

controllable, and that there is a body of literature pertaining to them. In a more extended study natural examples would be indispensable.

⁹ This particular test is much improved with a very slight difference, the omission of *I said* from the sentences with *about*, as the reviewers of this paper have pointed out to me.

About Alice: the New Yorker hired her.

I have ignored this and other possible paraphrases because, as far as I know, none is adequate; and thorough coverage would be excessively long.

¹⁰ Cf. Hajicova (1986); a similar approach appears in Sidner, without the notion of topic.

¹¹ This seems to be the approach of Grosz, Joshi & Weinstein (1983), and recent unpublished work. While accepting the idea that attention, focus, etc., cannot be structurally determined, they suggest some basic rules — presumably to be augmented — that are structural.

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THE CROSS-LINGUISTIC DISTRIBUTION OF ADJECTIVE ORDERING RESTRICTIONS*

1. INTRODUCTION

English displays well-known restrictions on the ordering of multiple prenominal adjectival modifiers (see Bloomfield, 1933; Whorf, 1945; Lance, 1968; Vendler, 1968; Quirk et al., 1972 among numerous others). Most descriptions include a hierarchy such as the following: QUALITY > SIZE > SHAPE > COLOR > PROVENANCE.¹ (1) shows that the preferred orderings are in line with this hierarchy:

- (1) a. SIZE > COLOR > PROVENANCE: small green Chinese vase (*green small Chinese vase, *green Chinese small vase, ??small Chinese green vase...)
- b. QUALITY > SHAPE: nice round plate (*round nice plate)
- c. SIZE > SHAPE: small square table (*square small table)

While it has been noted that such hierarchies are not absolutely rigid, speakers of English have a strong intuition that the above orders are basic.²

If we turn now to another language, Mandarin, we might be led to the conclusion that there is no evidence for such restrictions in that language. In the following examples, all of the indicated orderings are fine:

- (2) a. SIZE, COLOR:
 xiǎo-de lǜ-de huāpíng
small-DE green-DE vase
small green vase
 lǜ-de xiǎo-de huāpíng
small green vase
- b. QUALITY, SHAPE:
 hǎo-de yuán-de pánzi
good-DE round-DE plate
nice round plate
 yuán-de hǎo-de pánzi
nice round plate

- (2) c. SIZE, SHAPE:
 xiǎo-de fāng-de zhuōzi
small-DE square-DE table
 small square table
 fāng-de xiǎo-de zhuōzi
small square table

Notice that each of the adjectives in (2) is marked with the particle *de*, which we shall consistently gloss as *DE*. This particle is also used to mark relative clauses and possessives (see J. Huang, 1982; Kitagawa and Ross, 1982; C. Huang, 1987):

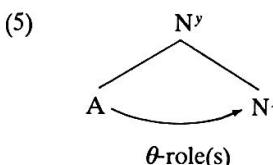
- (3) a. wǒ mǎi-de huāpíng
I buy-DE vase
 the vase that I bought
 b. wǒ-de huāpíng
I-DE vase
 my vase

Now, it is also possible to use monosyllabic adjectives in Mandarin to modify noun phrases without the use of *de* (Li and Thompson, 1981, pp. 117–8), and in such cases ordering restrictions such as those found in English reappear.³ We note here that such modification is limited to at most two *de*-less adjectives; we will provide an explanation for this restriction in a later section. So, in (4) we see that SIZE > COLOR, QUALITY > SHAPE, and SIZE > SHAPE restrictions do hold in Mandarin, as in English:

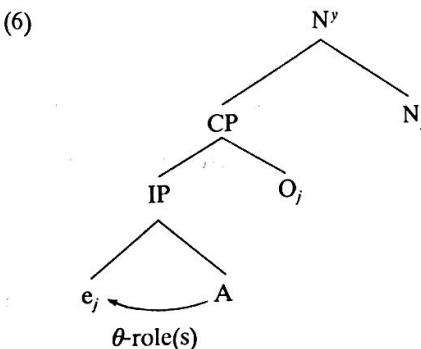
- (4) a. SIZE > SHAPE:
 xiǎo lǜ huāpíng
small green vase
 small green vase
 *lǜ xiǎo huāpíng
 b. QUALITY > SHAPE:
 hǎo yuán pánzi
good round plate
 nice round plate
 *yuán hǎo pánzi

