A TYPE-BASED APPROACH TO ADJECTIVAL DISTRIBUTION

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Most English adjectives can appear either prenominally or as predicates.

(1) a. the *red* rose

 b. Roses are *red*.

There are also adjectives that can appear only in one position or the other, but not in both:

(2) a. * the awake child

 b. The child is awake.

(3) a. the former president

 b. * The president is former.

The primary goal of this dissertation will be to address two questions that arise from this data. First, what is the relationship between prenominal *red* and predicative *red*? Second, what causes some adjectives, including *awake* and *former*, to be ungrammatical in prenominal and predicate positions, respectively?

To answer these questions, I will appeal to the theory of semantic types and posit a type-shifting operator that is always present when an adjective appears in predicate position. The vast majority of English adjectives, including *red*, can either occur in their basic form prenominally or combine with the operator to produce viable predicates. Adjectives like *awake* cannot occur without the operator and as such are restricted to predicate positions. Adjectives like *former*

can combine with the operator but the resulting predicates are ruled out by a constraint on trivial predication.

BIOGRAPHICAL SKETCH

Tova Friedman received a B.A. in Linguistics from Yale University in 2003.

This dissertation is dedicated to the memory of Dr. R. Peter Altman, 1934-2011.

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I am grateful to many people for their help and support during my time in graduate school, and I hope they know who they are.

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CHAPTER 1

THE DISTRIBUTION OF ENGLISH ADJECTIVES AND THEIR

SEMANTIC TYPES

1.1   Two Puzzles

Adjectives in English have three distinct patterns of syntactic distribution.[1] The first pattern is by far the most common, and I will call the adjectives that exhibit it Group I. These can appear either prenominally (in what is sometimes called 'attributive' position) or as predicates.

(4) a.   a *red* balloon

     b.   The ballon is *red*.

(5) a.   a *happy* dog

     b.   That dog seems *happy*.

(6) a.   a *helpful* suggetion

     b.   Your suggestion was *helpful*.

(7) a.   a *cruel* villain

     b.   The villain in the story is *cruel*.

(8) a.   an *intelligent* leader

     b.   Our organization needs a leader who is *intelligent*.

Group I distribution is characteristic of size adjectives like *big* and *small*, color adjectives like *red* and *blue*, and shape adjectives like *square* and *round*, along

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[1]There are many ways to categorize English adjectives, some of which would result in far more than three categories. The only criterion under consideration here is syntactic distribution.

with many others. These adjectives have properties discussed in the literature which will not be discussed directly here, for example gradability and the capacity to form comparatives (see, among many others, McConnell Ginet, 1973 and Kennedy, 1997). What is relevant here, and what determines membership in Group I, is syntactic distribution.

Group I adjectives present our first puzzle. How can the same lexical item occur in two such different positions without triggering a fatal type mismatch?

(9) **Puzzle 1:**

How do we reconcile the distribution of Group I adjectives with our theory of semantic composition?

The second distribution pattern is exhibited by a far smaller group of adjectives including, among others, *alleged*, *former*, *potential*, and *actual*. I will refer to these as Group II. Their distinguishing characteristic is that they appear only prenominally and are illicit in predicate position.

(10) a.   an *alleged* murderer

       b. * The murderer is *alleged*.

(11) a.   the *former* prime minister

       b. * That prime minister is *former*.

(12) a.   a *potential* outcome

       b. * This outcome is *potential*.

(13) a.   a *future* president

       b. * The fiftieth president of the United States is *future*.

(14) a.   an *utter* disaster

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b.   * The disaster wrought by a tornado can be *utter*

The Group II adjectives are also restricted from occurring with indefinite pronouns (as in 16), in contrast to Group I (as in 15).[2]

(15)   a.   Somebody *tall* must have left that there.

b.   Everything *interesting* has already been said.

c.   Anything *blue* will match this shirt.

d.   Nothing *good* ever happens on a Friday.

e.   Let's go someplace *fancy* for dinner.

(16)   a.   * Somebody *former* must have left that there.

b.   * Everyone *alleged* needs to get a lawyer.

c.   * Anything *actual* has to have come from somewhere.

d.   * Everything *potential* might one day come true.

e.   * Nothing *future* matters now.

The third distribution pattern is exhibited by very few adjectives in English, which I will call Group III. These appear only as predicates.[3]

(17)   a.   * the *asleep* boy

b.   That boy is *asleep*

(18)   a.   * He stood with *apart* legs.

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[2]For discussion of these and other indefinite pronoun constructions, see Larson and Marušič (2004) and Leu (2008).

[3]These adjectives, like those in Group I but unlike those in Group II, can also occur with indefinite pronouns.

(1)   a.   Nobody *alive* knows the answer.

b.   Anyone *asleep* will need to be woken up.

      b.   He stood with his legs *apart*.

(19)   a.   * I'm looking for work by an *alive* artist.

      b.   The artist whose work I'm looking for is *alive*.

(20)   a.   * The *awake* baby in the next apartment screamed all night.

      b.   The screaming baby in the next apartment was *awake* all night.

Asleep, *awake*, *alive*, and *apart* are examples of frequently used adjectives that belong to this group. Group III also contains a number of more antiquated forms, including *astir*, *adrift*, *akimbo*, and others. These adjectives have common morphology—they share the prefix *a*. Though I will not discuss the historical origins of the prefix, I will suggest below that it might be analyzed synchronically as an instantiation of an operator discussed here.

Groups II and III raise the second central question to be addressed: why do adjectives, which presumably constitute a single lexical category, have three different patterns of syntactic distribution?

(21) **Puzzle 2:**

    Why do some adjectives have different syntactic distribution from others?

My goal in this dissertation will be to address these two questions. To lay the groundwork, I will appeal to the theory of semantic types, assuming that syntactic distribution depends on the composition of nodes with appropriate semantic types, i.e. that a node will be distributionally viable in a given position (in a syntactic tree) if and only if its semantic type can combine compositionally with that of the position's sister node.

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1.2 The problem of Group I adjectives: flexible distribution

The two positions in which we find Group I adjectives require different semantic types in order to combine with adjacent nodes via function application. Without committing at this point to any particular types or syntactic structures for these adjectives, here is a set of configurations that serves to illustrate the structural difference between the two positions:

(22)   a.   Barney is a happy dog.

       b.   Barney is happy.

       c.   Barney is a dog.

(23)   a.

```
            IP
          /    \
     Barney     VP
              /    \
            is      DP
                   /△\
                  a happy dog
```

       b.

```
                IP
              /    \
           DP        VP
          /△\      /    \
        Barney   is      AP
                        /△\
                        happy
```

c.

```
              IP
        ┌──────┴──────┐
       DP            VP
      ╱  ╲         ┌──┴──┐
    Barney        is     NP
                        ╱  ╲
                       a dog
```
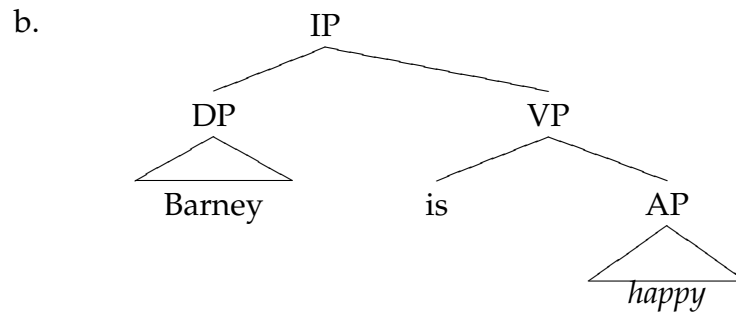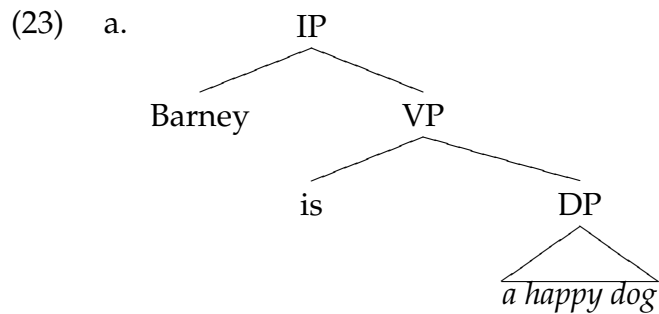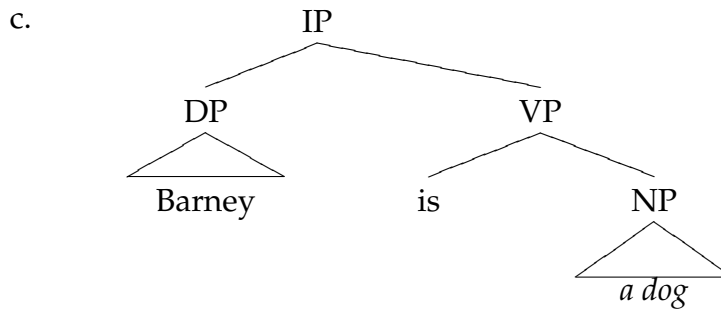
Assume, at least for now, that the copula is semantically vacuous (as do, e.g., Heim and Kratzer (1998) for sentences of this kind). In (23a), the Group I adjective *happy* combines with other material to constitute the sentence's VP, which then takes the subject, *Barney*, as its argument. In (23b), the (appparently) same lexical item, *happy*, must serve alone as the sole semantic content of the VP. In (23c), an NP without any adjective takes the same role, compositionally, that we have just seen occupied first by a noun with an adjective and then by a bare adjective. Since they are all able to serve as the full semantic content of the same node, the VP, apparently all three entities—the adjective + noun combination, the bare adjective, and the noun—must have the same semantic type. How is this possible? Assuming that all composition takes place via Function Application, how can the same lexical item, *happy*, have the type of a noun and simultaneously have a type that can combine with a noun? In other words, we would expect that any Group I adjective should be able to occur in only one of the two positions: either prenominally with a type appropriate for combining with nouns, or as a predicate with the same type that nouns have.

The behavior of Group II and III adjectives is less puzzling in this respect. Like other lexical items, each appears in a particular structural position that corresponds to a given semantic type.

To deal with the puzzle of Group I adjectival distribution, we must figure out what semantic type Group I adjectives have. Do they have the semantic type required for their prenominal position, or that required for their predicate position? Or is it possible that each Group I adjective is actually a pair of homophones with distinct types? This question has formed the basis of much investigation in previous literature. I will review two approaches which I ultimately reject and offer an instantiation of a third approach that I believe accounts for the facts while avoiding certain pitfalls of the other two. These three approaches, broadly construed, are as follows:

1. Approach Type 1: Some Group I adjectives have the prenominal type and others have the predicate type. Syntactic transformations allow Group I adjectives to appear in the position that is not appropriate for their type.

2. Approach Type 2: Group I adjectives have a semantic type that sometimes doesn't match their syntactic distribution, but a special compositional rule takes effect in such circumstances and type-mismatch is avoided altogether.

3. Approach Type 3: All Group I adjectives have the same semantic type, and a syntactic transformation allows them to appear in the position in which that type would normally be illicit.

The first approach is represented by the Doublet Theory of Siegel (1976). The second is familiar from Predicate Modification, a solution to the problem best known for its utilization by Heim and Kratzer (1998). In general, proposals that take the first approach are forced to make sometimes arbitrary decisions about which Group I adjectives have which type. If a Group I adjective can, in

principle, have either the prenominal or the predicate type, what is the determining factor in the choice? Predicate Modification (or any variation on the second approach) avoids this question by assigning all Group I adjectives the same type. On the other hand, it sidesteps the issue of type-mismatch not by putting forth any principled syntactic processes that solve the problem as it arises but by adding an entirely new compositional rule to our semantics that can seem ad hoc. I will choose the third option.

1.3   Approach 1: Varying Types with Syntactic Transformations

In this type of analysis, each Group I adjective has a semantic type that may or may not fit every syntactic position in which we find it. In instances where type mismatch would otherwise result from an adjective with a given semantic type occurring in the 'wrong' position, syntactic transformations rescue the structure.

1.3.1   Parsons (1971)

Parsons (1971), as characterized by Siegel (1976)[4], takes one variation on this approach. He divides Group I adjectives into two sub-groups, assigning members of one subgroup the type needed for prenominal position and members of the other the type needed for predicate position. The two lists are entirely disjoint: every adjective must be placed in exactly one of the two. A sample of these lists is in Table 1.1.[5]

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[4]I have been unable to procure a copy of Parsons' unpublished 1971 manuscript and have relied instead on Siegel's discussion of the work.

[5]Table 1 is constructed on the basis of my understanding of Siegel's discussion of Parsons's work, so it could easily misrepresent Parsons's actual categorization of some of the specific

List A	List B
carnivorous	large
sick	clean
parallel	big
portable	beautiful
nude	diligent
four-legged	large
angry	deep
infinite	red
drunk	white
rancid	blue
healthy	terrible
aged	original
nearby	plain

Table 1.1: Sample of Parsons (1971)'s division of Group I adjectives into two mutually exclusive lists

Parsons works in the original type system of Montague (1974). An adapted version, showing the types relevant to his and Siegel's proposals, is in Table 1.2.

Category	Type
IV:Intransitive Verb (= VP)	t/e
T:Term (= DP)	t/IV
CN (Common Noun Phrase)	t//e

Table 1.2: Semantic Types from Montague (1974)

The notation of semantic types is to be read as indicating that an entity of the type on the right of the slash(es) maps onto an entity of the type on the left. For example, the type written as *t/e* would be written in contemporary notation as $< e, t >$. Two categories that are semantically similar but syntactically distinct will have the same two types on their left and right sides, respectively, but will differ in the number of slashes. For instance, an intransitive verb has type *t/e*,

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adjectives listed. Since I will be objecting to Parsons's method of dividing adjectives into two categories and not to his categorization of any particular adjective, any deviations from the original categorization that might be discovered on inspection of the original work would affect the discussion only superficially.

but a common noun phrase has type *t//e*. Both take an individual (type *e*) as their argument and return a truth value (type *t*); i.e. both are one-place predicates. The difference in the number of slashes indicates that their syntactic features are distinct.

For Parsons and Siegel, the choice for Group I adjectives is between type t///e and type CN/CN. The former is a function from individuals to truth values; as such, it can form the sole semantic content of a VP. This is the type needed for adjectives in predicate position. The latter is a function from one Common Noun Phrase to another (in today's notation, $<< e, t >, < e, t >>$). It takes a noun and maps it to something that has the same type as the original noun, so that the resulting adjective + noun combination can stand in the same position as the original noun. This is the type needed for prenominal adjectives.

Parsons (1971) assigns some Group I adjectives type t///e and others type CN/CN even though they all appear in both positions. On his analysis, syntactic transformations occur whenever an adjective of type CN/CN appears in predicate position or one of type t///e appears prenominally. The criterion he uses to classify a given adjective as having one type or the other is intersectiveness.

Intersective adjectival modification picks out the intersection between the denotation of the noun and that of the adjective. For example, we could find the set of *carnivorous plants* by intersecting the set of *carnivorous* things with the set of *plant* things. In other words, the denotation of the phrase *carnivorous plant* would be as follows:

(24)   ⟦ carnivorous plant ⟧ = ⟦ carnivorous ⟧ ∩ ⟦ plant ⟧

Parsons assigns all intersective adjectives type t///e (list A in Table 1.1, above), and all non-intersective adjectives type CN/CN (list B in Table 1.1). An example of a non-intersective Group I adjective, for Parsons, is *large*. *Large*, and other adjectives like it, are taken to be non-intersective because of their behavior in the following inference pattern, in which they contrast with so-called intersective adjectives like *carnivorous* :

(25)   a.   The snake is a carnivorous animal.

     b.   The snake is a reptile.

     c.   *It follows that:* The snake is a carnivorous reptile.

(26)   a.   Barney is a large mouse.

     b.   Barney is a mammal.

     c.   *It does not necessarily follow that:* Barney is a large mammal.

If the inference pattern goes through, the adjective is classified as intersective. If it fails, it is taken to be non-intersective.

This test does not always yield clear results, as is evident from the well-known example of the *beautiful dancer* (Vendler, 1967). The phrase *beautiful dancer* is ambiguous: it can denote a person who is beautiful and who is a dancer (intersective) or a person who dances beautifully but is not necessarily beautiful (non-intersective). We can try using the test for intersection, but the results are inconclusive because of this ambiguity:

(27)   a.   Maria is a beautiful dancer.

     b.   Maria is a woman.

Depending on our interpretation of (27a), the following inference may or may not be valid:

(28)   Maria is a beautiful woman.

The assumption that every Group I adjective will either clearly pass the intersection test or clearly fail it is non-trivial, so the choice of intersection as the sole criterion for placement on a given list and assignment of semantic type seems dubious. But even if the adjectives divide cleanly as far as intersection, Parsons additionally requires that the two subgroups be clearly disjoint as far as other properties, as well. For example, all non-intersective adjectives are taken to be relative, while intersective adjectives are taken to be non-relative. A relative adjective is one that is interpreted relative to a comparison class determined in part by the noun it modifies. For example, a *skillful doctor* is interpreted as being skillful relative to a comparison class of doctors. Adjectives that are non-relative are said to be absolute.

For Parsons, properties of Group I adjectives divide as in Table 1.3:

Subgroup A	Subgroup B
type t///e	type CN/CN
intersective	non-intersective
absolute	relative
extensional	intensional
examples: four-legged, carnivorous	*examples:* red, big

Table 1.3: Properties of Group I adjectives that cluster together according to Parsons (1971)

This rigid correspondence between properties is difficult to maintain. For example, intersection and absoluteness do not always obviously go together. Returning to the *beautiful dancer*: even in the intersective reading (in which Maria

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is both beautiful and a dancer, but does not necessarily dance beautifully), it is hard to believe that *beautiful* is truly non-relative.

In addition to his dichotomous taxonomy for Group I adjectives Parsons needs syntactic transformation rules to account for the appearance of type t///e adjectives in prenominal position and type CN/CN adjectives in predicative position. These rules apply freely in his system and are necessary to account for many very commonplace uses of adjectives including, e.g., those in (29), in which a type t///e adjective occurs prenominally, and those in (30), in which a CN/CN adjective occurs as a predicate.

(29)   a. Dinosaurs were *carnivorous* animals.

b. I drew two *parallel* lines.

c. This highway feels like an *infinite* loop.

d. A *four-legged* table is more stable than a three-legged one.

(30)   a. My favorite t-shirt is *red*.

b. Autumn in this area can be *beautiful*.

c. I tried to move, but the pain was *terrible*.

d. That laundry is *clean*.

Parsons's transformation rules are as follows:

(31)   a. be a $[ADJ]_{CN/CN} \triangle_{dummy\ CN} \rightarrow$ be $[ADJ]_{t///e}$

b. NP_1 {*relative pronoun*} be $[ADJ]_{t///e} \rightarrow [ADJ_{CN/CN}\ NP_1]$

The rule in (31a) takes effect whenever an adjective of type CN/CN is required in predicate position (as in the sentences in 30). The adjective modifies a

dummy noun (notated with △) which is then deleted syntactically. For example:

(32)   This mouse is a large △ → This mouse is large

In combining with the dummy noun, the CN/CN adjective is able to form a node of the appropriate type for predicate position. In more contemporary terms, this rule effectively has an adjective of the prenominal type that appears in predicate position modifying a phonologically null nominal one-place predicate.

The rule in (31b) is a version of the standard reduced relative analysis of prenominal adjectives. In this analysis, which goes back to early generative grammar (at least as far as, e.g., Smith, 1961) and has been instantiated more recently by Kayne (1994), among others, a prenominal adjective results from raising of a reduced relative clause above the NP. For example:

(33)   This is an animal that is carnivorous → This is a carnivorous animal

Importantly, rule (31b) can apply to the output of rule (31a). This occurs whenever an adjective of type CN/CN appears in prenominal position but has an intersective reading. For example, the phrase *a good father* can be read in one of two ways: either to say that the person in question is good at being a father (non-intersective) or that he is both a good person and a father, while not necessarily good at fathering (intersective). For the latter reading, the derivation takes place in two steps, first using rule (31a) to turn a type CN/CN adjective into something of type $t///e$ and then using rule (31b) on the output of that first transformation to raise the adjective above the noun.

(34)   a. He is a good$_{CN/CN}$ father. *(non-intersective, prenominal)*

   b. He is a good △. *(by rule 31a; intersective, predicative)*

   c. He is a good △ father. *(by rule 31b; intersective, prenominal)*[6]

1.3.2   Siegel (1976)

Siegel (1976) takes the same basic type of approach as Parsons but makes one major modification. Instead of listing each Group I adjective exactly once on one of two mutually exclusive lists, she lists each Group I adjective twice, once with type CN/CN and once with type t///e. She acknowledges that this solution is not economical and is therefore not to be taken up unless analyses in which each of the adjectives is listed only once prove untenable. Her chief complaint against Parsons' analysis comes from a concern about the interpretation of adjectives in situations in which rule (31b) acts on the output of rule (31a), as above in (34). According to Siegel, this gives us a spurious interpretation for sentences like *He is a good father*. She agrees that the adjective in such a sentence can be read either intersectively or non-intersectively, but she points out that there is a difference in possible interpretations between the following two sentences.

(35)   a. He is a good father.

   b. That father is good.

(35b) can mean either that the individual in question is good at fathering, or that he is good in general (i.e. has a good character). Or, given the right context,

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[6]It is not clear to me how this structure is compositionally viable given that the dummy noun, although syntactically deleted after the application of both rules, is meant to be interpreted semantically.

it can mean that he is good at something else. For example, at a father-son soccer game someone might say the sentence in (35b) in reference to one of the adult players with the intention of commenting on his skills at the game. Siegel points out that this kind of three-way indeterminacy is not available in (35a).[7] In that sentence, the individual discussed can either be good at fathering or good in character, but the sentence cannot be used to mean that he is good at anything else (including, e.g., soccer), even in the right context. This troubles Siegel since, in order to interpret (35a) as meaning that the individual has a good character and is a father, we must use the intersective reading of *good*. As shown in (34) above, the structure of (35a) with intersective *good* contains a dummy noun:

(36)   He is a good △ father. *(by rule 31b; intersective, prenominal)*

If the dummy noun can be interpreted freely, Siegel argues, then in the right context we should be able to interpret (35a) to mean that the father is a good soccer player. But we can't.

Siegel, primarily on the basis of this concern, rejects Parsons's analysis and instead proposes what she calls the *Doublet Theory* of adjectives. Each Group I adjective is listed twice in the lexicon. One entry has type CN/CN and is

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[7]Siegel uses the term 'vagueness' rather than 'ambiguity' to refer to this precise kind of indeterminacy, reserving the term 'ambiguous' specifically to refer to the two-way ambiguity that we *do* get in (35a), to be discussed momentarily. The term 'vague' has been used with explicit meanings in the literature quite different from Siegel's. Kennedy (1997) uses it very specifically to refer to adjectives like *tall* and distinguishes these from what he calls 'indeterminate' adjectives, like *smart*. The difference is that the scale along which entities can be ordered by tall-ness is constant, regardless of context, but the ordering of the scale for smart-ness is subjective. If we call a person tall, we will mean to say different things depending on whether he is, e.g., a 'tall basketball player' or a 'tall third-grader'. We will select a different contextually determined comparison class to asses the validity of the statement. But the ranking of the individuals as far as their objective heights will not change. If we call a person 'smart', by contrast, then depending on context the ranking itself might shift: a given individual may be high on the 'smart' scale where math is concerned but lower on the scale where business acumen is in question, to give one example, so that a 'smart mathematician' might not also be a 'smart investor'.

prenominal and non-intersective in its base position. The other has type $t///e$ and is predicative and intersective in its base position. To account for the observation, also taken into account by Parsons, that both positions can have both intersective and non-intersective readings, she maintains the transformation rules that allow adjectives of a given type to move to the other position. What Siegel gains over Parsons is the ability to generate a sentence like (35a) in two different ways, one with an intersective reading (using the $t///e$ version of *good* and applying rule (31b)) and the other with a non-intersective reading (using the CN/CN version of the adjective), without having to derive the intersective version from a structure that includes a dummy noun.

(37) a. He is a good father (prenominal, non-intersective): $good_{CN/CN}$ in its base position

   b. He is a good father (prenominal, intersective): $good_{t///e}$ raised via rule (31b)

(38) a. That father is good (predicate, intersective): $good_{t///e}$ in its base position

   b. That father is good (predicate, non-intersective): $good_{CN/CN}$ derived with contextually interpreted dummy noun via rule (31a)

This is intended to produce the correct prediction that (35a) cannot be read to mean that the individual is good at, e.g., soccer. (37a) can mean only that the subject is good at fathering. (37b) can mean only that the subject is both good and a father, intersectively. These are now the only two readings available for (35a). (35b) is ambiguous between the readings in (38a) and (38b). (38a) means roughly the same thing as (37b): the father is good. (38b), on the other hand, can mean that the father is a good person, a good father, a good soccer player, etc.,

depending on the contextually-determined interpretation of the dummy noun. For Siegel, the difference in interpretive possibilities for the adjective in (37a) and that in (38b) warrants a four-way theory of Group I adjectives, in which both the intersective and non-intersective reading of each adjective can be either base-generated or derived.

