crosslinguistically as the syntactic category that expresses gradable notions. It's certainly the prototypical category for that. But even within English, gradability is neither a necessary condition for being an adjective (some adjectives aren't gradable, like *prime* and *wooden*) nor a sufficient one (many non-adjectives are gradable, like *hate* and *idiot*). Some languages even seem to be lacking in grammatical machinery specialized for manipulating gradable meanings (Stassen 1985, 2006, Kennedy 2007a, Bochnak 2013b,a). That suggests that this may not be the firm crosslinguistic foundation we are looking for—or in any case, that many caveats and refinements will be necessary in spelling out an explicit theory built on this idea.

In his magisterial work on the nature of syntactic categories, Baker (2003) takes a different tack. He treats adjectives as the elsewhere-case among categories. Nouns and verbs have distinctive definitional properties, which he articulates in detail. As for adjectives:

What distinctive property do adjectives have that underlies their various morphological and syntactic characteristics? The strongest and most interesting answer to this question would be to say that there is nothing special about adjectives.

This memorably elegant formulation is dangerously close to claiming that adjectives would be most interesting by being boring. Of course, Baker only means this only in a syntactic sense, so perhaps this chapter has not been entirely a waste of time.

All things considered, though, there seems to be no easy resolution to the issue of what an adjective is and whether the semantics can help us figure it out. But whatever other accusations one might level at adjectives, it should at least be clear that one can't accuse them of failing to provide a wide array of puzzles and problems that are not primarily about gradability.

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