- (4) c. SIZE > SHAPE:
 xiǎo fāng zhuōzi
small square table
 small square table
 *fāng xiǎo zhuōzi

In this paper, we shall show that the different behavior of (1) and (4) on the one hand, and (2) on the other correlates with a difference in the manner of θ -role assignment (or discharge) in the first two cases versus the latter. We shall argue that adjectival modification cross-linguistically breaks down into two kinds, both of which are exhibited in Mandarin. In the first kind, which we call 'direct' modification and which is exemplified in (1) and (4), the adjective assigns its θ -role(s) directly to its sister, which will be a projection of N, as indicated below:⁴

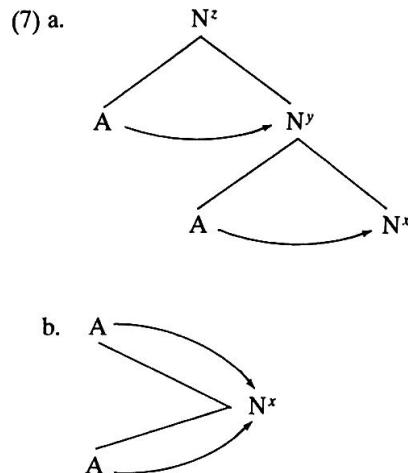


In the second kind, which is exemplified in (2), the adjective's θ -role(s) are associated with that of its modifiee indirectly by coindexation. In the case of the *de*-modifiers in Mandarin, we shall argue that the modifier clause is a relative clause; thus the adjective assigns its θ -role(s) to a phonologically empty variable within the modifier clause, this variable being bound by an operator which is coindexed with the head of the entire noun phrase. We indicate this structure below (note that CP = S' and IP = S in current GB usage; see (Chomsky, 1986)):



We style this 'indirect' modification. The crucial point here is that unlike the structure in (5), the adjective is not assigning its θ -role(s) directly to the N^x which it modifies; we shall argue below that Arabic has indirect modification in this sense, though an adjunction rather than relative clause structure is involved in this language. So, we suggest that it is wrong to view adjectival modification as a unitary phenomenon cross-linguistically. Any given language may exhibit one or both of the kinds of modification discussed.

Among instances of direct modification in particular it is also necessary to distinguish parallel and hierarchical modification. Hierarchical modification is diagrammed in (7a). So, each adjective assigns its θ -role(s) directly to its sister and the whole structure is hierarchical.⁵ Parallel modification is diagrammed in (7b), using the notation for parallel structures developed in Goodall (1987). Here, the adjectives assign their θ -role(s) directly to the head nominal independently of one another:



We shall argue below that while Mandarin and (generally) English direct modification are instances of hierarchical direct modification, there are languages such as French which exhibit parallel modification.

We now outline the primary claim we wish to make in this paper:

- (8) Restrictions on the ordering of multiple adjectival modifiers — henceforth AOR — obtain iff the adjectives involved are hierarchical direct modifiers.

We shall show that this claim is substantiated for a variety of languages from several language families.

Although establishing the correctness of (8) is our primary goal in this

paper, there are some other issues which we shall address. First of all, we will observe that when AOR occur in a language, the ordering hierarchy is, at least to a first approximation, the one observed for English; we have already seen that this holds true for Mandarin in (4). So, the gross hierarchy given in the introduction at least seems to be universal.

One question which then arises is whether AOR are a statement about left-to-right ordering — henceforth the 'linear ordering theory', or whether they refer to structural distance from the head noun — henceforth the 'head-proximity theory'.⁶ We shall argue that the head-proximity theory is correct, although this necessitates an interesting but not unmotivated analysis of Celtic noun phrase structure.

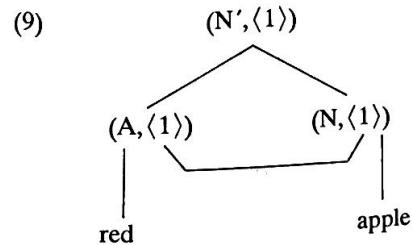
Finally, we will make some observations about the semantic and cognitive basis for AOR. We shall argue that the semantic property of absoluteness gives a clear first cut at predicting the ordering restrictions. We shall also show that absoluteness accounts for the property of Mandarin observed in passing above, namely that only two direct modifiers are possible. We shall point out that a crucial piece of the puzzle is missing: why is it that AOR should be confined to cases of direct hierarchical modification cross-linguistically?