Her analysis is summarized in Table 1.4:

Position	Intersective?	Type	Position Derived via Transformation?
Prenominal	no	CN/CN	no
Prenominal	yes	t///e	yes
Predicate	no	CN/CN	yes
Predicate	yes	t///e	no

Table 1.4: Four ways a Group I adjective can occur, according to Siegel (1976)

In some sense, Siegel's solution is a worst-case scenario. She needs complex syntactic transformations and two lexical entries for each Group I adjective. In addition to being uneconomical, her proposal might lead us to falsely predict speaker variation in the lexical entries for Group I adjectives. Why should it be, if each Group I adjective has two lexical entries, that every speaker of English has both in his or her lexicon? More importantly, both of these proposals address only the first puzzle raised above. They offer solutions to the problem of Group I adjectival distribution, but they have nothing to say about the restricted distribution of Group II and Group III adjectives.

1.4 Approach 2: Specialized Compositional Mechanisms

1.4.1 Predicate Modification

Predicate Modification (PM; Heim and Kratzer, 1998) takes the second approach listed above to the problem of assigning semantic types to adjectives. In PM, all Group I adjectives are assigned type et.[8] PM addresses the type problem that results whenever a Group I adjective occurs prenominally not via syntactic transformation but by adding a specialized compositional rule to the semantic system:

(39) Predicate Modification (from Heim and Kratzer, 1998): if α is a branching node, $\{\beta, \gamma\}$ the set of α's daughters, and $[\![\, \beta \,]\!]$ and $[\![\, \gamma \,]\!]$ are both in D_{et}, then $[\![\, \alpha \,]\!] = \lambda x_e.\ [\![\, \beta \,]\!](x) = [\![\, \gamma \,]\!](x) = 1$.

Predicate Modification follows the intuition that many adjectives behave intersectively. Following is an illustration of how it works. (As mentioned above, Heim and Kratzer take both the copula and the indefinite article to be vacuous in sentences like (40a).)

(40) a. Susan is a beautiful woman.

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[8]I will use et as shorthand for $< e, t >$.

b.

IP
├── Susan
└── I′
    ├── is
    └── NP (-def)$_{et}$
        ├── AP$_{et}$
        │   └── beautiful
        └── NP$_{et}$
            └── woman
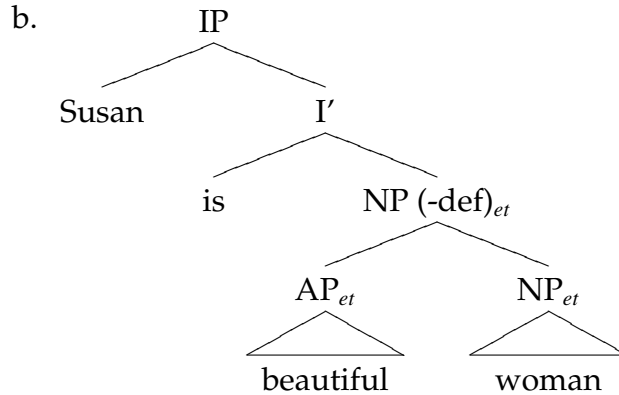
c. ⟦ Susan is a beautiful woman ⟧ = ⟦ beautiful woman ⟧(⟦ Susan ⟧)

⟦ Susan ⟧ = Susan

⟦ beautiful woman ⟧ = λx_e.⟦ beautiful ⟧(x) = ⟦ woman ⟧(x) = 1

⟦ beautiful ⟧ = λx. x is beautiful

⟦ woman ⟧ = λx. x is a woman

⟦ beautiful woman ⟧ = $(\lambda x_e$. x is beautiful = 1$)$ ∧ (x is a woman = 1)

⟦ beautiful woman ⟧ = λx_e. x is beautiful and x is a woman

⟦ beautiful woman ⟧(⟦ Susan ⟧)

= λx_e. x is beautiful and x is a woman (Susan)

= 1 iff Susan is beautiful and Susan is a woman

The truth conditions derived using Predicate Modification match our intuitions about the meaning of the sentence: that it is true if and only if Susan is both beautiful and a woman. PM also avoids the need that arises in analyses like Parsons's or Siegel's for specific transformation rules to help move adjectives between prenominal and predicate positions. With PM, the same type can appear in both positions with no problem.

PM is a useful tool that has been widely adopted, but it requires that we abandon Frege's Conjecture that all semantic composition is function applica-

tion. Instead of the elegant notion that structures are interpreted via a single mechanism, adding an ad hoc mechanism to solve a specific problem leaves us with a system in which most— but not all— composition is function application. PM also raises non-trivial concerns about the relationship between syntactic structure and semantic composition, since it is a mode of combining syntactic nodes that does not correspond to semantic saturation.[9]

In addition to the theoretical concerns it raises, PM makes false empirical predictions. It should allow for any two elements of type *et* to combine, but it can apparently be implemented *only* to deal with prenominal adjectives. Otherwise we would expect to see items of type *et* combining freely in the grammar via PM, which we don't. Most elements of type *et*, including NPs and VPs, cannot combine with other items of the same type:

(41) a. i. * John swims runs.

        ii. John swims and runs.

    b. i. * John likes fruit hates vegetables.

---

[9]Leaving Frege's Conjecture might be less unappealing if there were other instances in which additional compositional mechanisms seemed to be indicated. Kratzer (1996) suggests a mechanism very like PM, which she calls 'Event Identification', that combines an Agent position with a VP when both are associated with the same event. Like PM, Event Identification relies on intersection:

(1) Kratzer's Event Identification:
$[\![\ \text{Agent}\ ]\!] = \lambda x_{individual}.\lambda e_{event}.[Agent\ (x)\ (e)]$
$[\![\ \text{VP}\ ]\!] = \lambda e_{event}.[V\ (NP_{object})\ (e)]$
$[\![\ \text{Agent}\ ]\!]([\![\ \text{VP}\ ]\!]) = \lambda x.\lambda e.[Agent\ (x)\ (e)\ \wedge\ V\ (NP_{object})\ (e)]$

Chung and Ladusaw (2006) take the argument that other compositional mechanisms are called for even further. They look at evidence of object doubling in Chamorro and claim that in addition to function application and PM (their 'Modify') there is an additional compositional mechanism (labeled 'Restrict') that restricts the domain of a function's argument without saturating the argument position. (In the Chamorro case, this allows the incorporated object to restrict the domain of the predicate without saturating it; saturation then takes place via function application when the predicate combines with the full DP object.)

ii.   John likes fruit and/but hates vegetables.

c. i.   * He is an old friend respected colleague.

ii.   He is an old friend and respected colleague.

And although adjectives do stack one on top of another prenominally, they cannot stack in predicate position. Instead, like those in (41), such configurations require conjunction:

(42)   a.   I could use a hot nutritious meal.

b.   * I could use a meal that is hot nutritious.

c.   I could use a meal that is hot and nutritious.

(43)   a.   I love looking at old Chinese vases.

b.   * The vases in this display are old Chinese.

c.   The vases in this display are old and Chinese.

(44)   a.   There are some warm bulky blankets in the closet.

b.   * Down blankets are typically warm bulky.

c.   Down blankets are typically warm and bulky

PM thus introduces a new composition rule that is too powerful without properly constraining it.
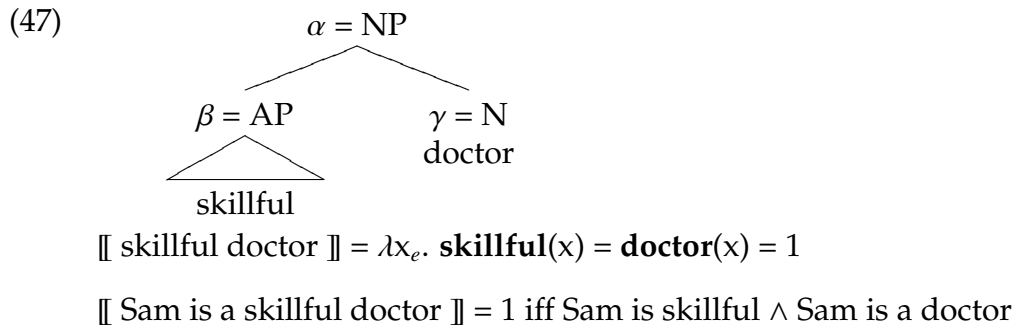
Third, PM provides too strictly an intersective reading for prenominal adjectives. It fails to account for the non-intersective readings of sentences like (35a), repeated here:

(45)   He is a good father.

PM does not directly address the ambiguity of the sentence between a reading where the subject is both good and a father (intersective) and where he is good at fathering (non-intersective). For many adjectives, the non-intersective reading, which PM doesn't account for, is more salient than the intersective reading, which it does. For example, (e.g. *skillful*) in the following sentence does not invite a strictly intersective interpretation.

(46)   Sam is a skillful doctor.

Applying Predicate Modification, we predict that *x is a skillful doctor* should mean that 'x is skillful' and 'x is a doctor' are both true:

(47)

$$\alpha = \text{NP}$$

$\beta = \text{AP}$ $\gamma = \text{N}$

skillful   doctor

$[\![$ skillful doctor $]\!] = \lambda x_e.$ **skillful**$(x) = $ **doctor**$(x) = 1$

$[\![$ Sam is a skillful doctor $]\!] = 1$ iff Sam is skillful $\wedge$ Sam is a doctor

The most salient interpretation of the sentence is that Sam is skillful at doctoring. In such a case, it is very possible that he is skillful at doctoring but terrible at many other things, so that he does not possess the properties denoted by *skillful* and *doctor* independently. But the truth value of $[\![$ *y is a skillful doctor* $]\!]$ that we get by using PM does not match this more salient reading of the sentence. Instead it indicates that Sam is both a skillful individual and a doctor. Instead of the strictly intersective interpretation of PM, the usual reading of the sentence requires that *skillful* have a subsective reading, relativized to the modified noun.

23

If we wished to implement PM without running into these pitfalls, we could start by offering a syntactic explanation for the failure of adjectives to stack in predicate position, perhaps along the lines of the restriction on linearizing adjacent elements of the same syntactic category discussed in Richards (2006). Richards proposes the following constraint on Kayne (1994)'s LCA:

(48)   Richards (2006) Distinctness Condition:

　　　　If a linearization statement $< \alpha, \alpha >$ is generated, the derivation

　　　　crashes.

This distinctness condition is shown to apply when two nodes with the same label occur within the same phase in an asymmetric c-command relationship, and could perhaps be extended to account for the data in (41) and (42) above.

We could also help address the problem, noted explicitly by Heim and Kratzer (1998), that arises from making all adjectives intersective: a standard *et* lexical entry for, e.g., a size adjective like *small* does not make any reference to a comparison class determined by the modified noun, even though a *small elephant* might still be a large animal. To maintain PM as designed we need adjectives like *small* to have type *et*, but we can build an intensional, relativized semantics into our lexical entries for the adjectives themselves without changing the type. This would look something like:

(49)   ⟦ small ⟧ = λx. x is small relative to C, *where C is a contextually determined comparison class*

This modification will also help us derive non-intersective readings of adjectives like *skillful* and *beautiful*, as discussed above, even with PM.

Regardless of any modifications or additions to PM that we might make to solve the stacking and intersection problems, though, it is ultimately untenable to use PM in any form for modal adjectives like *former* and *alleged* (as Heim and Kratzer also point out). Type *et* cannot be right for these adjectives: if it were, they should have no problem in predicate position. Furthermore, even in prenominal position and using a contextually determined comparison class C, a *former senator* on the PM analysis turns out to be a person who is a senator and who is former relative to C, which makes little sense. Thus PM, like the first approach taken by Parsons (1971) and then Siegel (1976), addresses on the first half of our puzzle. It gives us no handle on why adjectives in Group II and Group III behave differently from those in Group I and no insight into their behavior.

1.4.2 'Inverse' PM and the *glob* problem

PM is only one way of implementing the second general approach listed above to the Group I distribution problem. We could devise a PM-type approach that lists all Group I adjectives with the prenominal type instead of the predicate type. Instead of a special composition rule to explain *This is a red rose*, we'd now need a special composition rule to explain *The rose is red*. The ban on adjective stacking in predicate position would no longer pose a challenge. Instead, the question would be how an adjective like *red* can ever sit (alone) in predicate position.

I will not pursue this sub-approach further here, except to note that this type of solution would lose one major advantage of PM as formulated above. In

assigning all adjectives the predicate type (*et*, or t///e), PM avoids a problem faced by any proposal assigning the prenominal type (<*et,et*>, CN/CN, etc.) to at least some adjectives. This problem has been pointed out by Heim (1999a), and I will take her example and refer to it as the *glob* problem.

The problem is as follows: if at least some adjectives can take one one-place function from individuals to truth values and return another of the same type, why don't we see any adjectives like the hypothetical *glob* in the following sentence?

(50) John is a *glob* books.

Intended meaning: John likes books

Where the lexical entry for *glob* is:

(51) ⟦ glob ⟧ = λF_{et}. λx_e. $\forall y_e$ s.t. $F(y) \rightarrow$ x likes y.

In other words, once we allow some functions of this semantic type to serve as adjectives, how can we constrain the set of possible adjectives to keep out those which we never find in natural language?

PM, despite its drawbacks, does avoid the *glob* problem. Neither Parsons nor Siegel avoids the problem—they both assign the prenominal type to at least some adjectives—but neither addresses it, either.

1.5 The Third Option

I will pursue the third approach, listing each adjective (from any of the three groups) exactly once in the lexicon with a specific semantic type. All Group I and Group II adjectives will be listed with the prenominal type. Group I adjectives in predicate position will be derived via a syntactic process that is also viable for Group II adjectives. The resulting structures, however, will be ruled out in a principled way whenever the adjective involved is a member of Group II. Group III adjectives will be listed with the predicate type, though it is possible that their shared morphology is a fixed phonological representation of the same syntactic process that allows Group I adjectives to occur as predicates.

1.6 General Shape of the Dissertation

In the next chapter, I will lay out the details of my proposal and demonstrate its implementation for all three adjective groups. I will then present a series of challenges to the basic proposal and lay out my approach to each. Chapter 3 will deal with the *glob* problem, as just described (which I must address given the choices I make) and will discuss other logical properties of adjectives. Chapter 4 will implement the proposal on non-English data, specifically Greek Determiner Spreading, in which Group II adjectives are again illicit in predicate position.

CHAPTER 2

TYPE-SHIFTING IN PREDICATE POSITIONS

2.1 Assumptions about semantic types

The first step towards using type theory to explain the syntactic distribution of adjectives will be to clarify my assumptions about what semantic type(s) English adjectives have.

My assumptions about lexical entries and semantic types in general are as follows. First, I assume that a lexical entry is a lambda expression that has a specific semantic type corresponding to its formulation. Second, I assume that type-shifting can take place via composition (function application) with other syntactic objects that may be phonologically null.[1]

So what semantic types are needed for the two different positions in which Group I adjectives appear? I offer the following as working syntactic representations of the sentences in (22) from the previous chapter, repeated here in (52).[2] Nouns have type *<e,st>*: they are functions from individuals to sets of possible worlds. I will use *v* (nu) as shorthand for *<e,st>* here and throughout.

(52)   a. Barney is a dog.

---

[1]Although the analysis here relies heavily on semantic types and their ability to combine to create higher and lower types, it does not employ 'type-shifting' in the original sense of Partee and Rooth (1983) and Partee (1987). Instead, it is a proposal in which a syntactic head alleviates a potential type-mismatch. Nonetheless, like type-shifting operators I assume that the operator used here may be language specific and/or phonologically null.

[2]Since a semantic analysis of the indefinite article is not relevant to the present discussion, I follow Heim and Kratzer (1998, p. 61) in assuming that the indefinite article is vacuous with predicate nominals like the ones here. As before, and also following Heim and Kratzer, the copula will also be treated as semantically vacuous.

b. Barney is a happy dog.

c. Barney is happy.

(53) a.

```
            IP
          /    \
        DP      I′
       /\      /  \
   Barney   is    NP_{-def}
                   /\
                  dog
```

b.

```
              IP
            /     \
          DP       I′
         /\       /  \
     Barney    is    NP_{-def}
                     /      \
                   AP        NP
                  /\        /\
               happy      dog
```

c.

```
            IP
          /    \
        DP      I′
       /\      /  \
   Barney   is    AP
                  /\
               happy
```
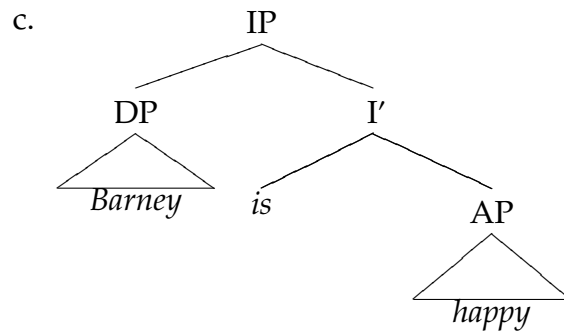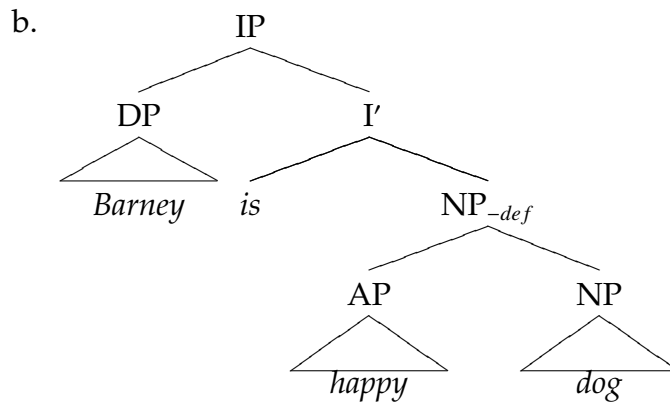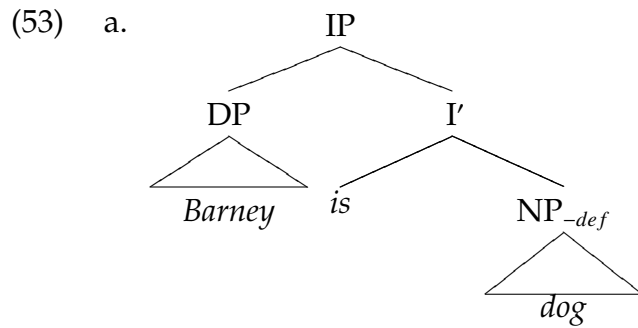
The nominal predicate in (52a) has type v.

(54)

```
              IP
          ╱        ╲
        DP          I′
       ╱  ╲       ╱    ╲
   △           is        NP_v -def
  Barney                    ╱╲
                           dog_v
```
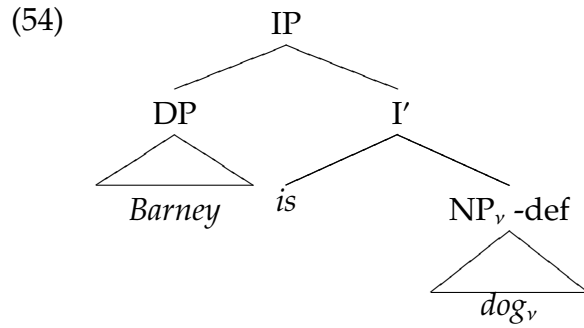
Since a prenominal adjective + noun combination can appear in the same
position as a noun, as in (52b), that combination must also have type *v*.

(55)

```
                 IP
             ╱        ╲
           DP           I′
          ╱  ╲        ╱    ╲
      △             is       NP_v -def
     Barney                 ╱        ╲
                          AP           NP
                         ╱╲            ╱╲
                       happy          dog
```
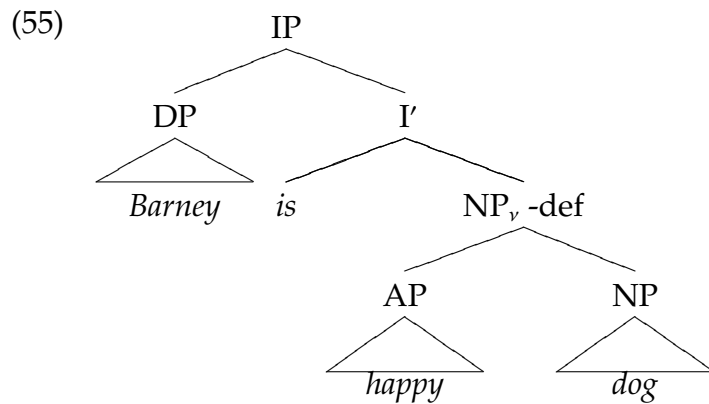
As such, and allowing no other compositional procedures than function ap-
plication, I assume that prenominal adjectives must have type $< v, v >$.

(56)

```
                 IP
             ╱        ╲
           DP           I′
          ╱  ╲        ╱    ╲
      △             is       NP_v -def
     Barney                 ╱        ╲
                      AP_{<v,v>}       NP_v
                        ╱╲            ╱╲
               happy_{<v,v>}         dog_v
```
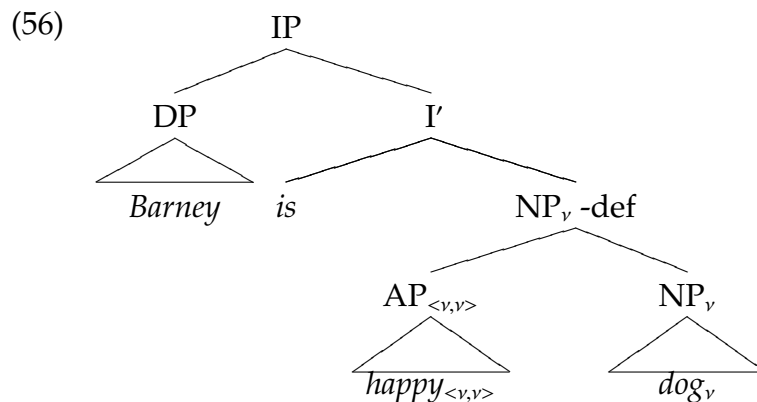
This will also work for sentences with more than one adjective stacked above

a noun: the lower adjective will take the noun as its argument, producing a node of type v, which will then serve as the argument of the higher adjective. This can continue recursively, which is appropriate since there is no apparent grammatical limit on the number of adjectives which can appear above a noun.[3]

(57)

IP
- DP
  - *Barney*
- I′
  - *is*
  - NP$_v$ -def
    - AP$_{<v,v>}$
      - *happy*
    - NP$_v$
      - AP$_{<v,v>}$
        - *young*
      - NP$_v$
        - *puppy*

---
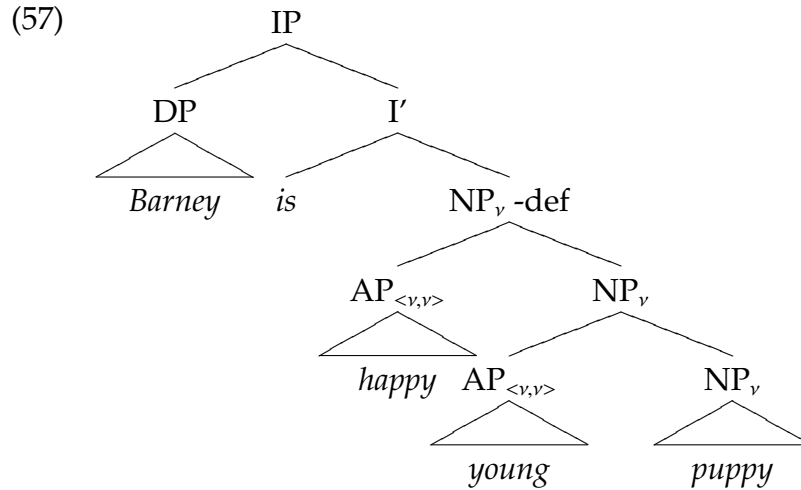
[3]See Sproat and Shih (1988) for a discussion of ordering restrictions on prenominal modification.

(58)

IP
- DP
  - Barney
- I′
  - is
  - NP$_v$ -def
    - AP$_{<v,v>}$
      - happy
    - NP$_v$
      - AP$_{<v,v>}$
        - young
      - NP$_v$
        - AP$_{<v,v>}$
          - brown
        - NP$_v$
          - puppy
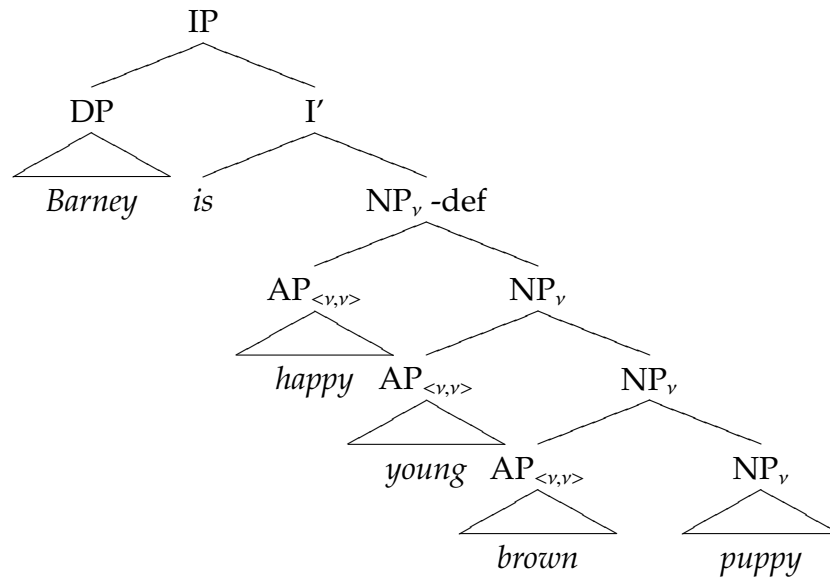
The adjective *happy*, along with all other Group I adjectives by definition, can also appear alone in the position of the predicate, as in (52c). We have already concluded that the node occupying that position must have type *v*. But we have also stated that the lexical entry for the adjective has type $< v, v >$.