In the next two sections we explicate the difference between direct and indirect modification, we argue that the primary claim in (8) holds cross-linguistically, and we show that AOR are cast in terms of head-proximity. In the fourth section we discuss the role of absoluteness in determining AOR.

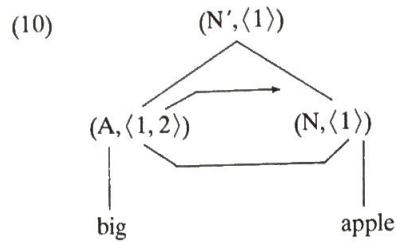
2. THE SYNTAX AND SEMANTICS OF ADJECTIVAL MODIFICATION

2.1. Direct Modification

Higginbotham (1985) suggests that adjectival modification frequently involves a mode of θ -role assignment which he calls θ -identification. So, *red apple* has the structure in (9) where the θ -position of the adjective and of the noun are identified:

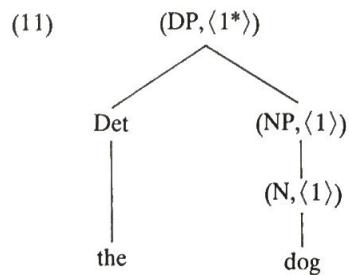


The semantics of θ -identification is intersective, so that a red apple is something which is both red and an apple; this is of course the traditional treatment of such absolute adjectives (see Siegel, 1980). Adjectives such as *big* which refer to relative properties are slightly more complicated in that they involve both θ -identification and what Higginbotham calls *autonomous θ -marking*, as indicated in (10):



The meaning of this is something which is both an apple, and big for an apple. The interpretation 'for an apple' is the result of autonomous θ -marking from the second θ -position of A (and see again, Siegel, 1980).

Now, specifiers such as *the* or *John's* function to *bind* the θ -role of a noun, thus discharging it and making it unavailable for further θ -role assignments. This θ -binding is indicated by an asterisk as shown in (11):⁷



One consequence of this analysis is that it should be impossible to have adjectival modification outside specifiers, since the θ -role of the noun is no longer available for θ -identification. Of course, there are adjectives which do not involve θ -identification, so-called intensional adjectives such as *alleged*; in Higginbotham's analysis, such adjectives merely involve autonomous θ -marking. However, the traditional semantic treatment of such adjectives as functions from common noun meanings to common noun meanings (see Siegel, 1980) would lead one to suppose that they too must occur within the scope of specifier material. Specifiers are functions

from common nouns to referential expressions; therefore intensional adjectives cannot modify specified (referential) noun phrases. The upshot is that such adjectival modifiers as we have been discussing may combine with NPs, but not with DPs.⁸

That this prediction is correct for both English adjectives and Mandarin de-less modifiers is easy to see:

- (12) *good the boy, *brown this rat, *round John's table, *alleged that communist
- (13) *hóng zhēige píngguǒ
red this apple
- *yuán mēige zhuōzǐ
round each table
- *qián nēige zōngtǒng
former that president

We shall henceforth call 'direct' modifiers any adjectival modifiers which directly assign θ -roles to the nouns they modify in one of the ways described above. So, direct modifiers must occur within the scope of specifier material, and hence cannot modify DPs; this necessity of occurring within the scope of specifiers, since it is derivable as we have seen, may be taken as the hallmark of direct modification. In addition, as we saw in the introduction (cf. examples (1) and (4)), AOR apply to strings: cf. direct modifiers in both English and Mandarin.

We note in passing that while direct modifiers cannot modify DPs, the level of projection of N selected by direct modifiers can in principle vary across languages. In fact, Mandarin and English differ on this. In English, adjectives can modify NPs as in:

- (14) [NP rapid [NP Russian [NP invasion of Afghanistan]]]

In Mandarin, on the other hand, direct adjectives would appear to be restricted to modifying N⁰. Modifiers with *de*, which as we shall see below can occur either inside or outside specifiers, must nonetheless occur outside direct modifiers:

- (15) a. hēi-de xiǎo shū
black-DE small book
small black book
- b. *xiǎo hēi-de shū
small black-DE book

We can suppose that this is due to a difference in the level of projection of the modifier allowed by the two kinds of modifiers. Following Zhu

(1956), direct modifiers only modify word-level projections of N, whereas modifiers with *de* modify higher projections.⁹

To summarize, direct modifiers are constrained to occur within specifiers, and again, as observed in the introduction, AOR seem to hold of both English and Mandarin direct modifiers. We next argue that adjectives with *de* in Mandarin, which do not observe AOR, do not assign their θ -role(s) to the head noun directly but rather have the structure of relative clauses, their θ -role(s) becoming associated with the head nominal indirectly via coindexation.