(59)   a.

IP
- DP
  - Barney
- I′
  - is
  - AP$_v$
    - happy

b.

```
                        IP
              ┌──────────┴──────────┐
             DP                     I′
          ┌───┴───┐          ┌──────┴──────┐
        Barney      is                     AP
                                      ┌─────┴─────┐
                                   happy_{<v,v>}
```
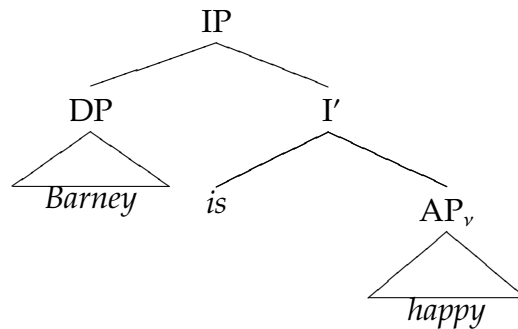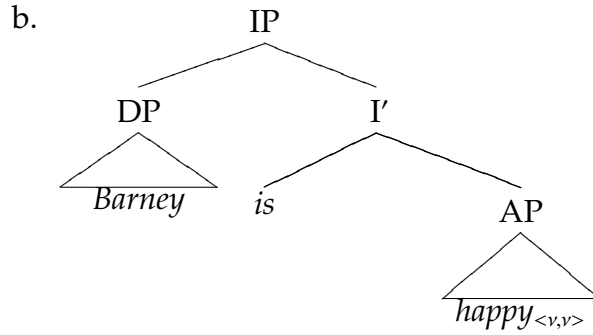
How can we reconcile these two observations?

What I propose is a syntactic object, which I will refer to as an operator (Op), that combines with the adjective and outputs a denotation of the simpler predicate type v. In effect, this allows an adjective of type $< v, v >$ to occupy a predicate position by overcoming the contradicting type requirements illustrated in (59)

In the next section I will show how this operator works.

2.2 Proposal part I

2.2.1 Semantic type of the operator

What should the operator look like? There are two possibilities regarding its semantic type. Let's assume a simplified tree for the English sentence *Barney is happy*, which has an adjective as predicate:

(60)

```
              IP
           ╱      ╲
     Barney         I'ᵥ
                  ╱      ╲
                is         AP
                          ╱╲
                      happy₍ᵥ,ᵥ₎
```
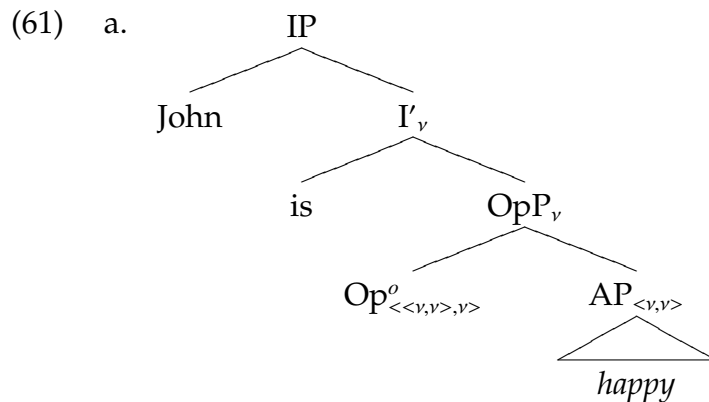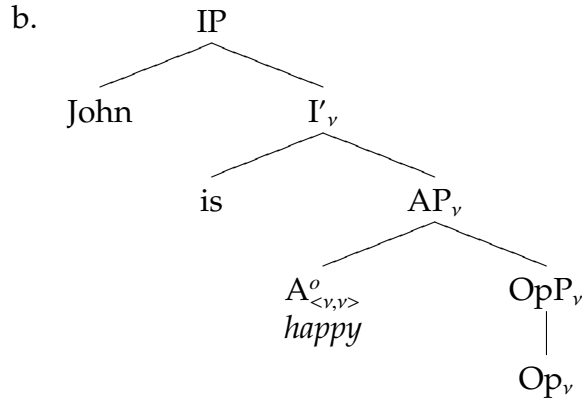
(60)

$$
\begin{array}{c}
\text{IP} \\
\text{Barney} \qquad \text{I}'_v \\
\text{is} \qquad \text{AP} \\
\text{happy}_{<v,v>}
\end{array}
$$
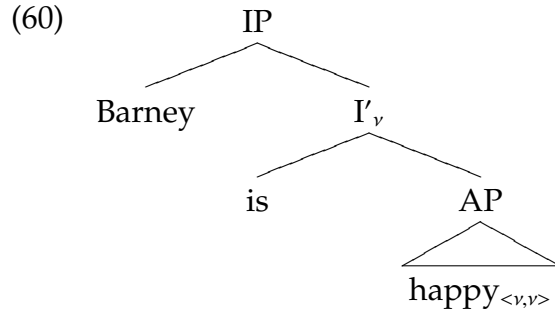
We know that I' has type v, since it combines with an individual of type e to form a proposition. If the AP *happy* has type $< v, v >$ (and assuming the copula is semantically vacuous), our type-shifting operator must combine with the adjective and have either type v or type $<< v, v >, v >$, depending on whether the adjective is a function with the operator as its argument or vice versa.

Both options for the operator—taking the adjective as its argument or serving as the argument of the adjective—are plausible. The respective structures look something like this:

(61)   a.

$$
\begin{array}{c}
\text{IP} \\
\text{John} \qquad \text{I}'_v \\
\text{is} \qquad \text{OpP}_v \\
\text{Op}^o_{<<v,v>,v>} \qquad \text{AP}_{<v,v>} \\
\textit{happy}
\end{array}
$$

b.

To decide between the two, I will use the following lexical entries, one for the adjective *happy* and one each for each possible version of the operator:

(62)   a. ⟦ happy ⟧ = $\lambda F_v.\lambda x_e.\lambda w_s.\ F(x)(w)$ and x is happy in w^4

       b. ⟦ Op$_{argument}$ ⟧ = $\lambda y_e.\lambda v_s.\ 1$

       c. ⟦ Op$_{function}$ ⟧ = $\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y_e.\lambda v_s.1)(x)(w)$

If the Operator is an argument of the adjectival function, as in (61b), we have this derivation:

(63)   ⟦ happy ⟧(⟦ Op$_{argument}$ ⟧)

      $= [\lambda F_v.\lambda x_e.\lambda w_s.\ F(x)(w)$ and x is happy in w] $(\lambda y_e.\lambda v_s.\ 1)$

      $= \lambda x_e.\lambda w_s.\ [\lambda y_e.\lambda v_s.1](x)(w)$ and x is happy in w

      $= \lambda x_e.\lambda w_s.1$ and x is happy in w

If the Operator is a function with the adjective as its argument, as in (61a), we have the following derivation:

---

[4]As discussed above, the adjective's lexical entry should make some reference to a contextually determined comparison class, which I will ignore for the sake of simplicity here since it does note affect the current discussion.

(64) ⟦ Op$_{function}$ ⟧ (⟦ happy ⟧)

=[$\lambda A_{v,v}.\lambda x_e.\lambda w_s.$ A($\lambda y.\lambda v.$1)(x)(w)] ($\lambda F_v.\lambda x_e.\lambda w_s.$ F(x)(w) and x is happy in w)

= $\lambda x_e.\lambda w_s.$[$\lambda F_v.\lambda x._e\lambda w_s.$ F(x)(w) and x is happy in w]($\lambda y.\lambda v.$1)(x)(w)

=$\lambda x_e.\lambda w_s.$ [$\lambda x_e.\lambda w_s.$1 and x is happy in w](x)(w)

= $\lambda x_e.\lambda w_s.$1 and x is happy in w

As we can see from the identity of the bottom lines in the two derivations, the outcome is the same whether Op is a function or an argument. At this point I can argue for no particular advantage to either choice, and I will choose arbitrarily to take the operator as a function with the AP as its argument.

2.2.2   Form of the operator

Our operator will be a syntactic head that takes an adjective of type $< v, v >$ and returns a predicate of type v. Thus its semantic type will be $<< v, v >, v >$.

(65) Type-Shifting Operator for Adjectives:

⟦ $Op_{<<v,v>,v>}$ ⟧ = $\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y_e.\lambda v_s.$1)(x)(w) = 1

Note that the function A takes as its argument a trivial function of type v ($\lambda y_e.\lambda v_s.$1). This allows for a freedom of interpretation for adjectives in predicate position that is desirable. For example, in the sentence *Barney is happy*, we do not know whether Barney is a happy dog, a happy pet, a happy individual, etc. The choice may be contextually determined, but it is not encoded directly in the semantics. Thus the operator does semantic work beyond just giving us

the right type for an adjective in predicate position: it has the desirable effect of neutralizing the v (noun-type) function modified by the adjective.

2.3   Implementation

2.3.1   Testing the Operator

To see how the operator works, let us examine the derivations I propose for the following set of sentences.

(66)   a.   John is a happy man.

      b.   John is happy.

      c.   John is an alleged murderer.

      d.   * John is alleged.

Working lexical entries for the adjectives and nouns in the examples follow.

(67)   a.   [[alleged]] = $\lambda F_v.\lambda x_e.\lambda w_s.\exists a\ \forall w'\ wR_aw'\ \rightarrow\ F(x)(w')$

      b.   [[happy]]= $\lambda G_v.\lambda x_e.\lambda w_s.G(x)(w)$ *and x is happy in w*[5]

      c.   [[John]] = **John**

---

[5]In fact this adjective and others like it should have some reference to context built into the lexical entry so that the adjective is evaluated relative to a contextually determined comparison class, as discussed in Chapter 1 in connection with Predicate Modification. The form of the lexical entry, then, should look more like this:

(1)   [[happy]]= $\lambda G_v.\lambda x_e.\lambda w_s.$ G(x)(w) and x is happy in w as determined from the ordering of a contextually relevant comparison class C

I will omit further mention of comparison classes at this point, keeping things as simple as possible to highlight the behavior of the operator, and return to the role of context in adjective meanings below.

d. ⟦ man ⟧ = $\lambda x_e.\lambda w_s.x$ *is a man in w*

e. ⟦ murderer ⟧= $\lambda x_e.\lambda w_s.w$ *is a murderer in w*

f. ⟦ $Op_{<<v,v>,<v>}$ ⟧ = $\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y_e.\lambda v_s.1)(x)(w)$

The lexical entry for *alleged* appeals to an accessibility relation R_a that allows us to access the set of possible worlds consistent with all the allegations made by an individual *a* in the base world. That part of the entry can be read as 'for all worlds *w'* such that *w'* is consistent with the allegations of the individual *a* in the base world *w* ...'. I will treat the accessibility relation as an unexamined tool that does the work of retrieving relevant possible worlds. Lexical entries for other Group II adjectives discussed below will also rely on this kind of access to a relevant set of possible worlds.

2.3.2 Operator with Group I adjectives

Our first task is to compute sentence (66a), repeated here:

(68)   a. John is a happy man.

b.

```
                    IP
            ┌───────┴───────┐
           DP              I'ᵥ
          ╱John╲       ┌────┴────┐
                       is      NPᵥ -def
                            ┌─────┴─────┐
                          AP₍ᵥ,ᵥ₎        NPᵥ
                          ╱happy╲        ╱man╲
```
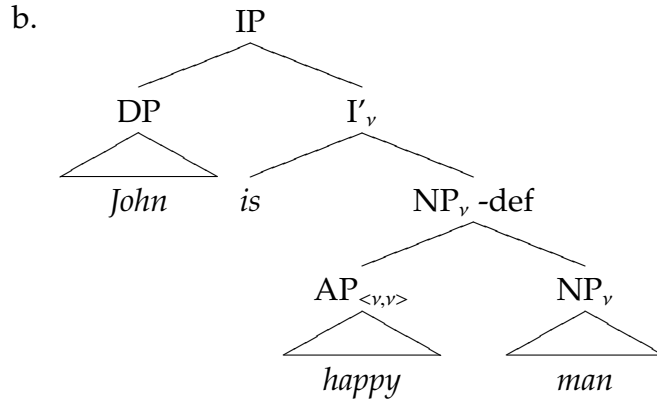
The noun *man*, of type v, combines with *happy*, which has type $< v, v >$, forming a predicate of type v.

(69) ⟦ happy ⟧(⟦ man ⟧)

= $\lambda G_v.\lambda x_e.\lambda w_s.G(x)(w)$ *and x is happy in w* $(\lambda x_e.\lambda w_s.x\ is\ a\ man\ in\ w)$

= $\lambda x_e.\lambda w_s.$ x is a man in w and x is happy in w

⟦ happy man ⟧(⟦ John ⟧) =

$\lambda w.$ John is a man and John is happy in w

The sentence turns out to be true in a world w iff John is a man and John is happy in w, the correct truth condition according to our intuitions.

For (66b), Op takes the adjective *happy* as its argument, producing a predicate of type v that can then combine with the subject of the sentence, *John*.

(70) a. John is happy.

b.
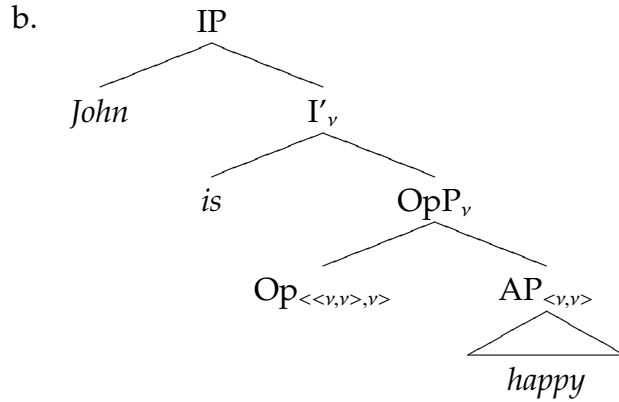
    c. ⟦ Op ⟧(⟦ happy ⟧)

$= \lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y_e.\lambda v_s.1)(x)(w)$ $([\lambda G_v.\lambda x_e.\lambda w_s.G(x)(w) \text{ and } x \text{ is happy in } w])$

$= \lambda x_e.\lambda w_s.[\lambda G_v.\lambda x_e.\lambda w_s.G(x)(w) \text{ and } x \text{ is happy in } w] (\lambda y_e.\lambda v_s.1)(x)(w)$

$= \lambda x_e.\lambda w_s.1 \text{ and } x \text{ is happy in } w$

⟦ Op happy ⟧(⟦ John ⟧) $= \lambda w_s. 1$ and John is happy in w

The sentence is thus true iff '1 and John is happy'. The first conjunct in the truth condition is trivial: the operator has effectively combined with the adjective to produce a predicate of the expected semantic type (v) without affecting the interpretation of *happy*. As we would expect given our intuitions about the sentence, John could be a happy man, a happy father, a happy baseball player, or just a happy individual.

Before illustrating the interaction of Op with Group II adjectives, I will digress to talk about where precisely the operator occurs in the syntactic structure of a slightly more complex sentence.

2.4 Structure

2.4.1 Stacking

As discussed in chapter 1 in connection with predicate modification, one of the distributional facts about adjectives that must be accounted for is that they can stack prenominally but not in predicate position. The data are as follows:

(71)   a.   John is a tall happy man.

        b.   * John is tall happy.

        c.   John is tall and happy.

(71a) shows stacked prenominal adjectives. (71b) shows the ungrammatical result of trying to stack the same two adjectives in predicate position. If we wish to use both adjectives as predicates, we must conjoin them, as in (71c).

How does the ungrammaticality of (71b) work under the current proposal, and can it tell us anything about the syntactic position of Op? I will consider three plausible structures for the sentence, each placing the operator in a different position.

Option 1

The first structure has only one operator for the two adjectives, dominating both APs.

(72)

```
                 IP
          ┌──────┴──────┐
        John            I′
                 ┌───────┴───────┐
                is              OpP
                                 │
                                Op′
                         ┌───────┴───────┐
                        Op°             AP!
                                 ┌───────┴───────┐
                              AP_{<v,v>}        AP_{<v,v>}
                              ╱╲               ╱╲
                             tall             happy
```
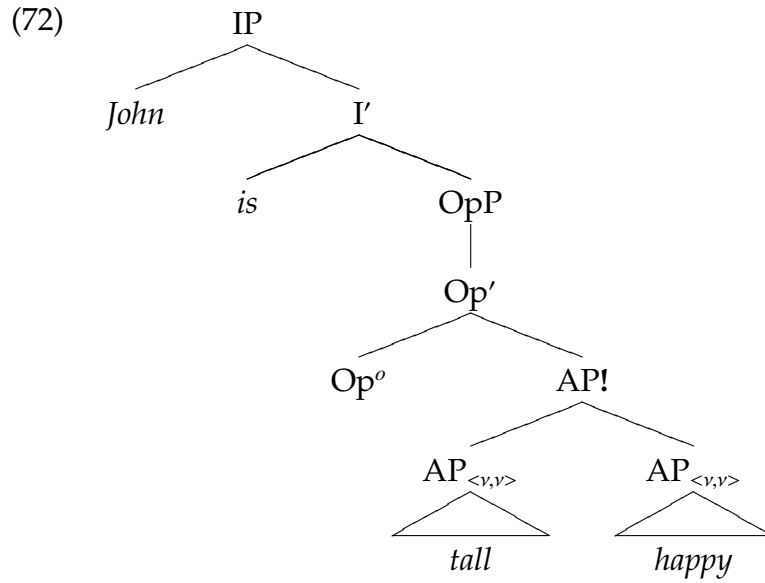
Here stacking is already ruled out via a type mismatch (indicated by **!**), so it is impossible to conclude anything new about the position of the operator.

Option 2

The third option uses two operators, each one combining with a single adjective:

(73)
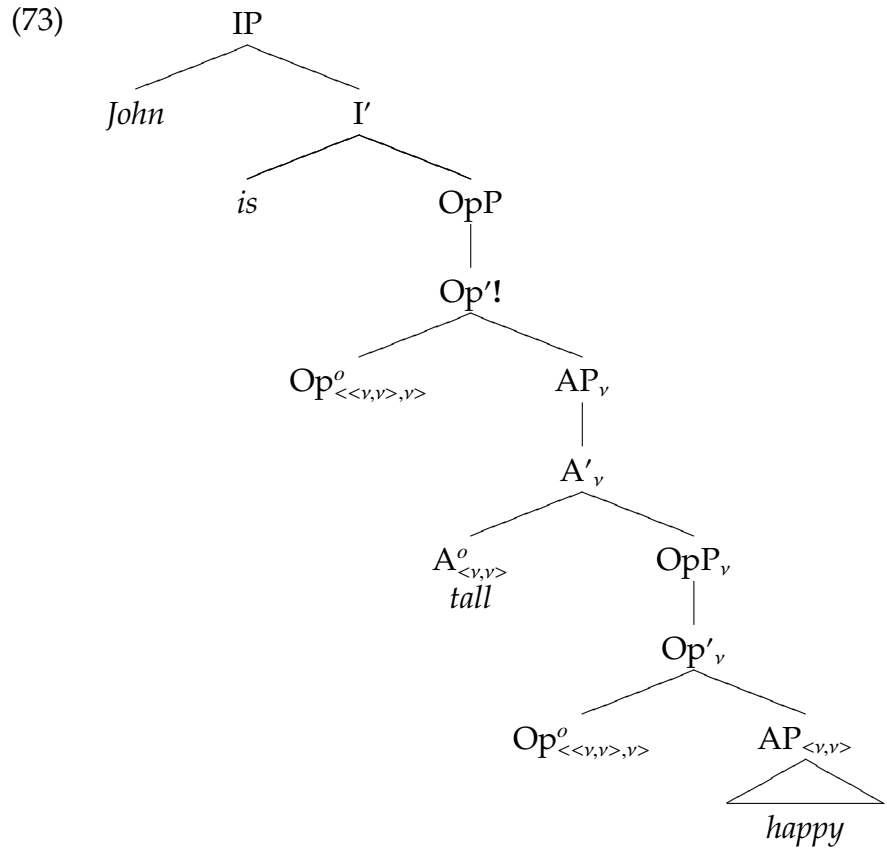
Again, the sentence crashes due to type mismatch (indicated by **!**) .

Option 3

The second structure has one operator again, this time with one of the APs in its specifier and another as its complement.

(74)

$$
\begin{array}{c}
\text{IP} \\
\diagup \quad \diagdown \\
\textit{John} \qquad \text{I}' \\
\diagup \quad \diagdown \\
\textit{is} \qquad \text{OpP}_v \\
\diagup \quad \diagdown \\
\text{AP}_{<v,v>} \qquad \text{Op}'_v \\
\diagup \quad \diagdown \\
\textit{tall} \quad \text{Op}^o_{<<v,v>,v>} \qquad \text{AP}_{<v,v>} \\
\textit{happy}
\end{array}
$$
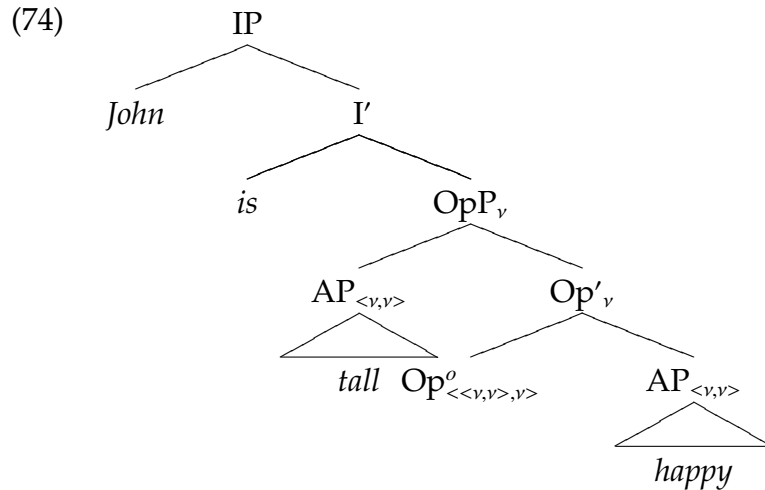
The structure faces no type mismatches, so if it were an accurate representation we'd expect the sentence to be grammatical. We know it isn't, so I conclude that this structure must not be correct.

I conclude that the analysis here can account for the ungrammaticality of stacking in predicate position only with the added requirement that Op cannot take an AP in its specifier.

2.5 Operator with Group II adjectives

Returning to the derivations begun above, we can see that the sentence in (66c) computes properly as well.

(75) a. John is an alleged murderer.

44

b.

```
              IP
            /    \
       John       I'ᵥ
                /    \
              is      NPᵥ-def
                     /       \
               AP_{<v,v>}     NPᵥ
                  /\           /\
             alleged       murderer
```
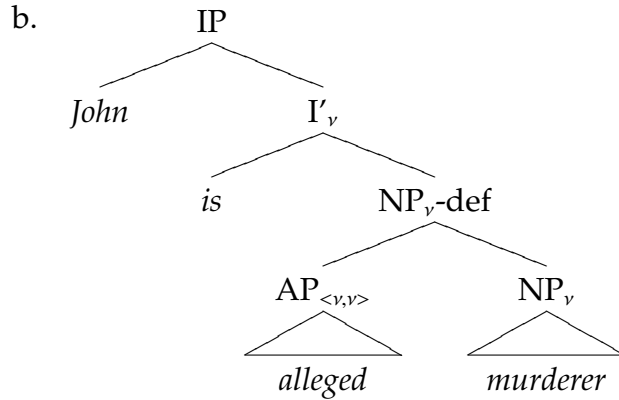
Alleged, with type $<v, v>$, combines with *murderer* to produce a predicate of type v as follows:

(76) $[\![$ alleged $]\!]([\![$ murderer $]\!]) = \lambda F_v.\lambda x_e.\lambda w_s.\exists a \ \forall w' \ wR_a w' \ \rightarrow \ F(x)(w')$

$(\lambda x_e.\lambda w_s.x$ is a murderer in $w)$

$= \lambda x_e.\lambda w_s.\exists a \ \forall w' \ wR_a w' \ \rightarrow \ x$ is a murderer in w'

The sentence in (66c) is thus true iff there is some individual a such that in every possible world w' consistent with what a alleges in the base world, John is a murderer in w'. Once again, this is the desired result.