2.2. Indirect Modification in Mandarin

We start with the well-known fact that adjectives can occur as bare predicates in Mandarin (see Li and Thompson, 1981, p. 142) as in (16), parallel to intransitive verbs in (17):

- (16) a. tiānqì hǎo
weather good
the weather is good
- b. bì guì
pen expensive
pens are expensive
- c. kǒnglóng dà
dinosaur big
dinosaurs are big

- (17) a. niǎo fēi
bird fly
birds fly
- b. nèizhī gǒu jiào
that dog bark
that dog is barking
- c. chēzi lái
car come
the car is coming

Now, relative clauses are formed with *de* in Mandarin, relative clauses with intransitive verbs being no exception; see (19). Given the observed parallelism between adjectives and intransitive verbs, it seems reasonable to assume that adjectives with *de* as in (18) are structurally identical to

relative clauses with intransitive verbs in (19), as also assumed by Li and Thompson (1981, p. 118):

- (18) a. hǎo-de tiānqì
good-DE weather
good weather
 - b. guì-de bì
expensive-DE pen
expensive pen
 - c. dà-de kǒnglóng
big-DE dinosaur
big dinosaur
- (19) a. fēi-de niǎo
fly-DE bird
the birds which are flying
 - b. nèizhī jiào-de gǒu
that bark-DE dog
the dog which is barking
 - c. lái-de chēzi
come-DE car
the car which is coming

Under standard assumptions, relative clauses are represented as having an operator in a non-argument position — usually COMP — binding a variable in an argument position; the operator would be coindexed with the head of the nominal. Assuming the same structure for *de*-adjectives would mean that the structure of (18c) is as diagramed schematically below (see also (6)):

- (20) [|[|[[e], dà] O_j] kǒnglóng_j]

That is, dà 'big' assigns its θ -role to an empty category [e] in the subject position of the *de*-clause via predication, just as it assigns it to the overt noun phrase in (16c). This empty category is bound by an operator *O*, which is further coindexed with the head of the noun phrase. Now, in a relative clause construction such as:

- (21) man, who_j[e]_j walks

man is identified via coindexation with the chain *who* ... [e]_j, which is assigned the external θ -role of *walk*. The reference of such a phrase is

taken to be those things which are both men and walk. Similarly, in (20), coindexation between the chain *O.../e/* and the head *kōnglóng* will yield the interpretation 'those things which are dinosaurs and big (for such).'

Given this analysis, one would expect that adjectives which cannot occur as predicates can also not occur as de-modifiers. This prediction seems to be correct. So, as also observed by C. Huang (1987), the adjectives *qián* 'former' and *wèi* 'fake' cannot occur as de-modifiers (22a, b), and this correlates with the impossibility of using them as predicates (22c, d):

- (22) a. **qián-de zōngtōng*
former-DE president
- b. **wèi-de yào*
fake-DE medicine
- c. **zhēige zōngtōng qián*
this president former
- d. **nèifù yào wèi*
that medicine fake

These two adjectives can only occur as direct modifiers:

- (23) a. *qián zōngtōng*
former president
former president
- b. *wèi yào*
fake medicine
fake medicine

Now, in English, relative clauses can be used either restrictively or non-restrictively (appositively) according to whether the relative clause is inside or outside the scope of the specifier (see Jackendoff (1977) for a similar analysis):

- (24) a. [[this man] [who is walking]] is speaking (= this man, who is walking, is speaking)
- b. [this [man [who is walking]]] is speaking (= this man who is walking is speaking)

The interpretation of these would be roughly as follows:

- (25) a. [this *x*] *man'(x)*, is speaking & *he*, is walking
- b. [this *x*] (*man'(x)* & *walking'(x)*) is speaking

So, another prediction of the relative clause analysis of de-modifiers is that

such modifiers in general and adjetival de-modifiers in particular should be able to occur either inside or outside specifiers. This prediction is correct for Mandarin:

- (26) a. *hóng-de zhēiběn shū zài zhuōzi shàng.*
red-DE this book at table on
This red book is on the table.
- a'. *zhēiběn hóng-de shū zài zhuōzi shàng.*
this red-DE book at table on
This red book is on the table.
- b. *hùi jiào-de nèizhī gǒu zǒu-le.*
can bark-DE that dog leave-ASPECT
That dog which can bark left.
- b'. *nèizhī hùi jiào-de gǒu zǒu-le.*
that can bark-DE dog leave-ASPECT
That dog which can bark left.

Assuming that the semantic translations of the two examples in (26a, a') are parallel to the non-restrictive and restrictive relatives in English, the interpretation would be as follows:

- (27) a. [this *x*] *book'(x)*, is on the table & it, is red
- a'. [this *x*] (*red'(x)* & *book'(x)*) is on the table

The interpretation in (27a), which we have given for (26a), directly contradicts the claim of C. Huang that Mandarin does not have non-restrictive relatives. In addition, he also denies something that we have tacitly assumed, namely that Mandarin has true specifiers, words which we have been glossing as 'this' or 'that'. He suggests that phrases like *zhēiběn shū* 'this book' do not automatically denote individuals in the way that their English counterparts do: when such phrases occur within the scope of a de-modifier, they do not refer to a unique individual but rather have the type of common nouns. (When *zhēiběn shū* occurs as an independent noun phrase, C. Huang assumes that there is a type-lowering operation which turns the noun phrase into a referential expression.) However, there seems to be evidence that Mandarin does have non-restrictive relatives, and that 'this' and 'that' are specifiers.

With respect to the second point it is sufficient to note that specifiers cannot be doubled. Consider the contrast in:

- (28) a. **zhēiběn nèixiē wǒ mǎi-de shū*
this those I buy-DE book
this one of those books that I bought

- (28) b. *yìběn nèixiē wǒ mǎi-de shū*
one those I buy-DE book
one of those books that I bought

(28a) could in principle have a perfectly reasonable interpretation (note the English translation), in parallel with the well-formed (28b). The ungrammaticality of (28a) suggests that in Mandarin, as in English, having two specifiers is simply structurally impossible. Note also that 'this' and 'that' which are specifiers in Mandarin contrast in behavior with possessives, which function as specifiers in English but not in Mandarin. Possessives in English are in complementary distribution with all other specifier material, whereas in Mandarin possessives may be stacked and may co-occur with one specifier:

- (29) a. *John's Fitzgerald's this book
 b. *Zhāngsān-de Fitzgeralde zhèiběn shū*
Z.-DE F.-DE this book
this book by F. belonging to Z.

The question of non-restrictive relative clauses or modifiers in Mandarin is more complex, and we only have space for a short discussion. We review three arguments that *de*-modifiers outside the scope of specifiers are plausibly analyzed as being non-restrictive relatives. First of all, our analysis of phrases like *hóng-de zhèiběn shū* with the accompanying interpretation in (27a) assumes that relative clauses can modify already referential expressions such as *this book*. Now, C. Huang observes that the Mandarin equivalents of *John, who just arrived* are ill-formed. While this is true, we observe that a large class of presumably identical constructions are perfectly well-formed so long as the non-restrictive relative refers to an inalienable or salient property of the head:¹⁰

- (30) a. *qùnián shēng-de Zhāngsān*
last-year born-DE Z.
Z., who was born last year
 b. *Cáo Xuēqín xiě-de Hóng Lóu Mèng*
C. X. write-DE red chamber dream
The Dream of the Red Chamber, which was written by Cao Xueqin
 c. *cōngmíng-de Lísì*
smart-DE L.
Lisi, who is smart

Since such constructions are quite freely formed, it seems ill-considered to rule them out in principle for Mandarin.