But what happens when we attempt to compute the sentence in (66d)? We must combine the operator with the Group II adjective *alleged*:

(77)   a. John is alleged

b.

```
              IP
            /    \
       John       I'
                /    \
              is      OpPᵥ
                     /      \
           Op_{<<v,v>,v>}   alleged_{<v,v>}
```
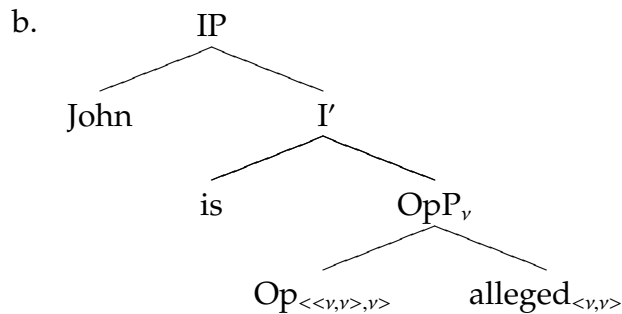
Combining Op with *alleged*, we get this result:

(78) ⟦ Op ⟧(⟦ alleged ⟧)

$= \lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y_e.\lambda v_s.1)(x)(w)$

$([\lambda F_v.\lambda x_e.\lambda w_s.\exists a\ \forall w'\ wR_aw' \rightarrow F(x)(w')])$

$= \lambda x_e.\lambda w_s.[[\lambda F_v.\lambda x_e.\lambda w_s.\exists a\ \forall w'\ wR_aw' \rightarrow F(x)(w')]\ (\lambda y_e.\lambda v_s.1)(x)(w)]$

$= \lambda x_e.\lambda w_s.[\exists a\ \forall w'\ wR_aw' \rightarrow [(\lambda y_e.\lambda v_s.1)](x)(w)]$

$= \lambda x_e.\lambda w_s.\exists a\ \forall w'\ wR_aw' \rightarrow 1$

Taking the subject **John**, we derive the meaning of the sentence as follows:

(79) $\lambda x_e.\lambda w_s.\exists a\ \forall w'\ wR_aw' \rightarrow 1$ (**John**)

$= \lambda w_s.\exists a\ \forall w'\ wR_aw' \rightarrow 1$

The types work out, but the function represented by the predicate (Op + alleged) applies vacuously to the argument **John**. The truth conditions for the sentence *John is alleged* read: true iff there is some person *a* such that in every possible world w′ consistent with what *a* alleges in the base world, 1. The sentence is trivially true.

The predicate [Op alleged] in the sentence can be abbreviated as the following constant function:

(80) ⟦ Op ⟧(⟦ alleged ⟧) $= \lambda x_e.\lambda w_e.1$

Applied to the argument **John**, we get the following proposition:

(81) $\lambda x_e.\lambda w_e.1$ (**John**)

$= \lambda w_s.1$

A predicate of this form tells us nothing about its argument. Substituting any other argument, the predicate is equally (un)informative, giving us the same proposition (or set of possible worlds) regardless of the argument:

(82) a. ⟦ Mary is alleged ⟧

       = ⟦ Op alleged ⟧(⟦ Mary ⟧)

       = $\lambda x.\lambda w.1$ (Mary)

       = $\lambda w_s.1$

   b. ⟦ the kitchen table is alleged ⟧

       = ⟦ Op alleged ⟧(⟦ the kitchen table ⟧)

       = $\lambda x.\lambda w.1$ (the kitchen table)

       = $\lambda w_s.1$

I will give two additional examples of Group II adjectives combining with the operator and then generalize from the results. Based on my generalization about what goes wrong when we apply Op to these three adjectives, I will posit a constraint on the output of such combinations.

Following are working lexical entries for the Group II adjectives *former* and *potential*. In both cases, take a variable of type *s* to represent a world-time pair, so that an expression like $w_s < w'_s$ can be taken to mean that the world-time pair *w* precedes the world-time pair *w'* temporally.

(83) ⟦ former ⟧ = $\lambda F_v.\lambda x_e.\lambda w_s.\exists w' < w$ *such that* $G(x)(w')$

    ⟦ potential ⟧ = $\lambda F_v.\lambda x_e.\lambda w_s.\exists w' > w$ *s.t.* $wR_{potential}w' \wedge F(x)(w')$[6]

---

[6]Here as in the lexical entry for alleged I use an accessibility relation R$_{potential}$ to help us access those possible worlds that are not just later than the base world but also relevant to the potential of the base world. I treat these accessibility relations as 'black boxes', since my goal here is not to explore in detail the specific meanings of any particular adjectives but to understand the basic form of the relevant lexical entries and show their interaction with the operator.

Both are illicit as predicates, like *alleged*.

(84) a. Bill is a former president.

    b. * That president is former.

(85) a. Victory is a potential outcome of the battle.

    b. * That outcome is potential.

In order to compute the semantics of the sentences *John is former* and *John is potential*, we will need to combine each of the adjectives with Op.

(86) a. * John is former.

    b.

```
            IP
          /    \
       John     I′
              /    \
            is      OpP_v
                   /      \
              Op_<<v,v>,v>   former_<v,v>
```
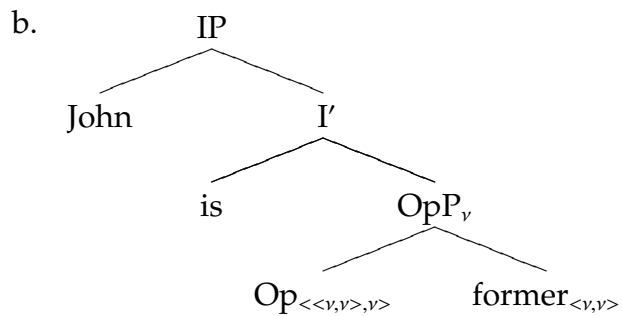
(87) a. * John is potential.

    b.

```
            IP
          /    \
       John     I′
              /    \
            is      OpP_v
                   /      \
              Op_<<v,v>,v>   potential_<v,v>
```
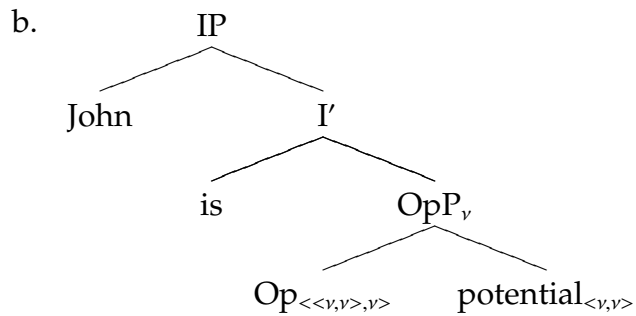
We get the following results:

(88) a. ⟦ Op ⟧(⟦ former ⟧):

$=\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y_e.\lambda v_w.1)(x)(w)$ $([\lambda F_v.\lambda x_e.\lambda w_s.\exists w' < w \text{ such that } G(x)(w')])$

$= \lambda x_e.\lambda w_s.[[\lambda F_v.\lambda x_e.\lambda w_s.\exists w' < w \text{ such that } G(x)(w')](\lambda y_e.\lambda v_s.1)(x)(w)]$

$= \lambda x_e.\lambda w_s.[\exists w' < w \text{ such that } [\lambda y_e.\lambda v_s.1](x)(w)]$

$= \lambda x_e.\lambda w_s.\exists w' < w \text{ such that } 1$

b. ⟦ John is former ⟧ $= \lambda x_e.\lambda w_s.\exists w' < w \text{ such that } 1$ (**John**)

$= \exists w' < w \text{ such that } 1$

I.e., *John is former* is true iff there is some world-time pair w' that precedes the base world-time pair temporally such that 1. The sentence is trivially true.

(89) a. ⟦ Op ⟧ (⟦ potential ⟧):

$=\lambda A_{v,v}.\lambda x_e.\lambda w_s.A(\lambda y_e.\lambda v_s.1)(x)(w)$ $([\lambda F_v.\lambda x_e.\lambda w_s.\exists w' > w \ wR_{potential}w' \rightarrow F(x)(w')])$

$= \lambda x_e.\lambda w_s.[[\lambda F_v.\lambda x_e.\lambda w_s.\exists w' > w \ wR_{potential}w' \rightarrow F(x)(w')](\lambda y_e.\lambda v_s.1)(x)(w)]$

$= \lambda x_e.\lambda w_s.[\exists w' > w. \ wR_{potential}w' \rightarrow [\lambda y_e.\lambda v_s.1](x)(w)]]$

$= \lambda x_e.\lambda w_s.\exists w' > w. \ wR_{potential}w' \rightarrow 1$

b. ⟦ John is potential ⟧ $= \lambda x_e.\lambda w_s.\exists w' > w \ wR_{potential}w' \rightarrow 1]$ (**John**)

$= \lambda w.\exists w' > w. \ wR_{potential}w' \rightarrow 1$

I.e., *John is potential* is true iff there is some world-time pair w' that follows the base world-time pair temporally and is accessible via the accessibility relation defined by $R_{potential}$ such that 1. Once again, the sentence is trivially true.

In both of these derivations, as in (78) above, we can reduce the predicate to the same abbreviated form as above in order to highlight the fact that it is a

constant function:

(90)   a. $[\![\text{ Op }]\!]([\![\text{ former }]\!]) = \lambda x_e.\lambda w_s.\exists w' < w$ *such that* 1

              $= \lambda x_e.\lambda w_s.1$

        b. $[\![\text{ Op }]\!]([\![\text{ potential }]\!]) = \lambda x_e.\lambda w_s.\exists w' > w. \; wR_{potential}w' \; \rightarrow \; 1$

              $= \lambda x_e.\lambda w_s.1$

Apparently, the predicate that results when we combine *any* Group II adjective with the operator can be reduced to the same constant function :

(91)   Constant function resulting from the application of Op to any Group II adjective:

       $\lambda x_e.\lambda w_s.1$

Regardless of the individual this function takes as its argument, it returns the same proposition: the trivial proposition that represents the set of all possible worlds.

The general intuition here is that Group II adjectives, when combined with the type-shifting operator Op, cease to be meaningful (as predicates) insofar as they cease to distinguish among members of the set of individuals that they take as their arguments. The combination of Op and a Group II adjective outputs a predicate that applies vacuously to any argument, always returning the trivial proposition $\lambda w_s.1$ regardless of the input.

2.6 Proposal part II

2.6.1 Constraint on Trivial Predication

I will posit the following constraint to capture this generalization:

(92) **Constraint on Trivial Predication:**

A predicate F_v is illicit if $\forall x_1, \ x_2 \ \in D_e.F(x_1) = F(x_2)$.

The constraint states that a constant function of type v is ungrammatical as a predicate. In other words, in order to be used as a predicate, a function of type v must be able to distinguish between arguments. Those that fail to do so in this way (outputting the proposition that selects the set of all possible worlds) I will refer to as 'trivial predicates'.

2.6.2 Triviality and ungrammaticality

Triviality has been taken as a source of anomaly/ungrammaticality in connection with a number of different linguistic phenomena. Barwise and Cooper (1981) take triviality to be the source of the definiteness restriction in *there*-existentials, and von Fintel (1993) uses triviality to rule out illicit exceptive constructions, to give just two examples. There is a major challenge to such analyses which is noted by both Barwise and Cooper and von Fintel: how can we rule out some constructions on the grounds that they are trivial when some seemingly trivial constructions are perfectly licit?

Gajewski (2002, 2009) discusses this general problem of the relationship between triviality and grammaticality at length. Gajewski contrasts analyses like those of Barwise and Cooper (1981) and von Fintel (1993), in which triviality seems to render a structure ungrammatical, with fully licit sentences that seem from their structure to be either tautologous or contradictory:

(93) War is war. (tautology)

(94) Steve is a nice guy, and Steve isn't a nice guy. (contradiction)

Both sentences seem to be fine, but Gajewski (2002) proposes a contrast between the logical structure of these licit trivial sentences and that of truly ungrammatical trivial structures. A tautology or contradiction, he claims, is only ruled out if it is L-analytic. By L-analytic he means that the logical structure of the sentence, once all non-logical lexical items have been replaced by distinct variables, is analytic (i.e. inherently true or inherently false by virtue of form). Logical lexical items, in this analysis, are those which are permutation invariant. That is, their denotations remain unchanged regardless of shifts in the domain. We can see that the grammatical sentence *War is war* is, for example, not L-analytic. The denotation of *war* is not permutation invariant, so each instance of *war* is replaced by a distinct variable. The copula remains, and we get the following

(95) War is war → x is y (logical skeleton)

Since a sentence of the form *x is y* is not tautologous, the original sentence is not ruled out.

The triviality under consideration here is quite distinct from those Gajewski considers, as it derives not from analyticity but from the application of a constant function.

2.7 Proposal part III: an economy constraint

I now return to (71c). Note the following contrast:

(96) a. John is tall and happy.

  b. * John is tall and alleged.

Why should there be a difference in grammaticality between the two? On the surface, the conjoined predicate in (96b) appears not to be trivial: it conveys information via application of the non-constant function denoted by *tall* (regardless of where we put the operator). When applied to an argument like *John* it does not apply vacuously: at the least, it tells us that the sentence is true iff John is tall in *w*.

Let's examine two possible structures for the sentence.

(97) a.

IP
- John
- I′
  - is
  - ConjP$_v$
    - OpP$_v$
      - Op′$_v$
        - Op$^o_{<<v,v>,v>}$
        - AP$_{<v,v>}$
          - *tall$_{<v,v>}$*
    - Conj′$_{<v,v>}$
      - Conj$^o_{<v,<v,v>>}$
        - *and*
      - OpP$_v$
        - Op′$_v$
          - Op$^o_{<<v,v>,v>}$
          - AP$_{<v,v>}$
            - *alleged$_{v,v}$*

54

b.

$$
\begin{array}{c}
\text{IP} \\
\diagup \quad \diagdown \\
\text{John} \qquad \text{I}' \\
\diagup \quad \diagdown \\
\text{is} \qquad \text{OpP} \\
| \\
\text{Op}' \\
\diagup \quad \diagdown \\
\text{Op}^o_{<<v,v>,v>} \qquad \text{ConjP}_{<v,v>} \\
\diagup \quad \diagdown \\
\text{AP} \qquad \text{Conj}'_{<<v,v>,<v,v>>} \\
tall_{<v,v>} \qquad \text{Conj}^o \qquad \text{AP} \\
and_{<<v,v>,<<v,v>,<v,v>>>} \qquad alleged_{<v,v>}
\end{array}
$$
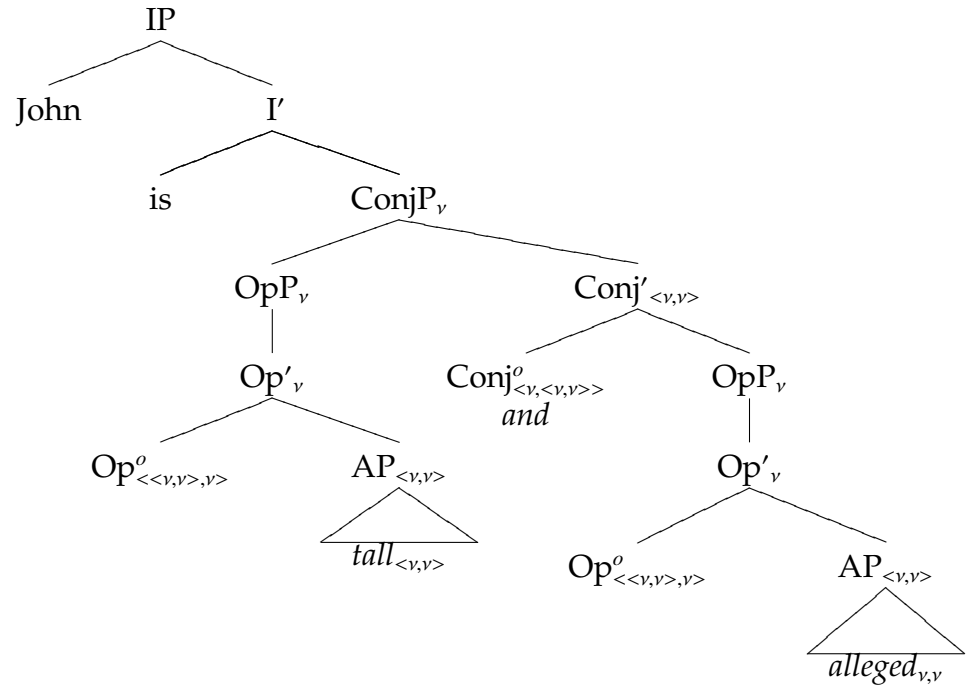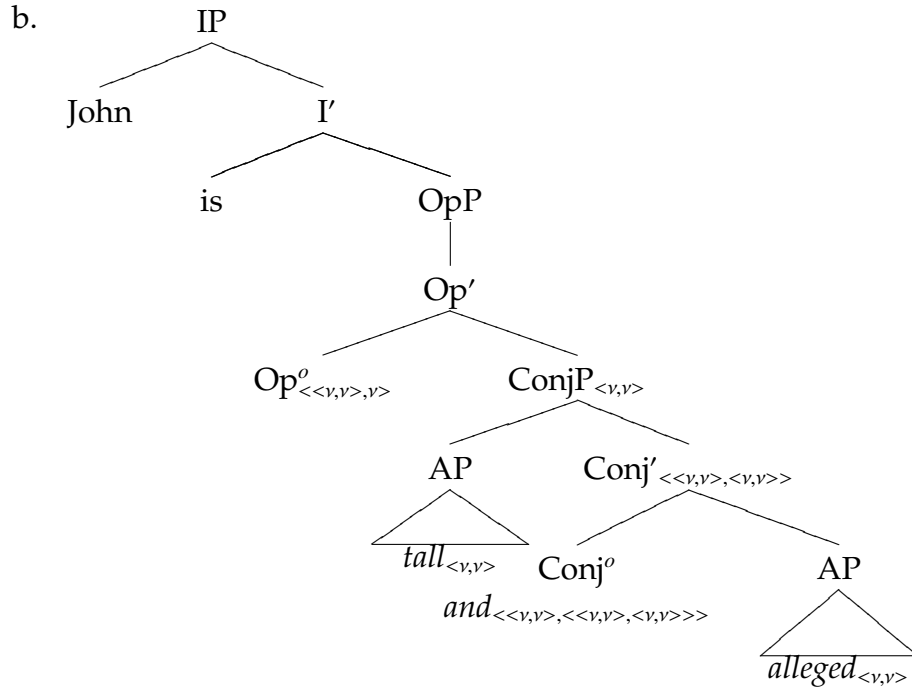
In both of these structures the types work out with no mismatch and the sentence is (incorrectly) predicted to be grammatical. This is a challenge to the proposal, which at present thus fails to rule out the ungrammatical (96b).

In (97a), the structure that I will assume going forward, the operator applies locally to each adjective, creating one trivial and one non-trivial predicate. The two predicates are then conjoined, yet the sentence is not saved by the presence of a non-trivial predicate. (97b) is an equally viable structure, in which the operator applies to the conjoined AP 'tall and alleged'. The resulting predicate is not trivial at all, it merely contains a trivial conjunct within it. It effectively tells us that the sentence is true iff the argument of the predicate is tall. So far, then,

55

this problematic sentence is not successfully ruled out by our constraint.

The proposal needs to be refined. It must be broadened in order to rule out data that would otherwise pass by the constraint. To work toward the proper refinement, we can look at the structure of the sentence under question in parallel with its interpretation.

Compare the denotations of these two sentences:

(98) a. * John is tall and alleged.

  b. John is tall.

Use the following lexical entries. (Note that we will need two separate entries for *and* since we will be conjoining phrases with one type in one sentence and with a different type in the other.)

(99) ⟦ and1 ⟧ = $\lambda A_{<v,v>}.\lambda B_{<v,v>}.\lambda F_v.\lambda x_e.\lambda w_s.\ A(F)(x)(w) \wedge B(F)(x)(w)$

  ⟦ and2 ⟧ = $\lambda F_v.\lambda G_v.\lambda x_e.\lambda w_s.F(x)(w) \wedge G(x)(w)$

  ⟦ tall ⟧ = $\lambda F_v.\lambda x_e.\lambda w_s.\ F(x)(w)$ and x is tall in w

  ⟦ alleged ⟧ = $\lambda G_{set}.\lambda x.\lambda w.\exists a_e\,s.t.\forall w'\ w'R_aw \rightarrow G(x)(w')$

  ⟦ John ⟧ = **John**

Here is what happens when we compute *John is tall and alleged*, using both of the possible structures suggested above in turn:

(100) a. ⟦ John is [Op tall] and [Op alleged] ⟧

    = ⟦ [Op tall] and [Op alleged] ⟧ (⟦ John ⟧)

    = ⟦ and2 ⟧ (⟦ Op alleged ⟧) (⟦ Op tall ⟧) (**John**)

= [[and2]] ($\lambda x_e.\lambda w_s.\exists a_e.\forall w'w'R_aw \rightarrow 1$) ($\lambda x_e.\lambda w_s.$ x is tall in w) (**John**)

= $\lambda F_v.\lambda G_v.\lambda x_e.\lambda w_s.F(x)(w) \wedge G(x)(w)$ ([[Op alleged]])([[Op tall]])(**John**)

= $\lambda x.\lambda w.1 \wedge$ x is tall in w (**John**)

= $\lambda w.$ **John is tall in w**

b. [[John is Op [tall and alleged]]]

= [[Op]] ([[and1]] ([[alleged]])([[tall]])) (**John**)

= [[Op]] ($\lambda A_{<v,v>}.\lambda B_{<v,v>}.\lambda F_v.\lambda x_e.\lambda w_s.A(F(x)(w)) \wedge B(F(x)(w))$

($\lambda F.\lambda x.\lambda w.[\exists a.\forall w' s.t.w'R_aw \rightarrow F(x)(w'))(\lambda F_v.\lambda x_e.\lambda w_s.$ F(x)(w) and x is

tall in w)(**John**)

= [[Op]] ($\lambda F.\lambda x.\lambda w.\exists a_e s.t.\forall w' w'R_aw \rightarrow G(x)(w') \wedge$ F(x)(w) and x is tall

in w)(**John**)

= [$\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y.\lambda v.1)(x)(w)$] ($\lambda F.\lambda x.\lambda w.\exists a_e s.t.\forall w' w'R_aw \rightarrow G(x)(w') \wedge$

F(x)(w) and x is tall in w) (**John**)

= [$\lambda x.\lambda w.\exists a_e s.t.\forall w' w'R_aw \rightarrow 1 \wedge 1 \wedge$ x is tall in w] (**John**)

= $\lambda w.\exists a_e s.t.\forall w' w'R_aw \rightarrow 1 \wedge 1 \wedge$ John is tall in w

= $\lambda w.1 \wedge 1 \wedge$ xis tall in w (**John**)

= $\lambda w.$ **John is tall in w**

Either way, the derivation of the sentence effectively comes out exactly the same as that of the sentence *John is tall*:

(101)   [[John is Op tall]] = [[Op]] ([[tall]]) ([[John]])

= $\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.A(\lambda y.\lambda v.1)(x)(w)$ ($\lambda F_v.\lambda x_e.\lambda w_s.$ F(x)(w) and x is tall in w)

(**John**)

= $\lambda x_e.\lambda w_s.$ 1 and x is tall in w (**John**)

= $\lambda w.$ **John is tall in w**

The truth conditions for *John is tall and alleged* come out the same no matter how the sentence is put together, and the predicate applies meaningfully to its argument, producing a non-trivial proposition, even though it contains a Group II adjective.

So why is the sentence *John is tall and alleged* out? I suggest that the sentence is bad because it contains superflous structure: structure that has no contribution to the syntactic well-formedness of the larger sentence in which it is embedded and that does not contribute to meaning in any way.

The trivial predicate *Op alleged*— or, in structure (100b), the conjoined predicate— adds complexity to the sentence, but it contributes nothing to the truth conditions (i.e. the sentence's meaning). The idea that adding structure without adding information should be disfavored is in no way novel. Grice (1989)'s Maxim of Manner can be seen as a rule of conversational reasoning that relies on comparisons between more and less complex utterances and prefers those which are less complex, assuming meaning is preserved. Grice's pragmatic considerations are, however, crucially violable. A Gricean implicature can be ignored or cancelled. Here I follow more recent literature (e.g., Heim, 1991; Sauerland, 2002; Fox, 2007; Katzir, 2008; Magri, 2009) in treating certain instantiations of such reasoning as inviolable grammatical constraints. Katzir (2007) argues in particular that structural complexity is at play in the selection of alternatives in scalar implicatures: alternatives that are more structurally complex than the utterance itself are ruled out by the grammar and do not play a role in evaluating implicatures.[7]

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[7]Katzir's definition of structural complexity is much more sophisticated than what is needed here. The relevant part here is his notion of assessing relative complexity based on deletion: a structure ϕ is strictly more complex than a structure ψ if we can transform ϕ into ψ via a finite series of deletions.

What I am suggesting here is that a sentence like *John is tall and alleged* is ruled out because the presence of *alleged* contributes structure without changing the denotation. This will have the effect of ruling out not only any sentence in which the sole predicate is trivial, but any structure that contains a trivial predicate within it.

(102)   Structural Economy Constraint

*ϕ containing a predicate F if $\forall x_1, x_2 \in D_e.F(x_1) = F(x_2)$ and $\exists \psi.[\![\phi]\!] = [\![\psi]\!]$ and ψ is less structurally complex than ϕ

2.8   Group III adjectives and the Operator

Before moving on, I return briefly to the Group III adjectives—those which appear in predicate position but not prenominally, including *awake*, *asleep*, and *alive*. I assume that they have type v and can thus appear in predicate position without requiring further intervention. They share similar morphology, and it is conceivable that the prefix *a* is an instantiation of Op.

(103)   a.   John is asleep.

   b. $[\![$ asleep $]\!] = \lambda x.\lambda w.$ x is asleep in w

   c. $[\![$ John is asleep $]\!] = [\![$ asleep $]\!]$ ($[\![$ John $]\!]$) $= \lambda w.$ John is asleep in w

They are restricted from prenominal position simply because their occurrence there would result in a type mismatch (indicated by the exclamation point in the following tree).