Secondly, in line with the interpretations given in (27) for (26a, a'), one would assign the interpretations in (31a', b') to the sentences in (31a, b):

- (31) a. *wǒ-de chēzi yǒu dà-de liǎngge mén*
I-DE car have big-DE two door
My car has two doors, which are big.
- a'. *my car has [two x| door'(x)], & they, are big*
- b. *wǒ-de chēzi yǒu liǎngge dà-de mén*
I-DE car have two big-DE door
My car has two big doors.
- b'. *my car has [two x| (big'(x) & door'(x))]*

The implicature generated by the two examples is different and is identical to that of their English counterparts, as predicted by the interpretations we have given. The second example is felicitous if the speaker's car has two or more doors, two of which are big. The first example is only felicitous when the speaker's car has exactly two doors which furthermore are big; this implicature can be derived from Grice's (1975) Maxim of Quantity.

Finally we consider sentences such as (32), discussed in Chao (1968):

- (32) *dài yǎnjīng-de nèiwèi xiānshēng zài shuōhuà*
wear eyeglasses-DE that gentleman is speak
That gentleman who is wearing eyeglasses is speaking.

Chao implies that the interpretation of *dài yǎnjīng-de* 'who is wearing eyeglasses' is restrictive in this example. On the other hand in English *that gentleman, who is wearing eyeglasses, is speaking*, which we claim to have the same structure as Mandarin (32), the relative clause is clearly non-restrictive. We suggest that this discrepancy is due to the linear ordering difference between the two languages. Specifically, in English, given that *who is wearing eyeglasses* is outside the scope of the specifier, and since it comes after the phrase *that gentleman*, it merely serves to further describe an already established referent. In Mandarin, however, the relative clause *dài yǎnjīng-de* comes first, and so picks out the relevant set of gentlemen. *Nèiwèi xiānshēng* then merely further describes the established individual. Consistent with this is the observation that the most appropriate usage of (32) is when there are several gentlemen, only one of which is wearing eyeglasses; (32) is therefore equivalent to English *the one wearing glasses, that guy, is speaking*; this is along the lines of the analysis proposed by J. Huang (1982, pp. 68–70) for such constructions.

To summarize what we have argued so far, Mandarin adjectives with *de*, indirect modifiers, are relative clauses and so their θ -roles are not assigned directly to the nouns they modify. In this way they contrast with bare adjectives in Mandarin — and all adjectives in English, which we have called direct modifiers. We also showed that indirect modifiers should not be constrained to occur inside specifiers, and this we may take as a hallmark of indirect modification. Moreover, direct modifiers are constrained by AOR, whereas indirect modifiers are not, as (2) shows. Before we show that the domain of AOR in fact patterns as in English and Mandarin cross-linguistically, we need to briefly discuss parallel modification.

2.3. Parallel Modification

We have been assuming that multiple modification structures are generally hierarchical. However, there are cases where the structure is plausibly parallel rather than hierarchical. As also noted by Nowicka-Schwartz (1980) for Polish, treating the prenominal modifiers as separate intonational phrases frees up the modifier order to some extent. So, for example, (33) seems felicitous with appropriate intonation, here indicated by commas, despite the fact that the unmarked ordering is QUALITY > COLOR > PROVENANCE:

- (33) She loves all those Oriental, orange, wonderful ivories.

Following Beckman and Pierrehumbert (1986) we will assume that in such cases the adjectives each constitute a separate (minimally) intermediate phrase. Furthermore, as Beckman and Pierrehumbert suggest, such an intonational phrasing is consistent with the analysis that such modifiers are interpreted in parallel. This is because clearly parallel structures such as coordinates are implemented intonationally as (minimally) intermediate phrases:

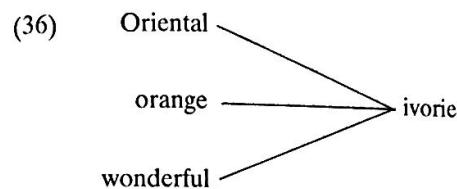
- (34) They gave watermelons, oranges, and berries.

The intonation of (33) is closer to the intonation of (34) than it is to that of (35), which can be said felicitously without comma intonation:

- (35) She loves all those wonderful orange Oriental ivories.

If the structure of (33) is one of coordination, then, we may fairly assume that the adjectives involved are each modifying the head noun independently, or in parallel, rather than in sequence. Hence, one might speculate that AOR should not apply here since the adjectives are not each modifying the entire structure consisting of the head and all adjectives closer to the head, but are rather each modifying the head in parallel.

The structure that we assume would therefore be parallel, in the sense of Goodall (1987):



3. THE DOMAIN OF AOR

We now turn to the central claim of this paper, which we repeat below:

- (37) AOR obtain iff the adjectives involved are hierarchical direct modifiers.

Put another way, AOR as exhibited in English and Mandarin are universal, but they may fail to show up in some language simply because that language fails to have hierarchical direct modification. In general we expect multiple adjectival modification structures to exhibit the clusters of properties described in one of (a) or (b):

- (38) a. i. AOR and
 ii. evidence that the adjectival modification involved is direct; in particular, the adjectives must be restricted to occur within the scope of specifiers.
 b. i. No AOR, and either
 ii. evidence that the adjectival modification involved is indirect; in particular, the adjectives will not be restricted to occur within the scope of specifiers; furthermore, there may be overt evidence, as in Mandarin, for treating the modifiers as relative clauses or appositives, or
 iii. evidence that the adjectival modification involved is parallel.

We shall show that adjectival modification across languages does in fact show one or other of these clusters of properties, as predicted by (37) and as we have seen holds in English and Mandarin direct modification (exhibiting (38a)), and in Mandarin indirect modification (exhibiting (38bi), (exhibiting (38a)), and in Mandarin indirect modification (exhibiting (38bi)). Before turning to that we need to allay one possible misunderstanding.

standing. It has been suggested to us that since one of the tests for direct-modifier status is strict ordering within the scope of specifiers, a simpler statement of the universal would be the (uninteresting) claim that, on the assumption that specifiers are modifiers, modifiers are either ordered in a language or they are not. This suggestion is off the mark. As noted in the introduction, and as noted by most other work on AOR, the restrictions represent preferences which can nonetheless be relaxed in appropriate contexts. On the other hand, there is no way to relax the restriction that modifiers must occur within specifiers in, say, English. This difference strongly suggests that AOR and restrictions on the ordering of specifiers and other modifiers cannot be collapsed, and that the ordering of specifiers outside direct modifiers is structurally required as we have argued.

We now turn to the cross-linguistic support for (37). In no case have we extensively examined the language in question; our purpose rather is to show that the properties noted in (38) appear to cluster as predicted. Also, it will be obvious that, at least to a first approximation, in all cases where AOR hold, they are the same ordering restrictions as in English and Mandarin. The only other question will be whether AOR are a statement about linear ordering or about head-proximity. We shall see that head-proximity seems to be correct.

3.1. Languages with Direct Modifiers

Some languages which exhibit the cluster of properties associated with direct modification are Dutch, given in (39), Greek in (40), Kannada in (41) and Mokilese in (42) (Harrison, 1976; note that DETERMINER is enclitic on the last word in the noun phrase). The orderings in the multiple modifier examples below are the preferred orderings, other orderings being much less acceptable:

- (39) a. SIZE > SHAPE > PROVENANCE:

de grote ronde chinesee vaas
the big round Chinese vase
the big round Chinese vase

b. *grote de vaas
big the vase

- (40) a. SIZE > COLOR > PROVENANCE:

to mikro kokkino kineziko vazo
the small red Chinese vase
the small red Chinese vase

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- (40) b. QUALITY > SHAPE:

to kalo strongilo antikimeno
the good round object
the good round object

c. *kalo to antikimeno
good the object

- (41) a. SIZE > SHAPE > COLOR:

dhodđa gundā nīlī göli
large round blue marble
large round blue marble

b. *dhodđa a nai
large that dog

- (42) a. SHAPE > COLOR:

mwok səl pwu:wu:sso
cup black round-DETERMINER
that round black cup

- b. SIZE > COLOR:

pwo:la wa:ssa siksikko
ball red small-DETERMINER
that small red ball

So, as predicted, the property of having AOR correlates with the necessity of the adjetival modifiers occurring within the specifier; note that while we do not present examples for Mokilese showing that modifiers outside DETERMINER are bad, Harrison quite specifically states that the specifier must come last. Note also that the Mokilese data would appear to answer the question of the precise statement of AOR: in this language the modifiers are postnominal and the preferred ordering is the reverse of the left-to-right ordering for English. However, stated in terms of head-proximity the ordering facts are the same in all cases.

3.2. Languages with Indirect Modifiers

Languages which exhibit the cluster of properties associated with indirect modification (38bi, bii) are Japanese, Thai and Arabic. In the following examples for Japanese (43) and Thai (44) the data under (a) show that adjective ordering is free and the (b) examples show that adjectives can come outside the scope of specifiers; note that Thai has left-headed noun phrases.