(104)   a.   John is an asleep person.

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b.

```
                    IP
                 /      \
             John        VP
                       /    \
                     is       NP_{-def}!
                             /        \
                          AP_v          NP_v
                          /\            /\
                       asleep         person
```
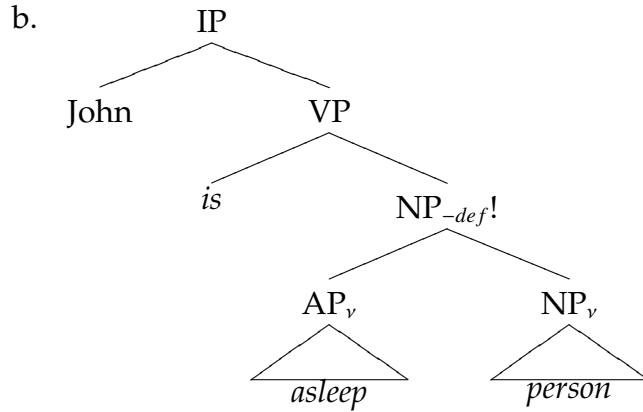
I will have nothing more to say about these adjectives here.

2.9 Additional Implications

The proposal so far consists of a type-shifting operator that allows adjectives of type $< v, v >$ to appear in predicate position and a constraint on trivial predication.

I have proposed that the following machinery is part of the grammar:

1. an operator that combines with adjectives of type $< v, v >$ and allows them to occur in predicate position

2. a constraint on trivial predication that rules out any resulting predicate if it is a constant function

3. a constraint that rules out structures containing trivial predicates

The constraint on trivial predication helps us address the problem of adjec-

tive distribution, but it must be carefully examined. What are its implications? The claim that any trivial predicate—not only those which result from combining our operator with a Group II adjective—is banned by the grammar raises predictions.

Where else might we see evidence of the constraint on trivial predication? The verb *exist* comes immediately to mind, as does the adjective *real*. Both can appear as predicates.

(105)   a.   Unicorns exist.

        b.   These diamonds are real.

In order for our analysis to hold, the constraint must hold. On close inspection, we will see that neither 'exist' nor predicative 'real' is a constant function. In fact, they are both ambiguous, and for each neither of the two possible meanings is a constant function.[8]

2.9.1   Is 'Exist' a trivial predicate?

At first, the verb 'exist' seems to be a potential case of trivial predication. But as Milsark (1974) points out, the verb is actually ambiguous:

(106)   Some unicorns exist.

Milsark notes that this sentence is ambiguous with the following two possible interpretations:

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[8]For extensive discussion of various perspectives on the nature of the predicate denoted by *exist* see Miller (2009), which considers the opinions of Aristotle, Frege, and Quine on the subject, among many others.

(107) a. There are a number of individual unicorns whose existence is assertable.

       b. The class of *unicorns* has at least one member.

The interpretation of *exist* in (107a) he refers to as Exist-I. It asserts that certain individuals are in existence. That in (107b) he labels Exist-C. It asserts that a particular class of individuals is instantiated, containing at least one member. Since the predicate 'exist' is ambiguous between Exist-I and Exist-C, but both meanings can apparently occur in predicate position, we need to examine both to see that neither is a constant function.

(108) a. ⟦ exist-I ⟧ = $\lambda x.$ x exists

       b. ⟦ exist-C ⟧ = $\lambda F_y. \exists$ x. s.t. F(x)

As we can see from the lexical entries, Exist-C quantifies over classes, where Exist I quantifies over individuals. The two derivations of (106) will differ in that *some unicorns* in the exist-I interpretation will operate as a real generalized quantifier taking a VP, exist-I, as an argument; in the exist-C interpretation ⟦ exist-c ⟧ has the type of a generalized quantifier and takes the predicate 'unicorns' as its argument, deriving roughly the same truth conditions as we would get for the generic sentence *Unicorns exist*.

Neither version of *exist* is a constant function in the sense discussed above. They both distinguish among their arguments. For exist-C, an argument will only return true if it is a class with at least one member. This is clearly not going to be true of all classes (or at least not trivially). For exist-I, the predicate distinguishes between those members of a class that are instantiated and those that are not.

2.9.2 What about the adjective 'real'?

Real is also ambiguous. It can mean 'non-imaginary', in which function it is similar to the predicate 'exist'; or it can mean 'non-fake', i.e. 'genuine' or 'authentic'. Working lexical entries for *real* are as follows:

(109)   a.   ⟦ real1 ⟧ = $\lambda F_y.\lambda x.\lambda w$. F(x)(w) and x exists in w

      b.   ⟦ real2 ⟧ = $\lambda F_y.\lambda x.\lambda w$. F(x)(w) and x is real in w in a given context C[9]

Note that the sentence 'Some unicorns are real' does not have the same ambiguous interpretation as (106) above. It can only have the exist-I interpretation, which says that there are individual unicorns that exist. The generic sentence 'Unicorns are real', on the other hand, has the exist-C interpretation.

But the sentence 'Some unicorns are real' is ambiguous in a different way. Because we know that unicorns do not exist, this will be easier to see with a different example. Let's use the following instead:

(110)   Some diamonds are real.

The sentence is ambiguous between the interpretation that some diamonds are not imaginary , i.e. they actually exist in the world, and the interpretation that some diamonds are genuine (while presumably others are fake.) The former interpretation would be natural in a context where, for example, a story existed about a made-up diamond that weighed twenty pounds. In such a case, we might say 'The diamond in that story is not real, but the Hope Diamond is

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[9]For now we can use these lexical entries for *real* only to show the abstract difference between the two meanings of the adjective. I will return to the role of context in the discussion of the adjective *fake* below.

real.' For the other interpretation, we can imagine two stones of which one is a genuine diamond and the other a fake, in which context we might say 'The diamond on the right is real, but the one on the left is fake.' In both cases, we can see that the adjectival predicate is not a constant function: it succeeds in distinguishing between arguments in a meaningful way.

SOME PROPERTIES OF NATURAL LANGUAGE ADJECTIVES

My primary goal in this chapter will be to address the problem of restricting adjectival functions of type $< v, v >$ to those that actually occur in natural language. This is the *glob* problem mentioned in chapter 1, and it has been raised as an objection to any proposal that allows adjectives to have $< v, v >$ as their basic type. It is thus an important obstacle for the current proposal to clear. I will argue that all adjectives we do find in natural language share a common logical property that distinguishes them from other possible functions of type $< v, v >$. The inspiration for the approach comes from a property of Generalized Quantifiers (GQs) discussed by Barwise and Cooper (1981).

3.1 Review of Generalized Quantifiers

I begin with a brief review of the logical properties of Generalized Quantifiers (GQs), as discussed by Barwise and Cooper (1981). Note that the types used in this part of the discussion are not intensional—this could easily be revised to maintain consistency throughout this work, but I will abstract away from intensionality for the moment to be consistent with Barwise and Cooper's original discussion instead.

A GQ consists of a determiner and a noun. A few examples follow:

(111)   a. every man

   b. some people

   c. all books

The determiner in each case has type $<<e,t>,<<e,t>,t>>$ and takes the noun as its argument:

(112) ⟦ every ⟧ (⟦ man ⟧) = $\lambda F_{et}.\lambda G_{et}.\forall x_e$ s.t. $F(x) \rightarrow G(x)$ ($\lambda x.x$ is a man)

   = $\lambda G_{et}\forall x$ s.t. x is a man $\rightarrow G(x)$

(113) ⟦ some ⟧(⟦ people ⟧) = $\lambda F_{et}.\lambda G_{et}.\exists x_e$ s.t. $F(x) \wedge G(x)$ ($\lambda x.x$ is a person)

   = $\lambda G_{et}\exists x$ s.t. x is a person $\wedge G(x)$

(114) ⟦ all ⟧(⟦ books ⟧) = $\lambda F_{et}.\lambda G_{et}.\forall x_e$ s.t. $F(x) \rightarrow G(x)$ ($\lambda x.x$ is a book)

   = $\lambda G_{et}\forall x$ s.t. x is a book $\rightarrow G(x)$

The GQ then takes a VP as its argument:

(115) ⟦ Every man eats ⟧ = ⟦ every man ⟧(⟦ eats ⟧)

   = $\lambda G_{et}\forall x$ s.t. x is a man $\rightarrow G(x)$ ($\lambda x.x$ eats)

   = $\forall x$ s.t. x is a man $\rightarrow$ x eats

(116) ⟦ Some people smoke ⟧ = ⟦ some people ⟧(⟦ smoke ⟧)

   = $\lambda G_{et}\exists x$ s.t. x is a person $\wedge G(x)$ ($\lambda x.x$ smokes)

   = $\exists x$ s.t. x is a person $\wedge$ x smokes

(117) ⟦ All books are made of paper ⟧ = ⟦ all books ⟧(⟦ made of paper ⟧)

   = $\lambda G_{et}\forall x$ s.t. x is a book $\rightarrow G(x)$ ($\lambda x.x$ is made of paper)

   = $\forall x$ s.t. x is a book $\rightarrow$ x is made of paper

Another way of looking at this, in terms of sets, is that generalized quantifiers pick out sets of sets of individuals. The GQ *every man* picks out all the VPs that denote actions performed by *every man*. Since a VP is a set of individuals who perform the action denoted by the verb, the GQ *every man* effectively picks

out the set of sets of individuals that contain every man in the given model as members.

3.2   The *Glob* Problem

I return now to the problem of constraining functions of type $< v, v >$ that can occur as adjectives. This problem, which has been raised by Heim, faces any proposal about adjective types in which at least some adjectives have $< v, v >$ as their basic type. The question is: if an adjective can have the type $< v, v >$, why can't just any function of that type occur as an adjective? Why, for example, do we not find adjectives like *glob*, defined as follows?

(118) $[\![$ glob $]\!] = \lambda F_{et}. \lambda x_e. \forall y_e$ s.t. $F(y) \rightarrow x$ likes y.

Glob is a function from sets of individuals to sets of individuals. It picks out the individuals from one set that like the individuals from another set.

(119)   a.   John is a glob books. (meaning: John likes books.)

   b.   Many children are glob candy. (meaning: many children like candy)

   c.   That glob chocolate ate the whole cake. (meaning: someone who likes chocolate ate the whole cake)

Glob occurs prenominally, and it has the right type to occupy the same position as any prenominal adjective, making these hypothetical sentences perfectly interpretable.

(120)   a.

```
              IP
        ┌──────┴──────┐
      John           I′
               ┌──────┴──────┐
              is            DP
                       ┌──────┴──────┐
                      a            NP_v
                              ┌──────┴──────┐
                          AP_<v,v>        NP_v
                            glob          books
```

b.

```
                  IP
          ┌───────┴───────┐
        QP                I′
   ┌────┴────┐      ┌──────┴──────┐
many children are              NP_v
                          ┌──────┴──────┐
                       AP_<v,v>        NP_v
                         glob          candy
```

c.

```
                        IP
              ┌─────────┴─────────┐
            DP                    I′
     ┌───────┴───────┐       ┌────┴────┐
   that            NP_v   ate the whole cake
              ┌──────┴──────┐
          AP_<v,v>        NP_v
            glob         chocolate
```
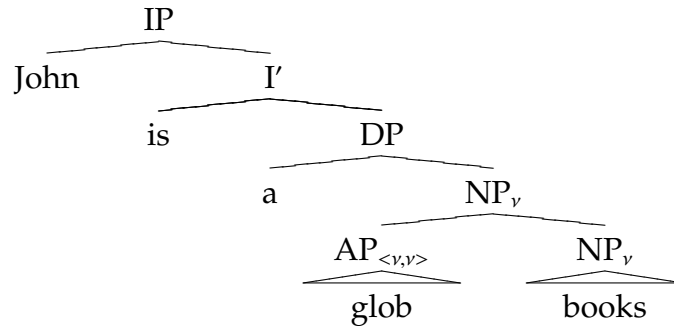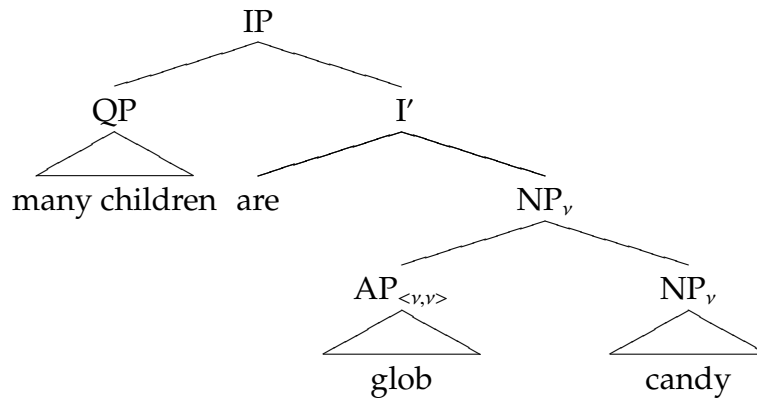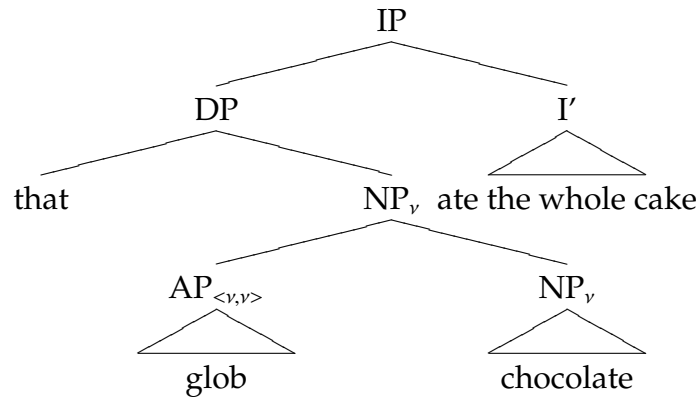
Yet we never see an adjective like *glob*. Why not? What's wrong with it?

Although the sentences are made-up, it is easier to impose on the nonce-adjective *glob* a different kind of meaning. We are tempted, instead of taking the sentence *John is a glob chocolate* to mean that John *likes* chocolate, to take it to

mean that John is some kind of chocolate. Of course, that is an odd interpretation in any event, but try this sentence instead:

(121)   Flipper is a glob whale.

Here it is much easier to imagine that the intended meaning of the sentence is that Flipper is some kind of whale, which is a perfectly plausible state of affairs. In fact it's far easier to imagine that meaning to be correct than to interpret the sentence using the actual meaning of *glob*. We have trouble interpreting an adjective that maps one function of type v to another of the same type when the meaning of the adjective is that individuals in the denotation of one of the functions like individuals in the denotation of the other. It is much easier, by contrast, to imagine that a function of this kind (i.e., an adjective) maps individuals in the denotation of one function onto individuals *in the denotation of the same function*. It is easier to imagine that a *glob whale* is some kind of whale than to imagine it to be an individual who likes whales.

As a preliminary conclusion, it seems possible that the reason why *glob* and other adjectives do not occur in natural language, and the reason why a hypothetical adjective of that kind is so difficult to interpret, is that natural language adjectives of type $< v, v >$ must be subsective. I.e., the reason why it's easier to imagine that a *glob chocolate* is a kind of chocolate is because that's what we're used to: we are accustomed to adjectives picking out some members of a set from within that set. This is how we conceive of adjectival modification. The absence of *glob*-type adjectives (as well as the difficulty of interpreting nonce-versions of them) may be due to a constraint that does exactly what we have been looking for: it restricts the functions of type $< v, v >$ that can occur as adjectives.

The idea that at least some adjectives are subsective is by no means novel. Subsection (and intersection, which is a special case of subsection in which both sets have a portion that does not overlap with the other set) has long been discussed as a property of adjectives. In chapter 1 I mentioned the adjective *skillful*. *Skillful* is often taken to be subsective, a characterization which is easy to understand from the following use of the adjective.

(122)   I know he's a doctor, but is he a skillful doctor?

This is a perfectly acceptable utterance asking whether a particular individual who is known to belong to the set of doctors also belongs to the subset of that set that contains only skillful doctors. There are many other examples, but interpreting most Group I adjectives as subsective is generally not difficult.

Group II adjectives, on the other hand, present something of a problem. In fact, they have often been categorized in the literature specifically as being 'non-subsective'. Statements that use them in standard subsective ways, like the one using *skillful* above, are odd. Note the following contrast, for example:

(123)   a.   Of all the doctors in the room, please pick out the skillful doctors.

  b. ?? Of all the murderers in the room, please pick out the alleged murderers.

The standard conclusion from evidence of this kind is that the Group II adjectives cannot possibly be subsective.

There is also a set of Group I adjectives that have often been taken to be conclusively non-subsective. These are the privative adjectives—words like *fake*.

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For example, in the phrase *fake gun*, how can *fake* possibly be taking a subset of guns when it's picking out exactly those things that are not guns? In other words, on the assumption that a fake gun is not a gun, *fake* cannot be subsective.

In addition to these challenges, there is a possible objection to the particular example of a glob-type adjective used here, namely that it introduces argument structure within the semantics (vs. the syntax) and would therefore be ungrammatical regardless of any adjective-specific constraint in the grammar.

To address all of these issues, I'll speculate about a possible connection between adjectives and determiners. I begin with a digression to review the details of the property 'lives on' noted by Barwise and Cooper as belonging to all GQs, then return to what I suggest may be a parallel property of natural language adjectives.

3.3 Conservativity and the Property 'Lives On'

Barwise and Cooper talk about the question of whether a given GQ 'lives on' the predicate denoted by the noun within it. The property 'lives on' is defined as follows:

(124)   A quantifier Q *lives on* a (one-place) predicate A if Q is a set of (one-place) predicates with the property that, for any predicate X denoting a subset of D_e, (the set denoted by) $X \in Q$ iff $(X \cap A) \in Q$.

In simpler terms, a GQ lives on the noun within it if, for any VP, VP is a member of the GQ if and only if the intersection between the VP and the noun

is in the GQ. So the only way a VP can be taken as the argument of a GQ with this property and return TRUE is if it is also the case that every member of the set derived from intersecting that VP with the noun in the GQ would also return TRUE if taken as an argument of the GQ. For example, The quantifier *all men* lives on the predicate ⟦ men ⟧ iff for any VP that returns TRUE when combined with *all men*, the intersection between the set of men and the VP would also return true. I will use a simplified model to illustrate how this works:

(125) In the model ℚ, the following sets are exhaustive:

⟦ men ⟧ = {John, Matthew, Mike}

⟦ smoke ⟧ = {Matthew, Mike}

⟦ own pets ⟧ = {John, Matthew, Mike}

The sentence *All men smoke* is thus false for ℚ. Let's use this information to check informally whether the GQ *all men* lives on the predicate ⟦ men ⟧:

(126) a. A quantifier Q *lives on* a (one-place) predicate A if Q is a set of (one-place) predicates with the property that, for any predicate X denoting a subset of D_e, (the set denoted by) X ∈ Q iff (X ∩ A) ∈ Q.

b. The quantifier *all men* lives on the predicate *men* if for any VP, ⟦ VP ⟧ ∈ ⟦ all men ⟧ ↔ ⟦ VP ∩ men ⟧ ∈ ⟦ all men ⟧

c. Taking the VP *smoke* first, we can see that the left side of the biconditional is not satisfied: it is not the case that all men smoke, so it is not the case that ⟦ smoke ⟧ ∈ ⟦ all men ⟧. The right side of the biconditional should, then, be false.

d. The right side reads ⟦ smoke ⟧ ∩ ⟦ men ⟧ ∈ ⟦ all men ⟧. The intersection between the VP and the noun is the set of men who smoke

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(namely, the set containing Matthew and Mike as members). Is the set of men who smoke in ⟦ all men ⟧? No: it is not the case that *all men smoke*. Thus both sides of the biconditional are false.

(127)   a.   The quantifier *all men* lives on the predicate *men* if for any VP, ⟦ VP ⟧ ∈ ⟦ all men ⟧ ↔ ⟦ VP ∩ men ⟧ ∈ ⟦ all men ⟧

     b.   Now taking the VP *own pets*, we can see that the left side of the biconditional is satisfied: it is the case that all men own pets, so it is the case that ⟦ own pets ⟧ ∈ ⟦ all men ⟧. The right side of the biconditional should also be true.

     c.   The right side reads ⟦ own pets ⟧ ∩ ⟦ men ⟧ ∈ ⟦ all men ⟧. The intersection of the VP and the noun is the set of men who own pets, which is an element of the quantifier.

Barwise and Cooper point out that natural language quantifiers always have this property.

It is sometimes more intuitive to deal with the more familiar concept of conservativity in natural language determiners than the less familiar 'lives on'. Keenan and Stavi (1986) used the term 'conservative' to refer to a determiner that, when it combines with a noun to form a GQ, always forms a GQ that lives on the property denoted by the noun. A formal definition of conservativity is as follows:

(128)   A determiner D is conservative if, for any (one-place) predicate N and any VP ⊂ D_e, VP ∈ D(N) iff (N∩VP) ∈ D(N)

A standard way to test whether a determiner is conservative or not is to consider the validity of any statement of the following form:

(129) D N VP ↔ D N are N ∩ VP

Translating the above into the frame sentence of the form 'D N VP if and only if D N are N that VP', we can implement the test for a few familiar determiners:

(130) a. All whales swim ↔ all whales are whales that swim: TRUE

b. Some whales swim ↔ some whales are whales that swim: TRUE

c. No whales swim ↔ no whales are whales that swim: TRUE

It is relatively easy to conceptualize a made-up counter-example: something that is a determiner in form and type but is not conservative. Consider the made-up determiner *brill*. Brill has the following denotation:

(131) $[\![$ brill $]\!] = \lambda N_{et}.\ \lambda M_{et}.\ |\,N\,| = 2 * |\,M\,|$

Brill is not conservative, but this can be difficult to judge intuitively using the test above.

(132) Brill whales swim ↔ brill whales are whales that swim.

However, we can prove that brill is a non-conservative determiner by translating the sentence 'Brill whales swim if and only if brill whales are whales that swim' into more familiar terms.[1] I'll begin with the left side of the biconditional.

(133) $[\![$ brill whales swim $]\!] = [\![$ brill $]\!]\,([\![$ whale $]\!])([\![$ swim $]\!])$

$= [\lambda N_{et}.\lambda M_{et}.\ |\,N\,| = 2* |\,M\,|\ (\lambda x.x \text{ is a whale})](\lambda y.y \text{ swims})$

---

[1]Brill is a determiner in that it has the same type as other determiners, denoting a logical relationship between two one-place predicates.

$= \lambda M_{et}. \mid \textit{the set A of all whales} \mid = 2* \mid M \mid (\lambda y.y \textit{ swims})$

$= \mid \textit{the set A of all whales} \mid = 2* \mid \textit{the set B of individuals that swim} \mid$

The left side of the biconditional, then, means roughly 'There are twice as many whales as there are individuals that swim.' Now to the right side.

(134) $[\![$ brill whales are whales that swim $]\!] = [\![$ brill $]\!]([\![$ whale $]\!])([\![$ whales that swim $]\!])$

$= [\lambda N_{et}.\lambda M_{et}. \mid N \mid = 2* \mid M \mid (\lambda x.x \textit{ is a whale})](\lambda y.y \textit{ is a whale and y swims})$

$= \lambda M_{et}. \mid \textit{the set A of all whales} \mid = 2* \mid M \mid (\lambda y.y \textit{ is a whale and y swims})$

$= \mid \textit{the set A of all whales} \mid = 2* \mid \textit{the set B of individuals that are whales that swim} \mid$

The right side, then, means that 'There are twice as many whales as their are whales that swim'. Put even more simply, we can say 'Exactly half of the whale population swims'.

So the question is whether the following statement is valid: There are twice as many whales as there are individuals that swim if and only if exactly half of the whale population swims.' To see that the statement is not valid, consider the model $\mathbb{L}$.

(135) $\mathbb{L}$:

D_e = {whale1, whale2, whale3, whale4, person1, person2, person3, person4}

$[\![$ whale $]\!]$ = {whale1, whale2, whale3, whale4}

$[\![$ swim $]\!]$ = {whale1, whale2, person1, person2, person3, person4}

The biconditional does not hold true in $\mathbb{L}$. The left side is false, but the right side is true. So brill is not conservative.

Although it was unnatural to conceptualize, we are able to conceive of and reason about a non-conservative determiner (and thereby a GQ, 'brill whales', that does not live on its noun 'whale'). It is clear that such a determiner is not to be found in natural language. Conservativity can be stated as a genuine constraint: all natural language determiners are conservative, and all GQs live on the property denoted by the noun they contain.

I would like to suggest that there may be a parallel constraint on adjectives. Is it possible that all natural language adjective + modified noun combinations must 'live on' the property denoted by the noun?

3.4   A Parallel Constraint on Adjectives

Can we use extend the definition of 'lives on'/conservativity to posit a parallel constraint on adjectives?

To repeat the formal definition of 'lives on':

(136)   A quantifier $Q_{<et,t>}$ *lives on* a (one-place) predicate A_{et} **if Q is a set of (one-place) predicates** with the property that, for any predicate X_{et} denoting a subset of D_e, the set denoted by $X_{et} \in Q$ iff $(X \cap A) \in Q$

The version of this definition I propose for adjective-noun combinations follows:

(137) An adjective-noun combination J *lives on* the property denoted by the noun if, for any $X \in D_e$, $X \in [\![J]\!] \rightarrow X \in [\![N]\!]$

A determiner is viable in natural language if, in combination with a noun, it forms a GQ that lives on that noun. I propose that an adjective is viable in natural language if, in combination with a noun, it forms a unit that lives on that noun according to the definition above. If this is so, we may have a response to the *glob* objection, allowing us to maintain that Group I and II adjectives have type $< v, v >$ with impunity. Note that this constraint suggests that adjectives must have a property that is something like the more familiar property of subsectiveness. As mentioned above, though, both Group I privative adjectives and Group II adjectives in general have standardly been taken to be non-subsective. I will argue that these potentially problematic cases are not counterexamples to the 'lives on' constraint for adjectives, but rather reinforcing evidence that the constraint is a move in the right direction.

3.5 'Privative Adjectives': *Fake*, etc.

A privative adjective like *fake* gets its name from the idea that, when combined with a noun, it picks out a subset of the complement of the set denoted by the noun. If this were the case for *fake*, then any individual belonging to the set denoted by *fake gun* could never belong to the set denoted by $[\![$ gun $]\!]$, and a privative adjective would by its meaning violate the lives-on constraint just proposed. This conclusion, though, leads to independent problems discussed in recent work by Partee (in particular, Partee, 2007).

The first problem with assigning *fake* a truly privative interpretation is re-

lated to the problem of interpreting 'real' as non-trivial, even prenominally. If *fake* is truly privative, what are we to make of the following sentences? They seem to be contradictory and tautologous, respectively.

(138)   This gun is a fake gun.

(139)   This gun is a real gun.

Yet both of these utterances can be used informatively by someone trying to demonstrate the difference between the two kinds of guns. In addition, referring to *fake guns* and *real guns* as 'kinds of guns' seems perfectly natural. So the first question about privative adjectives is: what non-trivial interpretation can they possibly have, even prenominally?

Partee notes various other adjectival interpretations that can be problematic in a similar way. For example, she asks how we can interpret the phrase *stone lion* (referring to a sculpture of a lion, e.g.). If we take a certain interpretation of the noun *lion*, then there are no members of the denotation that are also in the denotation of *stone*. Thus in effect, in such situations, we have the same problem as with *fake*: we can't reasonably compose the adjective with the noun, but we can use the combination perfectly naturally and meaningfully.

Partee's approach is to claim that privative adjectives like *fake*, as well as certain other adjectives like *real* and exceptional uses of adjectives like *stone* in *stone lion*, 'coerce' the denotation of the nouns they modify to include both positive and negative examples. In other words, modifying a noun with an adjective of this kind directly affects the way the denotation of the noun is construed in that context. As such, she claims, these adjectives are subsective: they shift the denotation of the noun they modify and then pick out a subset from the set denoted

by the noun.

The idea of coercing the denotation of a noun presumably relies on the noun's receiving an intensional interpretation to begin with. Since we have been assuming an intensional interpretation for nouns all along, privative adjectives fit perfectly into the lives-on constraint proposed here without depending on any additional notion of coercion.

I would like to suggest that the role of context in determining the scale against with the fakeness of an entity is to be judged is separate from whatever mechanism allows the interpretation of a noun to be coerced– or interpreted intensionally– as needed. Contra Partee, I argue that coercion of some kind regularly takes place regardless of whether a noun is or is not modified by a privative adjective (or one like 'stone' in the *stone lion* example). Nouns are interpreted intensionally, and the role that context plays in determining how this is done is outside the domain of the adjective meaning itself. Discourse context of some kind, but *not* the contextual parameter within the meaning of the adjective itself, plays a role in determining what the intensional *gun* represents in a given utterance. The noun in *fake gun* is interpreted contextually just as it would be in *large gun* or *concealed gun*.

Empirical observations support this line of reasoning. We can just as easily have a *concealed gun* in a paintball competition as in a live gunfight. Additionally, the use of the word *gun* by itself, without any adjectival modification, may or may not refer to paintball guns, water guns, etc. in addition to the lethal kind. It is not modification by the adjective *fake* that determines what does and does not count as a gun in a given discourse context. Instead, the privative adjective *fake* takes the relevant interpretation of the noun and helps us locate it on a scale

of fakeness specified by a contextual parameter that *is* part of the meaning of the adjective. For this reason, a given gun may be fake in some contexts but real in others while simultaneously qualifying as a gun of some kind in both.

As such, I suggest that the lexical entry for fake might look something like this:

(140) ⟦ fake ⟧ = $\lambda F.\lambda x.\lambda w.F(x)(w)$ and x is fake in w according to a scale specified by context

A *fake gun* has the property that it is a phony version of some object that can be construed as representative of that object depending on discourse context. The lexical entry suggests that fakeness is an independent property, separate from the matter of a coerced interpretation of the modified noun. This is evident also from the way we use the adjective. Imagine, for example, walking into an antique shop and uttering the following:

(141) There are a lot of fake things in this room.

In fact we might even say simply:

(142) This room is full of fakes.

We can use either utterance to refer to fake objects of varying kinds. The shop might have counterfeit collectible stamps, a faux-wood antique table, etc. What these objects have in common is that their inclusion in the interpretation of a noun is highly context-dependent in a precise way. I contend that this is the quality denoted by *fake*.

As to the scalar nature of *fake*, we can think of a collection of gemstones. If we are comparing three stones— a diamond, a piece of cubic zirconium, and a piece of glass cut to look like a gemstone— we can felicitously utter the following:

(143)   The cubic zirconium is a fake, but at least it's not as fake as that piece of glass. That one's not even a gemstone!

I will return to the matter of scales and the role of context in adjective meanings in the following section.

3.6   Group II Adjectives and the 'Lives-On' Constraint

One of Partee's concerns in addressing the privative adjective problem is taxonomical: she concludes that all adjectives except the Group II adjectives (which she terms 'modal adjectives') are subsective, and she acknowledges that such a situation still leaves us with the *glob* problem. As mentioned above, rather than argue that all adjectives are subsective per se, I wish to argue that all adjectives, including Group II adjectives, obey the lives-on constraint.

I face three challenges to such an assertion. The first it to argue that Group II adjectives have the property 'lives-on', which runs counter to many people's intuitions about their meaning. The second is to maintain a distinction between these Group II adjectives and Group I adjectives like *fake* that leads the former to be trivialized by combination with the operator and the latter to survive intact (since the latter, but not the former, appear as predicates) even though they both conform to the lives-on constraint. The third relates to a potential objection to the earlier discussion of the *glob* problem: I must demonstrate that an otherwise

grammatically viable function of type $< v, v >$ is illicit as an adjective since, when modifying a noun, it forms an adjective-noun combination that fails to live on the intension of the modified noun.

3.6.1 Group II adjectives live on the nouns they modify

To repeat our lexical entries for *alleged* and *former*:

(144) $[\![$ alleged $]\!] = \lambda F_{<v,v>}.\lambda x.\lambda w.\exists a$ s.t. $\forall w'\ wR_aw'\ F(x)(w')$

(145) $[\![$ former $]\!] = \lambda F_{<v,v>}.\lambda x.\lambda w.\exists w' < w$ s.t. $F(x)(w')$

Both lexical entries make reference to possible worlds that are not the base world. For *alleged*, we have an accessibility relation R_y that gives us the set of possible worlds w' that are consistent with what y believes in the base world. For *former*, we have a specification $w' < w$ which allows us to pick out the set of possible worlds that temporally precedes the base world. Both lexical entries state that, at least in some possible worlds, the individual has the property denoted by the noun. In other words, to interpret *alleged* we must access a set of possible worlds in which x *is* a murderer and check to see whether the set of possible worlds consistent with a's allegations in the base world is a subset of that set. It is paradoxical to claim simultaneously that there are possible worlds consistent with what a believes in which x is a murderer and that x is not a murderer in any possible world. Likewise for *former*: in order to be able to access the set of *former presidents*, there must be at least some possible worlds in which x has the property denoted by *president*. In other words, the intension of the noun *murderer* or *former*, respectively, must contain x as a member.

What these Group II adjectives do, then, is precisely to denote functions that live on intensions of the nouns they modify. For example, ⟦ alleged murderer ⟧ picks out the subset of possible-world-murderers who are murderers in the allegation worlds of a particular person (as accessed from the base world). What *former president* does is pick out those individuals who, in some time prior to the base time, were *presidents*. Thus the functions conform perfectly to our constraint, though they arguably rely more heavily on access to possible worlds than do most Group I adjectives.

3.6.2 The role of context in adjective meanings

I have just argued that both privative adjectives and Group II adjective conform to the lives-on constraint for adjectives proposed above. But privative adjectives are viable as predicates, where Group II adjectives are not. In order for the arguments here to hold, it must be the case that, when a privative Group I adjective like *fake* combines with the operator, the result is not a constant function. This must stand in contrast to the result when a Group II adjective combines with the operator and does output a constant function.

Before going any further, let's confirm via intuition that the predicate *fake* is not a constant function. It is possible, again looking at a chunk of cubic zirconium, to state the following two sentences felicitously:

(146)   a. That is a fake diamond.

b. That is not a fake gemstone.

In predicate position, we can do the same given the same situation:

(147)   a. That diamond is fake.

         b. That gemstone is not fake.

The predicate *fake* thus does choose between arguments and is not a constant function.

Let's examine what happens to *fake* and *alleged* when they combine with our operator:

(148)   a. ⟦ Op ⟧(⟦ fake ⟧)

             $= [\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.\ A(\lambda y_e.\lambda v_s.1)]\ (\lambda F.\lambda x_e.\lambda w_s.F(x)(w)$ in a context C and x is fake in w)

             $= \lambda x_e.\lambda w_s.\ 1$ and x is fake in w

         b. ⟦ Op ⟧(⟦ alleged ⟧

             $=[\lambda A_{<v,v>}.\lambda x_e.\lambda w_s.\ A(\lambda y_e.\lambda v_w.1)]\ (\lambda F_{<v,v>}.\lambda x_e.\lambda w_s.\exists a\ s.t.\ \forall w'\ wR_aw'\ F(x)(w'))$

             $= \lambda x_e.\lambda w_s.\exists a\ s.t.\forall w\ wR_aw'.\ 1$

The resulting predicate *alleged* is trivial since it is a constant function. The resulting predicate *fake*, however, is still able to meaningfully distinguish between arguments, as it does in sentences like, e.g., *That diamond is fake*.

What is it about the meaning of 'fake' that causes it, but not 'alleged', to combine happily with the operator? I would like to argue that the relevant distinction is the role of context in the respective lexical entries of the two types of adjectives. Kennedy (1997) discusses extensively the relationship between adjective meanings and scales. For many adjectives—sometimes known as gradable adjectives—it makes sense to consider the adjective meaning as denoting some relationship between the noun being modified and a given position on a scale. Depending on context, the scale might look slightly different. To give a

familiar example of the outcome, note the following pair of sentences:

(149)   a. My nephew is a tall third-grader.

        b. My uncle is a tall basketball player.

A *tall third grader* will probably not be nearly as tall as a *tall basketball player*, though both nouns can be modified by tall and the resulting predicate can be predicated truthfully of the right individual. If we make a complete scale of all entities in the universe according to their tallness, the basketball player and the third grader will both be on the scale, but they will be nowhere near one another. Thus in each sentence the context must direct us to the appropriate use of the adjectival scale in order for us to evaluate the truth value. Kennedy reviews two broad lines of thinking about how this might work. In the first, the role of context is to direct us to the appropriate portion of the scale. In the second, context tells us where on the scale to set our 'standard' marker, so that in that context everything below the standard is not tall and everything above it is tall. Either way, the contribution of context to the interpretation of the adjective itself is to indicate how the comparison class should be set.

I contend that this role of callibrating a comparison class is the *only* role which context plays in adjective meanings. Additional roles of context in discourse containing adjectives may be much broader. For example, in the case of a so-called 'non-linear' adjective like *good*, discourse context may play a role in determining which version of the adjective is in use: the one with a scale that ranks people by how good they are as doctors? as football players? as people? But the role of context within the adjective meaning itself is limited to the manipulation (either by excerpting or by moving the standard) of a given scale.[2]

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[2]In this way, an approach based on Kennedy and others along the same lines addresses

Group II adjectives do not involve comparison classes: they have no scales, and their lexical entries make no reference to context. We don't set a standard or determine a comparison class: there is no independent property of alleged-ness that can sensibly be called scalar. Instead, we make a non-scalar assessment about all murderers in every possible world to evaluate the truth value of the predicate formed by the adjective-noun combination.

The same is true, e.g., for *former*. Context may play a role in the discourse—e.g., setting the utterance time to establish temporal order—but it has no role to play in the meaning of the adjective itself. A president is not either former or not former depending on his position in some comparison class consisting of things that are former. Instead, his presidency may be former or not depending on the larger discourse context (e.g., the utterance time, which is external to the meaning of the adjective).

Note that the fact that Group II adjectives are non-gradable falls out naturally under this view.

It is important to add that I reject the notion that any contextual parameter specified within the adjective's lexical entry plays a role in, e.g., picking out the relevant individuals whose 'allegation worlds' should be considered in the interpretation of the adjective 'alleged'. The adjective itself requires only that for some individual the allegation holds. Any pragmatic knowledge of whose allegations are relevant to the discourse (e.g., only those of sane people; only

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Siegel's empirical problem from Chapter 1. The reason why an adjective like *good* is sometimes two-way ambiguous (what Kennedy calls 'vague' and at other times fully indeterminate (what Siegel calls 'vague') is that such an adjective has multiple scales available. However we conceive of the relationship between these multiple scales ranking individuals according to their goodness at various things (soccer, virtue, fathering), the role of the contextual parameter *within* the adjective itself is to constrain the portion of the scale considered or to set the standard appropriately, *not* to tell us which scale is relevant for the larger utterance.

those of people familiar with the relevant facts; only groups of two or more people) enters at a higher level than the interpretation of the adjective itself. In other words, a Group II adjective is interpreted in the same way in every context, but (as is generally the case) in the context of a given discourse we ignore irrelevant implications of the interpretation. (E.g., in the case of 'alleged' we might, during most conversations, ignore the allegations of the insane.)

We have seen, then, how it is possible that both *fake* and *alleged* conform to the lives-on constraint, while of the two only *fake* survives combination with the operator to form a viable predicate, since only *fake* denotes an independent property that can be evaluated without direct reference to the interpretation of the modified noun.

3.6.3 *Glob* does not live on the noun it modifies

We are left with potential challenges to the details of the way the *glob* problem has been presented. *Glob* clearly violates the lives-on constraint, since an individual can be a *glob books* without being a book, but it must also be clear that *glob* is ruled out for this reason and not for independently violating some separate grammatical restriction. An argument against drawing any conclusions about the *glob* problem based on the standard *glob* example adopted above is that, in introducing argument structure within the semantics rather than the syntax, it is inherently ungrammatical regardless of any specific constraints on the semantics of adjectives.[3] Following is another example of *glob*, which we can call *glob'*, and which does not introduce argument structure in the semantics:

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[3]Thanks to John Whitman for pointing out this challenge to the original example.

(150) $[\![\ \text{glob}'\ ]\!] = \lambda F_v.\lambda x.\lambda w.F(x)(w)\ \textit{or x is big in w}$

Glob' does not live on the noun it modifies, since it does not follow that if x is an element of the set denoted by *glob' noun* then x is also a member of the set denoted by the noun itself.

As to demonstrating that no *glob* exists which both does conform to the lives-on constraint and does not constitute a viable adjectival function in natural language, I am unable to find such an example at this time but of course do not rule out that such a function is conceivable. However, to maintain the arguments here it is necessary to show that those functions of type $< v, v >$ that violate the constraint are not viable natural language adjectives, and not vice versa. If some function of that type conforms to the constraint but is nevertheless absent from natural language, that may or may not be the result of an accidental gap but should not directly weaken the argument here.

3.7   Trivial predication in *there*-expletives

There is a third discussion in Barwise and Cooper (1981) to which I believe the current proposal may be relevant: their analysis of the definiteness restriction in *there*-existentials (a puzzle also discussed by Kuno (1971), Jenkins (1972), Stowell (1978), Williams (1984), Zucchi (1995), McNally (1998), Keenan (2003), and Francez (2007), among many others). To review the relevant data:

(151)   a.   There is a man in the garden.

   b.   There are some men in the garden.

   c.   There are men in the garden.

d. * There is the man in the garden.

e. * There is every man in the garden.

The phenomenon illustrated by this data has become known as the definiteness restriction because definite DPs are restricted from *there*-expletives. On closer inspection, though, the exact characterization of the group of DPs that are restricted from *there*-expletives is more complex. Barwise and Cooper contend that the DPs that cannot occur in *there*-expletives are exactly those that are most difficult to construe as trivial (a property of GQs to be discussed in detail in the following section). They call these the *strong* determiners and provide the following definition:

(152) A determiner *D* is *positive strong* (or *negative strong*, respectively) if for every model $M = \langle E, [\![\ ]\!] \rangle$ and every $A \subseteq E$, if the quantifier $[\![\ D\ ]\!](A)$ is defined then $A \in [\![\ D\ ]\!](A)$. (Or $A \notin [\![\ D\ ]\!](A)$, respectively.) If D is not positive or negative strong then D is *weak*.

Or, simplified:

(153) A determiner is strong if a statement of the form D N is an N/are Ns is either automatically valid or contradictory. If the validity of the statement is contingent, D is weak.

For example,

(154)   a. All men are men: automatically valid regardless of model; *all* is a strong determiner

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b. Neither man is a man: automatically contradictory regardless of model; *neither* is a strong determiner

c. Some men are men: model contingent; *some* is a weak determiner

They intentionally use the terms *strong* and *weak* to recall the work of Milsark (1974) on *there*-existentials, in which the author refers to those determiners that can appear in the construction as weak and those that cannot as strong. Having created a formal definition for the two categories of determiner, Barwise and Cooper use the definition to formulate their version of the definiteness restriction, which relies on the following semantic interpretation of *there*-existentials:

A sentence of the form *there is/are* NP can be interpreted as meaning that the set of individuals in the model (E) is a member of the quantifier denoted by the NP.

Barwise and Cooper (1981)

The set of individuals can be seen as a predicate (VP) that denotes all individuals. To use Keenan and Stavi's terms, it is the universal property that applies to all individuals in the model. Barwise and Cooper paraphrase it with the verb *exist*. Their semantics for *there*-existentials can be paraphrased as follows:

(155)   A *there*-existential of the form *There is/are NP* means *NP exists*

A *there*-expletive with a strong determiner is ungrammatical for Barwise and Cooper (1981) because stating that the universal property is in the quantifier is the same as saying that *A* is in the quantifier, which is true by definition for

quantifiers with strong determiners. In other words, when a GQ contains a strong determiner we already know that the universal property is an element of the quantifier, and as such a *there*-existential with a strong determiner is tautologous.

Barwise and Cooper offer an intuitively sensible semantics for *there*-existentials and a simple, elegant approach to the definiteness restriction that produces viable results. Unfortunately, their analysis backs them into a corner with respect to syntactic constituency within *there*-existentials. I believe that, using the machinery set up here already, we can maintain their semantic analysis of the construction without having to stick to their awkward syntactic analysis.

For convenience, I will follow Francez (2007) in referring to the NP in a *there*-existential as the *pivot* and all material following the NP as a coda. Barwise and Cooper, in order to maintain their analysis in the face of the ungrammaticality of a sentence like *There is the man in the garden*, must claim that the coda (here *in the garden*) is inside the NP. Otherwise the sentence would be redundant (it would tell us twice that ⟦ exist ⟧, or the universal property, is a member of the set denoted by the GQ) but it wouldn't be a tautology, since it would also contribute new information: that ⟦ in the garden ⟧ is a member of the set denoted by the GQ.

In addition to being counterintuitive in the interpretation of many readily available examples, the idea that the coda must be contained within the pivot NP had already by the time of Barwise and Cooper (1981)'s writing been argued against formally by many including Milsark (1974). Milsark, commenting on analyses of *there*-expletives that preceded his but kept the coda inside the NP pivot such as Jenkins (1972), shows that, while parts of NPs usually cannot be

extracted, coda material can be separated from the pivot via extraction.

(156) a.   I talked with a man in a suit of armor.

      b.   * In a suit of armor I talked with a man.

(157) a.   There is a guppy in the drainpipe.

      b.   In the drainpipe there is a guppy.

(158) a.   It's John at the door.

      b.   * Where is it John?

(159) a.   There's a salt cellar in the cabinet.

      b.   Where is there a salt cellar?

Francez (2007) adds that the pivot plus coda combination does not always have the same distribution as an NP, (data from Francez (2007), p. 34):

(160) a.   There are no students who you know enrolled in the class

      b.   * No students who you know enrolled in the class asked about you.

We have, as part of the working machinery of the present analysis, already posited a constraint on trivial predication that cannot be sidestepped via the inclusion of informative material in the larger structure. Recall the discussion of the sentence *John is tall and alleged* in chapter 2. We saw that, although the predicate *tall* is non-trivial, because the sentence is burdened by the extra structure of the trivial predicate *alleged*, which adds structure but no meaning, it is still ungrammatical.

We can extend this phenomenon to allow ourselves to maintain Barwise and Cooper's semantic analysis of *there*-existentials without having to maintain their

untenable claim about the constituency of the pivot + coda. To restate their problem: if *the man in the garden* were not a single NP, then the sentence shouldn't be trivial: although we would learn redundantly that *the man* exists, we would also gain the new information that he is *in the garden*. (If it is a single NP, as they suggest, then we have learned the trivial information that [DP the [NP man in the garden]] exists.)

Our constraint on trivial predication, combined with the structural economy constraint, gives us an alternative. We can maintain Barwise and Cooper's basic interpretation of *there*-existentials, along with their account of the definiteness restriction, even with the more plausible structure [[D NP] [PP]] for *the man in the garden*. The sentence might be salvaged by the non trivial predication that occurs when the PP takes the DP *the* man as its argument. But there is a second predicate, that signified by the universal property, that is trivial and contributes no additional meaning. On Barwise and Cooper's interpretation, the sentence *There is the man in the garden* violates our structural economy constraint, since it is equivalent in denotation to the more structurally economical *The man is in the garden*.

3.8   Constant Functions and Ungrammaticality

Returning to the discussion of triviality and ungrammaticality in Chapter 2, above, there is yet another parallel to be drawn- quite speculatively at this point- between the behavior of adjectives as discussed here and Barwise and Cooper (1981)'s discussion of generalized quantifiers. Like predicate adjectives, GQs can be constant functions. My goal here is not to draw any definitive conclu-

sions about the relationship between constant functions and ungrammaticality, but to discuss a potential similarity between two instances of constant functions in grammar that may indicate room for further research.

Barwise and Cooper (1981) discuss two things that can go wrong when determiners combine with nouns to form GQs. The first, in which the GQ fails to denote anything, is not particularly relevant here. This occurs when the noun's denotation is not in the domain of the determiner. For example, the determiner *both* has a highly restricted domain: it contains only sets with exactly two members. Additional examples of determiners that have very restricted domains are *the* and *neither*. *The* has only singleton sets in its domain; *neither*, like *both*, has only sets with exactly two members in its domain.

The other way in which a GQ can go bad is more relevant here. In this type of failure, the GQ is trivial. This can happen in one of two ways: the denotation of the DP (a generalized quantifier) can assign TRUE to all VPs (i.e. can pick out the power set of VPs, written as Pow(E)) or FALSE to all VPs (i.e. can pick out ∅), thereby failing to pick out any subset from the set of VPs. When a GQ does not fail in this way (in either direction), Barwise and Cooper term it a 'proper quantifier' or a 'sieve'.

The term 'sieve' refers to the ability to distinguish among VP arguments. A generalized quantifier (GQ) denotes a 'sieve' if it picks out some but not all (and not no) VPs. Interestingly, there are no GQs that are always non-sieves. Instead, triviality is determined by the model, and the actual failure of these trivial functions can be difficult to observe directly. The constraint on trivial predication as formulated in the previous chapter rules out predicates that fail to pick out some but not all DPs, and this type of triviality is far more visible

(we can see it, for example, in the simple but bad sentence *John is alleged*).

In both of these cases of triviality, a constant function is bad. Is there a general disinclination toward constant functions in the grammar?

Let's look at the properties of non-sieve GQs more closely. These are GQs that, given the model, fail to distinguish among VPs. Two examples from Barwise and Cooper are as follows:

(161)   Example of a non-seive GQ that picks out $\emptyset$: in a model with no men, the GQ *many men*

(162)   Example of a non-seive GQ that picks out Pow(E): in a model with no men, the GQ *every man*

In other words, in a model with no men, the GQ *many men* is a non-sieve because it returns FALSE regardless of what VP it takes as its argument. If there are no men, there is no action that is performed by many of the non-existent men. On the other hand, in the same model the GQ *every man* fails to distinguish between VPs in the opposite direction: regardless of the VP it takes as its argument, it returns TRUE. Since there are no men, it is trivially true that every man performs every action. There are, of course, many models in which one or both of these GQs is non-trivial. But regardless of what model we work with, the two will never switch the direction of their triviality from the model with no men. *Many men* will never return TRUE for all VPs, and likewise *every man* will never return FALSE for all VPs.

To make a firm comparison between trivial predication and trivial GQs, it would be necessary to know definitively whether the non-occurence of GQs that

are *always* non-sieves, model independently, is principled (as I am contending the constraint on trivial predication is) or arises from an accidental gap. I have not succeeded in finding a way to ascertain which is the case. It would also be useful to compare the result of using a trivial predicate to that of using a non-sieve GQ, which we can do if we set up the model correctly. Are non-sieve GQs ungrammatical, or at least anomalous, like trivial predicates? For comparison, following are a few examples of each phenomenon.

(163) a. John is alleged.

  b. That president is former.

  c. The events reported are actual.

(164) In a model $\mathbb{M}$ which contains no unicorns and no square triangles:

  a. Every square triangle is a triangle. (TRUE)

  b. Every square triangle is large. (TRUE)

  c. Many square triangles are triangles. (FALSE)

  d. Many square triangles are large. (FALSE)

  e. Every unicorn flies. (TRUE)

  f. Every unicorn has a horn. (TRUE)

  g. Many unicorns fly. (FALSE)

  h. Many unicorns have horns. (FALSE)

The sentences in (163) are clearly not sound, which under the current analysis results from the fact that their predicates are trivial. The sentences in (164) do not seem to be bad, but there is something odd about them. They contain constant functions: each of the GQs returns the same output regardless of what

VP argument we give it. I would like to be able to compare the oddness of the sentences in (164) to the anomaly of those in (163). Does the occurrence of a constant function have the same impact in both cases?

The comparison between the two types of sentences is made difficult by the fact that the non-sieve GQs are not *always* constant: given a different model, they would be perfectly sound sieves. By contrast, the trivial predicates resulting from the operator's action on Group II adjectives are impossible to construe as non-constant functions, regardless of our model. In the absence of an example of a GQ that is *always* a non-sieve, regardless of the model, we cannot make a direct comparison from which to form a firm and general hypothesis about the status of constant functions in grammar. As such, I am only able to speculate for now and leave further exploration to future work.

CHAPTER 4

GREEK DETERMINER SPREADING

4.1 Testing the Proposal on Non-English Data

The goal of this final chapter will be to implement the proposal laid out in the previous chapters using non-English data. To do so I will look at adjectival modification in the modern Greek DP. As we will see momentarily, adjectives in Greek can occur in two different configurations within the DP itself. This contrasts with English, in which DP-internal adjectives occur only prenominally.[1] In Greek, adjectives can appear in a position that parallels the English prenominal position, but they can also occur in an alternative structure that has been widely discussed in the literature and is referred to as Determiner Spreading (or, sometimes, 'Polydefiniteness').

4.2 Determiner Spreading in Greek

Greek has two configurations for DPs. The first looks similar to the English DP. The word order is determiner > adjective > noun, and adjectives stack in the standard order described in Sproat and Shih (1988). DPs with this word order have been termed 'monadic' by Kolliakou (2004). In the second configuration, adjectives can be prenominal or postnominal, and every postnominal adjective must be preceded by its own definite article. This phenomenon is referred to as

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[1]Except in exceptional cases, e.g. phrasal modifiers as in the following sentence.

(1) A dog hungry for a good meal will often bark.

'Determiner Spreading' (DS) by Androutsopoulou (1994) or 'polydefiniteness' (Kolliakou, 2004). [2]

Greek definite DPs can be either monadic or DS:

(165) a. to megalo vivlio
           the big   book
           'the big book'

       b. * to   vivlio megalo
           the book big
           'the big book'

       c. to   megalo kokkino vivlio
           the big   red   book
           'the big red book'

       d. ? to   kokkino megalo vivlio
           the red   big   book
           'the red big book'

(166) a. to megalo to kokkino to vivlio
           the big   the red   the book

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[2]According to some speakers, indefinite DPs also exhibit the word order variations of DS. Other speakers reject data with varied word order in indefinites. There is no 'indefiniteness spreading': even for speakers who accept varied word order, repetition of the indefinite article is impossible.

(1) a. ena megalo vivlio
         a   big   book
         'a big book'

     b. ? ena vivlio megalo
         a   book big

     c. ? ena vivlio megalo kokkino
         a   book big   red

     d. * ena megalo ena vivlio
         a   big   a   book
         'a big book'

     e. * ena vivlio ena megalo
         a   book a   big
         'a big book'

     f. * ena vivlio ena megalo ena kokkino
         a   book a   big   a   red
         'a big red book'

'the big red book'

b.   to   megalo to   vivlio to   kokkino
         the big   the book   the red
         'the big red book'

c.   to   vivlio to   megalo to   kokkino
         the book   the big   the red
         'the big red book'

d.   to   vivlio to   kokkino to   megalo
         the book   the red   the big
         'the big red book'

e.   to   kokkino to   vivlio to   megalo
         the red   the book   the big
         'the big red book'

f.   ? to   kokkino to   megalo to   vivlio
         the red   the big   the book
         'the RED big book'[3]

What is the syntactic position of the extra determiners? And why is word order variation possible with DS but not in a monadic DP?

The syntactic aspects of DS have been widely discussed, e.g. by Androutsopoulou (1994, 1996), Alexiadou and Wilder (1998), Kolliakou (2004), Lekakou and Szendrői (2007), Larson and Yamakido (2008), Leu (2009), and Katzir (2011). In many cases, though, these syntactically-oriented analyses have failed to seriously consider the semantics of DS in weighing the viability of different syntactic structures for the construction.

In this chapter I will work primarily with the proposal for DS of Alexiadou

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[3]The word order in (166f) conveys the same special meaning as the Greek monadic DP with the equivalent adjective ordering (*to kokkino megalo vivlio*) or its English translation (*the RED big book*). The adjectives violate the conventional ordering guidelines (e.g., SIZE > COLOR) discussed in Sproat and Shih (1988). As in the monadic DP, the unusual adjective ordering is permissible but marked; the speaker must be referring to an already salient group of big books and picking out the unique red member of that set.

and Wilder (1998), which is appealing in many ways but disregards semantic issues almost completely. I show how our type-shiftng operator affects the distribution of Group II adjectives in Greek DS.[4] I also propose that the structure of DS includes a separate type-shifting operator that combines with the NP to enable it to combine with the one-or-more adjectives modifying it. Since the second type-shifting operator fails to prevent the observed anomaly of Group II adjectives in DS, I conclude that the first type-shifting operator applies directly above the merged position of these adjectives and that the second type-shifting operator comes too late in the structure to salvage them.[5]

In the course of making this argument, I will also address a number of problems with Alexiadou and Wilder's account specifically. First, I eliminate their full clausal structure from within the DP. They need to merge DS adjectives as

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[4]Some but not all speakers find some but not all Group II adjectives acceptable in DS with appropriate contrastive focus. The data is elusive and seems to vary highly among speakers. Nevertheless, the question of how information structure relates to the availability of DS has been discussed in some of the literature, including among others Ioannidou and den Dikken (2006) and Lekakou and Szendrői (2007). Following is a sampling of the controversial data:

(1) a. # o   proighoumenos o   prothipourghos
         the former   the prime-minister
         'the former prime minister' (from Androutsopoulou (1996))

     b. # O proigumenos o   prothipurgos   pethane.
         the former   the prime-minister died
         'The former prime minister died.' (from Lekakou and Szendrői (2007))

     c. # o   proedros o   proin
         the president the former
         'the former president' (Effi Georgala, p.c.)

     d. # o   *ipotithemenos* o   dholofonos
         the alleged   the murderer
         'the alleged murderer' (Effi Georgala, p.c.; italics indicate contrastive focus)

     e. # o   dholofonos o   *ipotithemenos*
         the murderer   the alleged
         'the alleged murderer' (Effi Georgala, p.c.; italics indicate contrastive focus)

Interestingly, Group II adjectives have also been noted as anomolous in Slavic split-NPs (see Pereltsvaig (2008) and Partee (2009)), and there too the anomaly can apparently be made more acceptable through focus.

[5]All conclusions drawn earlier about the syntactic position of Op, including the restriction on taking AP in its specifier, apply to the Greek data as well.

predicates of reduced relatives, following Kayne (1994), in order to exclude the Group II adjectives from DS. By providing an independent semantic account of these adjectives' behavior in DS, I avoid the reduced relative structure altogether. Second, I eliminate the potential for conflict, acknowledged by the authors,[6] between two movements to A' positions within their analysis. In my proposal, one of the two movements is type-driven and the other remains (as in their analysis) feature-driven, so the two cannot conflict.

4.3   Androutsopoulou

Alexiadou and Wilder (1998) take an approach based on the work of Antonia Androutsopoulou (Androutsopoulou, 1994 and Androutsopoulou, 1996). Following are the main features of Androutsopoulou's analysis:

1. A special functional projection, DefP, dominates each NP and AP in a definite DP and hosts the *syntactic* feature [+def].

2. $\text{Def}^0_{[+def]}$ is spelled out as the definite article

3. semantic definiteness is associated with D^0, which occurs only once at the top of the tree; Def^0 is semantically vacuous

4. varied word order results when any given DefP raises to the specifier of a higher DefP, producing all the desired word orders listed in section 4.2 and no others.[7]

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[6]See Alexiadou and Wilder (1998), fn.18.

[7]Androutsopoulou suggests that this is movement to check the definiteness feature, but that the movement can take place either overtly or covertly

Androutsopoulou's tree for DS is as follows:[8]

(167)

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                        DP
                    ╱        ╲
              Spec,DP         D′
                          ╱        ╲
                        D⁰          DefP₁
                        ∅        ╱        ╲
                         Spec,DefP      Def′
                                     ╱        ╲
                                   D⁰          AP
                                   the      ╱     ╲
                                        Spec,AP    A′
                                                ╱     ╲
                                              A⁰       DefP₂
                                              big    ╱      ╲
                                                Spec,DefP    Def′
                                                          ╱        ╲
                                                        Def⁰         AP
                                                        the      ╱     ╲
                                                             Spec,AP    A′
                                                                     ╱     ╲
                                                                   A⁰       DefP₃
                                                                   red    ╱      ╲
                                                                    Spec,DefP    Def′
                                                                              ╱       ╲
                                                                            Def⁰       NP
                                                                            the      book
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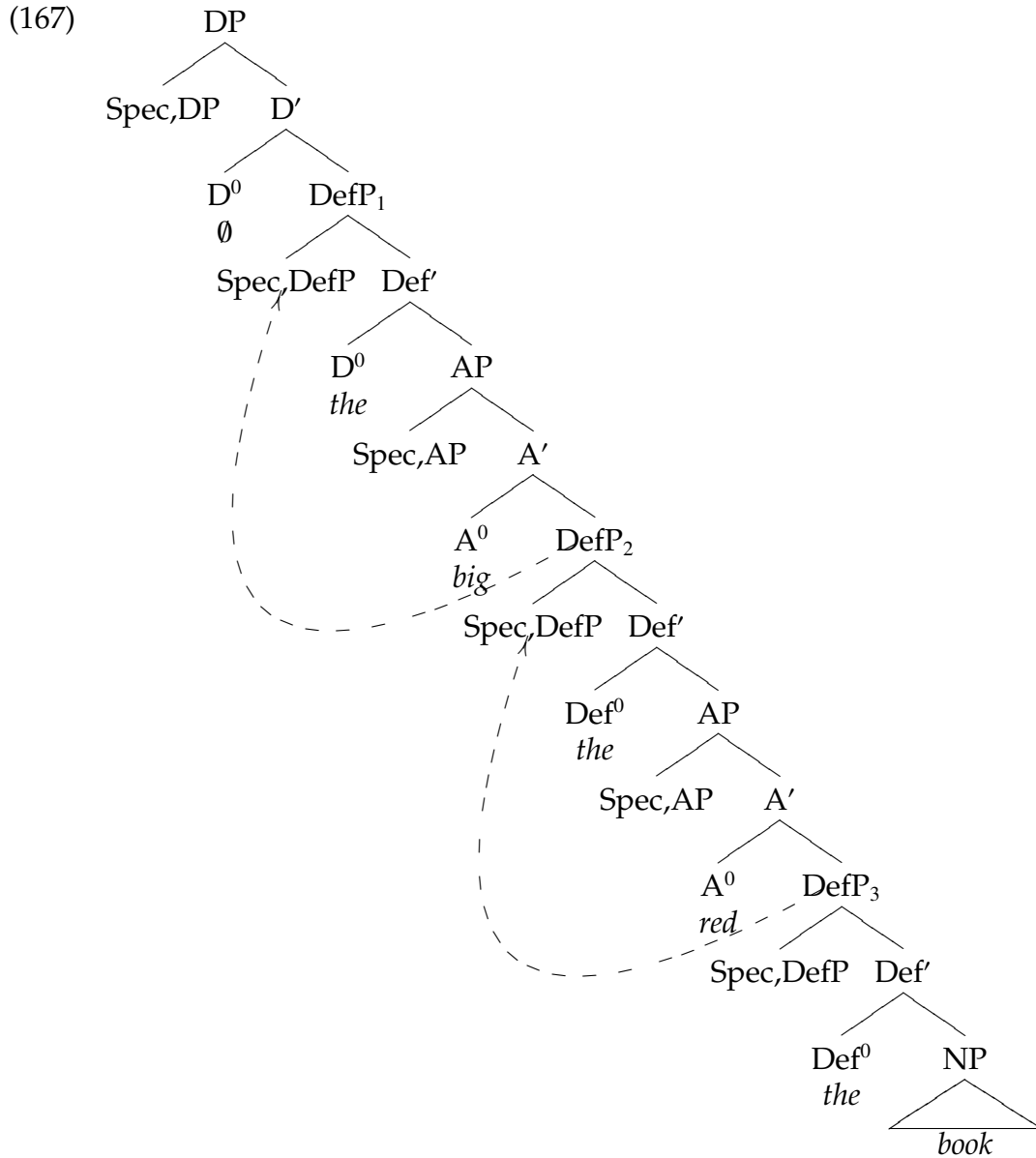
[8]Despite the way the tree is drawn here, Androutsopoulou remains agnostic as to whether adjectives are heads or specifiers. She argues that either of these two options is preferable to making adjectives NP adjuncts, since adjectives seem to exhibit strict ordering restrictions and there is no principled way to order multiple adjuncts adjoined to the same projection. Note that, as she points out, Greek does have phrasal adjectives—clearly at least these adjectives cannot be treated as heads.
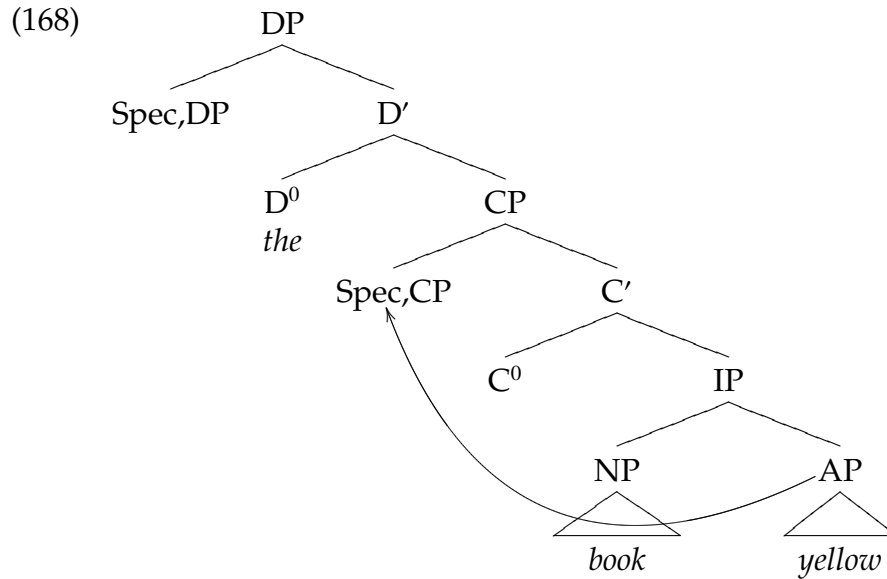
4.4 Alexiadou and Wilder (1998)

Androutsopoulou analyzes DS as a series of embedded constituents, each headed by a semantically null element that is pronounced as a copy of the definite article. Alexiadou and Wilder take Androutsopoulou's structure as their starting point but make a number of departures from her account. First, they dispense with the special DefP projection that Androutsopoulou uses to host the extra determiners in DS on the grounds that it is unmotivated, replacing it with iterations of DP. Second, they follow Kayne (1994) in generating adjectives postnominally as the predicates of reduced relative clauses.[9] In the resulting structure, each determiner takes a full CP complement, and each embedded relative clause takes a DP as subject and an AP as predicate.

In Kayne's proposal, the adjective is preposed from its merged position as the predicate of a reduced relative clause to spec CP:[10]

[9]Kayne himself revives a much older idea from early generative syntax, cf., e.g., Smith (1961).
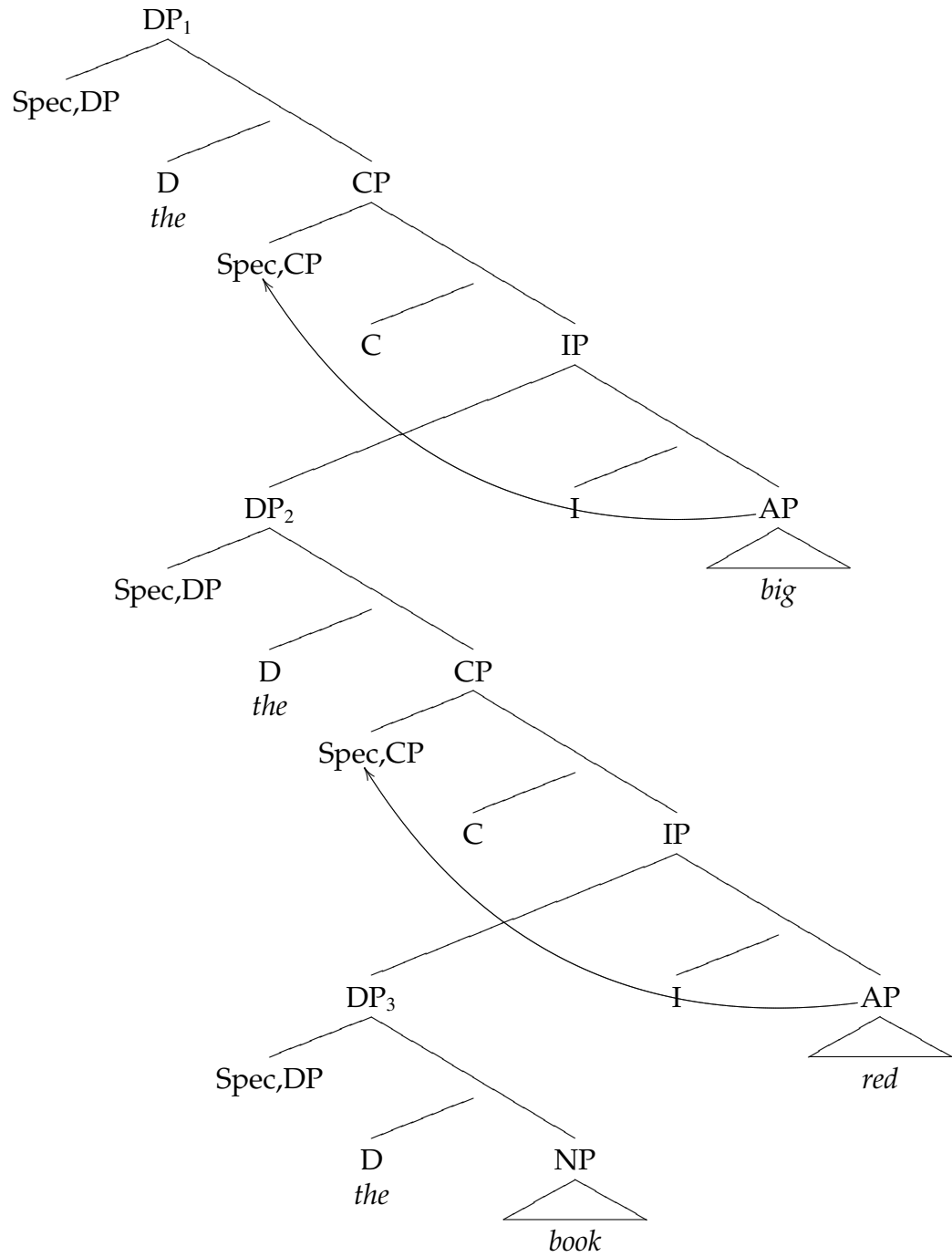[10]Kayne (1994), chapter 8

(168)

Alexiadou and Wilder claim that Greek DS has a similar structure, with APs raising to Spec,CP obligatorily but with DPs in Spec,IP, and that the structure can iterate:[11]

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[11]See Alexiadou and Wilder (1998), fn.7 for their discussion of the need for DPs, not NPs in Spec,IP in their structure.

(169)

DP₁
- Spec,DP
- D *the*
- CP
  - Spec,CP
  - C
  - IP
    - DP₂
      - Spec,DP
      - D *the*
      - CP
        - Spec,CP
        - C
        - IP
          - DP₃
            - Spec,DP
            - D *the*
            - NP *book*
          - I
          - AP *red*
    - I
    - AP *big*

They account for the word-order variation observed in DS by allowing any DP to optionally raise to the specifier of any higher DP:

(170)
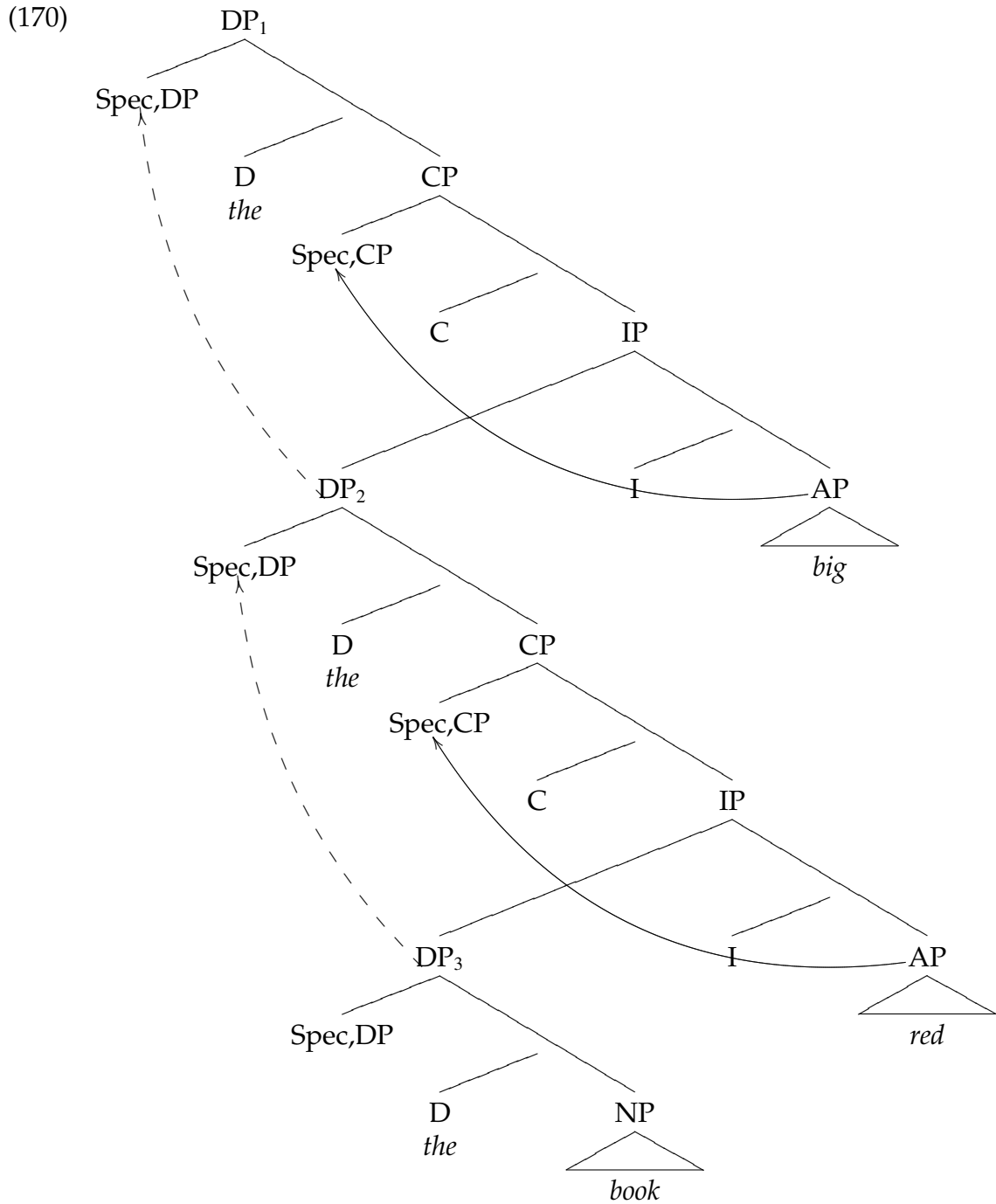
If no DPs raise, we get the basic word order *the big the red the book*. If DP$_3$ raises directly to the specifier of DP$_1$, we get *the book the big the red*; if DP$_3$ raises to the specifier of DP$_2$ and no further movement takes place, we get *the big the book the red*. If DP$_2$ raises to the specifier of DP$_1$ and no other movement takes place, we

get *the red the book the big*; if DP$_3$ raises to the specifier of DP$_2$ and then DP$_2$ raises to the specifier of DP$_1$, we get *the book the red the big*. The anomalous DS structure #*the red the big the book* can only result from the adjectives' having been merged initially in the anomalous order *red>big* (and indeed speakers confirm that the anomaly of *the red the big the book* is on par with that of its monadic counterpart *the red big book*).

Alexiadou and Wilder are also able to account for the 'mixed DPs' some speakers find acceptable. These are cases where a monadic DP is embedded within a DS structure.

(171)   a.   to megalo to kokkino vivlio
                 the big   the red   book
                 'the big red book'

          b.   to   kokkino vivlio to megalo
                 the red   book the big
                 'the big red book'

Contra Kayne, they maintain that, in addition to the reduced relative source for prenominal adjectives, such adjectives can alternately be merged between D and NP.[12] Thus a non-DS DP can be embedded within a DS DP, with a 'mixed DP' resulting. For them, monadic DPs are simply the result of merging all the adjectives in a given DP in this way (i.e. between D and N). Since there are no embedded DPs in such cases, word order in monadic DPs is fixed.

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[12]This may mean as NP adjuncts or, for those who prefer Cinque-style functional projections to host adjectives, in either head or specifier of some projection(s) between D and N. The particular choice does not affect their analysis.

4.5 Critique of Alexiadou and Wilder (1998)

4.5.1 Group II adjectives in DS

For Alexiadou and Wilder, adjectives in DS are merged as the predicates of relative clauses. Like some earlier generative linguists who took this as the base position for prenominal adjectives (see Siegel (1976) for an extensive review and discussion), but unlike their more recent and direct source for the analysis, Kayne (1994), they disallow any adjective that would be ungrammatical in this base position from appearing in the resulting structure even after movement. Specifically, Alexiadou and Wilder claim that Group II adjectives like *alleged* and *former*, because they cannot appear in the predicate position where DS adjectives are merged, are ungrammatical in DS even though they have undergone movement to Spec,CP. There are a number of problems with this assumption.

Kayne (1994) generates all adjectives, including, presumably, the Group II ones, as predicates of relative clauses. As mentioned briefly above, though, no adjective is allowed to remain in that position. Instead, the AP must raise above the NP it modifies to the specifier of CP.[13] For Alexiadou and Wilder, though, there must be a stipulative distinction between those adjectives which are made grammatical by the movement (e.g. *yellow*) and those which cannot be helped (e.g. *former*). Their claim is that Group II adjectives cannot be merged as the predicates of relative clauses to begin with. But they give no principled reason why these adjectives cannot be merged there while others, which would also produce ungrammaticality if allowed to remain there, can be. Instead they must

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[13]In languages like French, where the noun precedes the adjective in the surface word order, Kayne posits an additional raising of the noun above the adjectives' landing site.

reason that, though all adjectives are ultimately bad in that position, some can be salvaged by raising to Spec,CP while others cannot be.

4.5.2   Moving AP to Spec,CP

A second problem faced by Alexiadou and Wilder's analysis is the lack of any apparent motivation for AP to raise to Spec,CP. This they inherit directly from Kayne, who states explicitly that he 'has no explanation' for why the AP cannot remain in its base position.[14] Even if the movement were well-motivated, though, it leaves Alexiadou and Wilder in the unfortunate position of having two constituents moving around each other—DP and AP—both into A′ positions. Their movements must be carefully choreographed to prevent conflict (and the wrong word order that would result from one goal's moving to the other's target). I will avoid this problem entirely since, though I borrow intact Alexiadou and Wilder's ideas about the optional raising of any DP to the specifier of a higher DP, for me the movement of AP to a higher position in the tree is not just obligatory but also type-driven.

4.5.3   Determiner scope

Alexiadou and Wilder, like Androutsopoulou, assume that extra copies of the determiner in DS are expletive. The copy of D^0 that has the semantics of definiteness associated with it—i.e., the non-expletive copy—is presumably the highest copy, since its definiteness scopes over the entire DP. But in the event that an-

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[14]Kayne (1994), page 100.

other DP moves to the specifier of the highest DP—a movement that can happen in Alexiadou and Wilder's analysis, as described above—that D^0 is no longer the highest D^0 in the tree. Yet it still must be able to take semantic scope over the entire DP, now including the material in its own specifier. In the analysis I offer below I will not make any real improvement on Alexiadou and Wilder's position with respect to this problem. I will, however, suggest here both for the benefit of my own analysis and theirs that we assume for now that any moved DPs are reconstructed at LF to their unmoved positions so that the semantically definite D^0 is interpreted in a position where it scopes over the entire DP, as desired. Independent evidence for this reconstruction would be reassuring, but for now I leave it as an assumption.

4.5.4   PPs in DS

One last problem with Alexiadou and Wilder's approach is that we would expect to see PP modifiers in DS, since they are licit in (reduced) relative clauses, but this prediction is not borne out by the data:
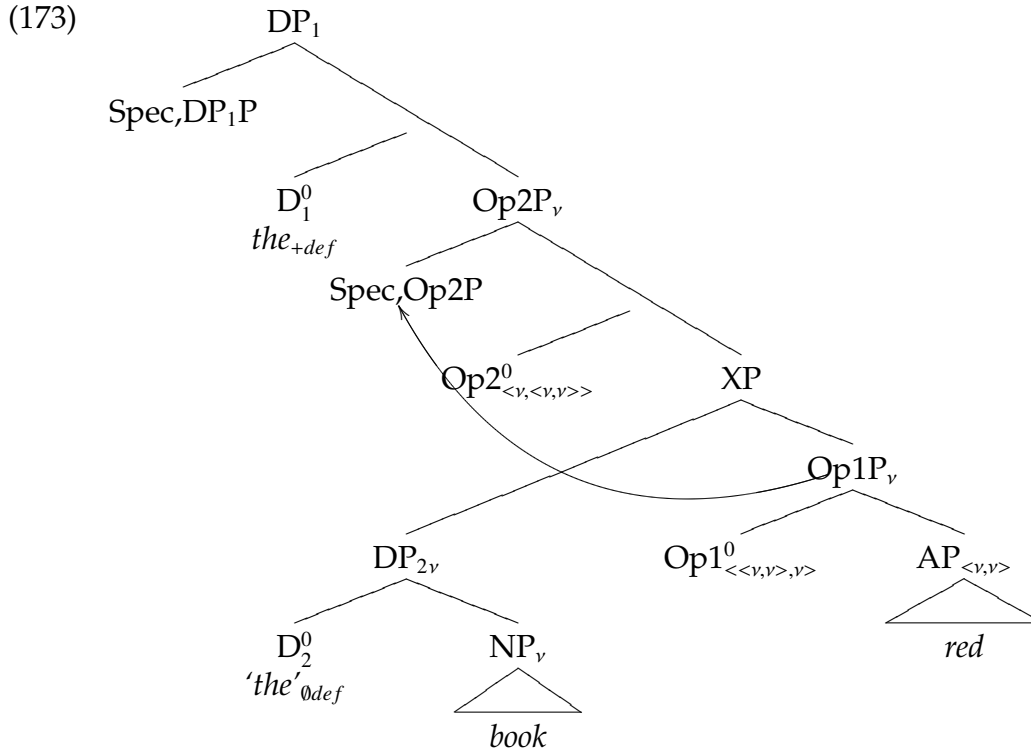
(172)   a.   to vivlio to opio   ine pano sto   rafi
            the book   which is on   to-the shelf
            'the book which is on the shelf'

      b.   to vivlio pano sto   rafi
            the book on   to-the shelf
            'the book on the shelf'

      c.   * to vivlio to pano sto   rafi
            the book   the on   to-the shelf
            'the book on the shelf'

      d.   * to pano sto   rafi to vivlio
            the on   to-the shelf the book

'the book on the shelf'

This problem will become moot in the current proposal with the elimination of relative clauses from the DS structure.

4.6   Structure

The examples of application of the operator for predicate adjectives in the earlier chapters were in English, but in Greek the same operator should apply to any adjective in a predicate position. Although I will not use their full clausal structure, I will adopt from Alexiadou and Wilder the assumption that DS is a predicative construction embedded within the DP. Thus an adjective in DS will need to combine with the operator in order to produce a node with the predicative type, v. The structure I propose for the DS DP *the red the book* is as follows:

(173)

DP_1
- Spec,DP_1P
- D_1^0 *the*$_{+def}$
- Op2P$_v$
  - Spec,Op2P
  - Op2$^0_{<v,<v,v>>}$
  - XP
    - DP$_{2v}$
      - D_2^0 *'the'*$_{\emptyset def}$
      - NP$_v$ *book*
    - Op1P$_v$
      - Op1$^0_{<<v,v>,v>}$
      - AP$_{<v,v>}$ *red*

The lowest DP, which is semantically transparent and inherits the semantics of the NP it contains, can form a predicative phrase (XP) with Op1P, which contains AP. Op1 is the same type-shifting operator that occurs whenever adjectives are required to act as predicates. It combines with the adjective, which begins with type $< v, v >$, to form a predicate with type v. But Op1P cannot combine with DP$_2$, which also has type v. OpP must therefore move to a position where it can be interpreted.

The phrase structure of DS provides the landing site: the specifier of a projection above the predicative phrase XP. This position is analogous to Alexiadou and Wilder's Spec,CP landing site for AP. But where they have an empty C^0 head, I have another type-shifting operator, Op2, which contributes crucially to the semantics of DS by combining with the DP to form a node of type $< v, v >$ that is sister to Spec,Op2P (which has type v since it hosts the raised OpP, which

has that type). Op2 is a function of type $<v,<v,v>>$ that raises the type of the DP and intersects the function denoted by DP with another function G (here the raised OpP).[15]

(174) $[\![$ Op2 $]\!]= \lambda F_v.\lambda G_v.\lambda x_e.\lambda w_s.F(x)(w) = G(x)(w) = 1$

The two sister nodes can now combine straightforwardly via function application, producing an Op2P with type et which can then continue to combine with the semantically contentful determiner (which has the usual type $<et,e>$).

As in Alexiadou and Wilder (1998), the alternate word order *the book the red* results if the lower DP (DP$_2$) raises to the specifier of the higher one (DP$_1$).

(175)

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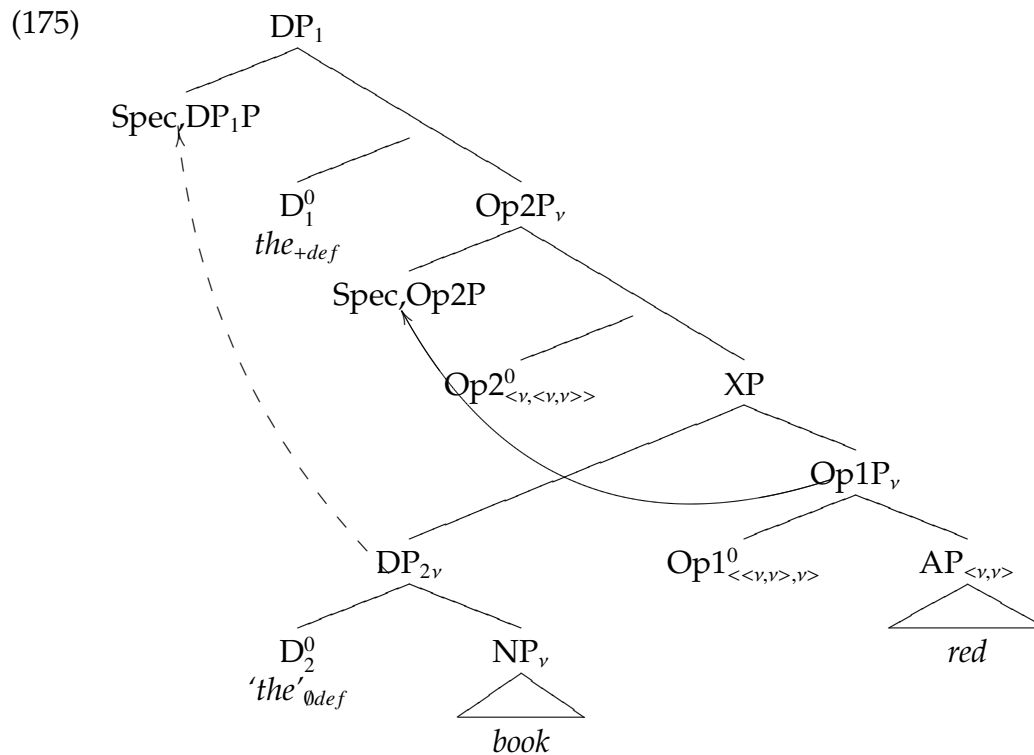
[15]The effect of Op2 is not unlike that of Predicate Modification. However, there are two crucial differences. First, it is a syntactic object that combines via function application and not a special compositional rule. Second, in this case intersection seems to be precisely what we need for appropriate interpretation of DS structures according to native speakers. See in particular data from Lekakou and Szendrői (2007) on this point.

If there is more than one adjective, the process iterates:

(176)
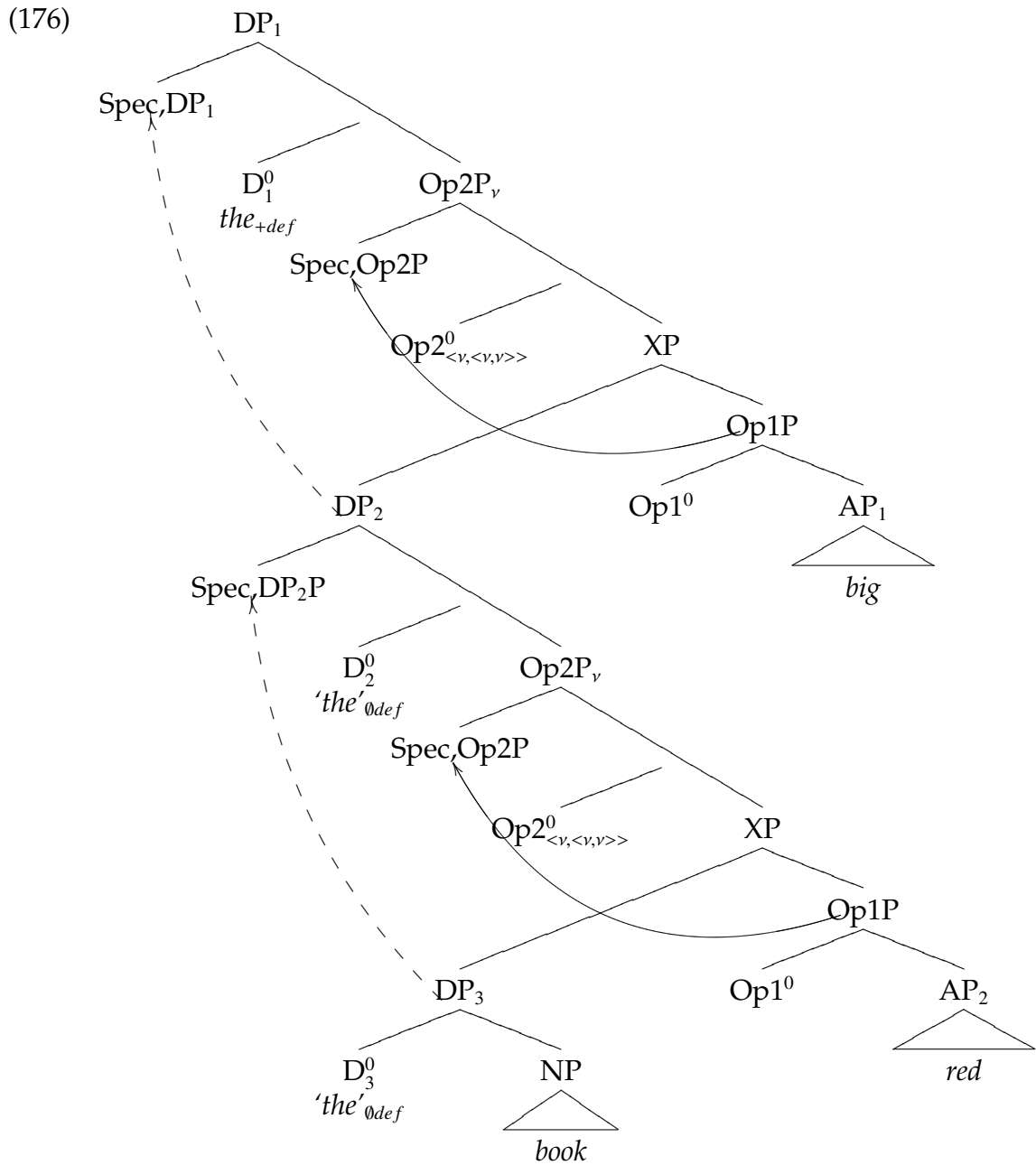
DP2 is semantically transparent (since its head is semantically null) and inherits type v from the Op2P it dominates. AP_1 combines with its own Op1, and the resulting Op1P (of type v) raises to the specifier of Op2P. The entire DP_2 combines with Op2, and that complex combines with the Op1P that has raised to

its sister node, forming an Op2P with type *v*. Finally Op2P combines with the semantically contentful determiner in D_1^0. Again, raising of any given DP to the specifier of any higher DP is optionally available, producing varied word order.

With only the minimal change of replacing Alexiadou and Wilder's relative clause structure with the one proposed here, we have already gained several advantages over their proposal. There is no unmotivated clausal structure, AP raising is fully motivated, and the fact that the movement of AP is type-driven ensures that it will not conflict with DP raising.

4.6.1 Group II adjectives in DS

What happens when we attempt to use a Group II adjective in DS? Let's return to a simpler predicative structure: a sentence that uses a Group II adjective as a postcopular predicate.

(177) a. John is an alleged murderer.

b. ?? John is alleged.

Lexical entries for *alleged* and *murderer* are repeated here.

(178) a. ⟦ alleged ⟧ $= \lambda F_v.\lambda x_e.\lambda w_s.\exists a \ \forall w' \ w_0 R_a w' \ \rightarrow \ F(w')(x)$

b. ⟦ murderer ⟧ $= \lambda y.\lambda w.y$ *is a murderer in w*

I have argued for a constraint restricting the combination of Op1 with Group II adjectives, repeated here:

(179) Constraint restricting the application of Op1:

A predicate F_v is anomalous if for any two members x and y of the set D_e (the set of all individuals), F(x) = F(y).

A Group II adjective in DS will violate the constraint. Let us examine what happens if, instead of *red*, we try to merge *alleged* in the DS structure.

(180)
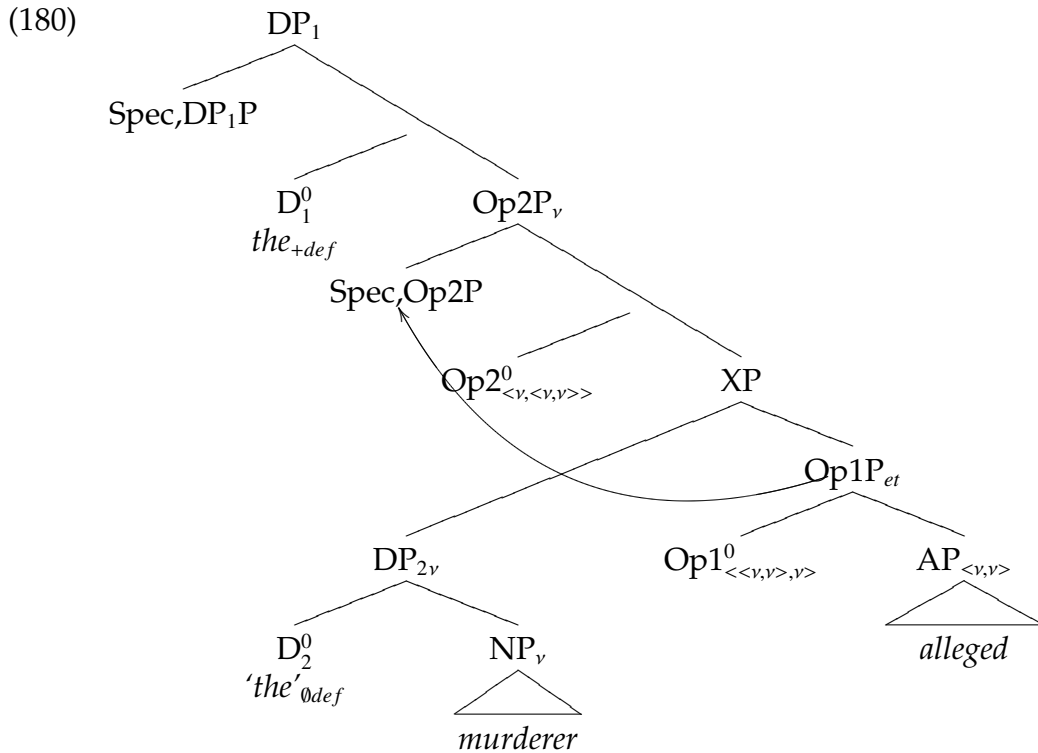
No adjective is able to remain in its merged position in DS, since once it combines with Op1 in its base position the Op1 phrase becomes uninterpretable in situ. However, there is a difference between an Op1P formed by Op1 plus a Group I adjective and one formed by combining Op1 with a Group II adjective. The Op1P with the Group I adjective is uninterpretable in situ because of a type mismatch, but given a sister node with the right type its contribution to the meaning of the DP will be straightforward. An Op1P with a Group II adjective, on the other hand, will have the same trivial interpretation as any predicate

formed by Op1 plus a Group II adjective. In (180) we have an Op1P with the following semantics:

(181) $[\![$ Op1P $]\!] = \lambda x.\lambda w.\exists a \; \forall w' \; wR_a w' \; \rightarrow \; 1$

The combination of Op1P and a Group II adjective is already ruled out by the constraint on trivial predication. But let us continue with the derivation and see whether incorporating the anomalous Op1P into a larger structure will allow us to recover.

DP2 has the semantics of the NP it dominates:

(182) $[\![$ DP$_2$ $]\!] = \lambda y.\lambda w.y \; is \; a \; murderer \; in \; w$

When Op2 combines with DP$_2$, we get:

(183) $[\![$ Op2 $]\!]$ ($[\![$ DP$_2$ $]\!]$) $= \lambda F_v.\lambda G_v.\lambda x_e.\lambda w.\lambda y.\lambda v.y \; is \; a \; murderer \; in \; v(x)(w) \; \wedge$
        $G(x)(w)$
        $= \lambda G_v.\lambda x_e.\lambda w_s.$ x is a murderer in w $\wedge$ G(x)

This then combines with Op1P, which sits in its sister node:

(184) $[\![$ Op2P $]\!] = [\lambda G_v.\lambda x_e.\lambda w_s.$ x is a murderer in w $\wedge$ G(x)] $(\lambda x_e.\lambda w.\exists a \; \forall w' \; wR_a w' \; \rightarrow$
        1)
        $= \lambda x_e.\lambda w_s.$ x is a murderer in w $\wedge \exists a \; \forall w' \; wR_a w' \; \rightarrow \; 1$

(180) has been judged anomalous by native speakers.[16] Apparently, incorporating the anomalous Op1P into the larger DS structure cannot mitigate the

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[16]See Alexiadou and Wilder (1998), page 306.

anomaly. In this, DS also conforms to a second constraint posited earlier in the dissertation: the economy constraint that rules out structures containing a trivial predicate. In the DS case, raising to Spec,Op2P is obligatory to prevent type mismatch, just as it would be with a Group I adjecitve, but it cannot alleviate the ungrammaticality of a trivial predicate resulting from the combination of Op1 with a Group II adjective.

4.7 Discussion

By replacing Alexiadou and Wilder's relative clause structure for DS, we have avoided a number of the problems noted above. First, we no longer have full clausal structure, an immediate advantage since none seems to be needed to accommodate the DS data. Second, we have two different types of movement, one type-driven and the other feature-driven. The AP, which in Alexiadou and Wilder's analysis was forced to raise without any principled explanation, must raise in order to be interpreted, since in situ it combines with an operator and the Op1 + AP complex produces a type mismatch. DPs, on the other hand, can still raise for word-order variations but do so for entirely separate reasons.[17] No potential conflict between AP and DP raising to various A' positions ever arises. Third, on the current proposal, which includes Op1 as part of the basic phrase structure of the DS DP, PPs are automatically banned from DS, which conforms with the data, since Op1 combines only with APs.

Additionally, we now have a principled explanation for the anomaly of

[17]DP may raise to the specifier of a higher DP to check a syntactic feature, as Alexiadou and Wilder as well as Androutsopoulou suggest, or the information structure of DS may play a role in motivation the movement. Either way, it is certainly not type-driven.

Group II adjectives in their raised position within DS. Without Op1, all adjectives would be bad in the base position—as in any predicate position, they have the wrong type. But the behavior of a given adjective when it combines with Op1, which is part of the DS structure simply by virtue of the fact that adjectives are used as predicates in that construction, is now the determining factor in whether an adjective will be fully licit in DS or not.

4.7.1 Crosslinguistic distribution of Op2?

We have seen the Op1 is an operator that occurs anytime an adjective is used as a predicate. It would be interesting to know whether Op2 is specific to DS or whether it also occurs elsewhere in the syntax of Greek or some other language. Understanding how freely it is distributed might be a key to understanding why Greek has DS in the first place. From Alexiadou and Wilder's analysis, it is not entirely clear why DS occurs in Greek but not in other languages that have relative clauses. I leave this inquiry for future work.

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