- (43) a. SIZE, COLOR:

ookina akai inu
large red dog

large red dog

akai ookina inu
large red dog

SIZE, SHAPE:

chiisana shikakui ie
small square house

small square house

shikakui chiisana ie
small square house

- b. ookina ano kuruma
big *that car*
that big car

- (44) a. SIZE, COLOR:

maa sii-dam tua-vai

dog *color-black* *CLASSIFIER-big*
big black dog

maa tua-yai sii-dam
big black dog

- b. maa tua-nii sii-dam
dog CLASSIFIER-this color-black
this black dog

We note that Fukui (1986) argues that the Japanese equivalents of 'this' are not specifiers. However, his evidence for this claim is based on examples such as (43b); such examples would only be evidence for his claim if the modifiers involved are direct modifiers like adjectives in English. If they are indirect, like Mandarin *de*-modifiers, then an analysis of Japanese similar to what we proposed for Mandarin above seems appropriate. In fact, Kitagawa and Ross (1982) present evidence that prenominal adjectives in Japanese are underlyingly marked with the particle *no*, which they analyze as filling the same syntactic role in Japanese as *de* does in Mandarin. If correct, this supports the idea that the modification is indirect.

We note that Thai also allows a limited number of modifiers which may be placed after the head noun with no intervening specifier material as

shown in (45b), and so are apparently direct modifiers. In such cases the adjectives obey the same linear ordering constraints as in Mokilese, (45a) giving the only possible ordering:

- (45) a. SIZE > COLOR:

maa dam yai
dog black big
big black dog

- b. *maa tua-nii dam
 dog *CLASSIFIER*-this black

Thai thus resembles Mandarin in having both direct and indirect modification; the behavior of these two classes is completely as predicted, and the ordering exhibited in (45a) is consistent with the head-proximity theory.

The situation in Arabic is more complex but it is still clear that the behavior of adjectival modifiers falls in line with our expectations. Arabic adjectival modifiers are postnominal and must agree in definiteness with their modifiee; this is shown in (46a-d). Furthermore, this is clearly not simply morphological agreement as evidenced by (46e), where the head noun is not marked for definiteness but the modifier must nevertheless be definite since the noun phrase it is modifying has a definite referent. Finally, possessives are in complementary distribution with the marker of definiteness on the head noun, as shown in (46f, g). Still, the noun phrase is definite as shown by the requirement that a modifying adjective must also be definite, as in (46h). Furthermore the adjective must occur outside the possessive: no other order than that shown in (46h) is possible:

- c. *kalbu-n al-ahmaru
dog-IND DEF-red

- d. *al-kalbu ahmaru-n
DEF-dog red-IND

- e. biriṭaaniyaa l-kubraa
Britain *DEF-great*
 Great Britain

- (46) f. *kitaabu l-waziiri*
book DEF-minister-GEN
 the minister's book
- g. **al-kitaabu l-waziiri*
DEF-book DEF-minister-GEN
- h. *kitaabu l-waziiri l-ahmaru*
book DEF-minister-GEN DEF-red
 the minister's red book
- **kitaabu l-waziiri ahmaru-n*
book DEF-minister-GEN red-IND

Since definiteness is a property of noun phrases, the requirement that adjectives agree in definiteness with their modifiees suggests that the adjectives in question are modifying full DPs rather than just nouns; this would of course predict that adjectives must be outside possessives, as observed. Our suggestion is that Arabic adjectives are really appositive constructions; the structure of (46h) would be an adjunction structure roughly as in (47a) and its interpretation as in (47b):

- (47) a. [DP [DP book DEF-minister's] [DEF-red]]
 b. the minister's book, the red one

The facts strongly suggest that Arabic adjectival modifiers cannot be direct since they are outside the scope of specifiers, and this predicts that no AOR should be found. This is indeed correct:

- (48) SIZE, COLOR:
kalbu-n ahmaru-n kabiiru-n
dog-IND red-IND big-IND
 big red dog
- kalbu-n kabiiru-n ahmaru-n*
big red dog

So Japanese, Thai and Arabic show the cluster of properties which we would expect to be associated with indirect modification. In addition the few cases of direct modification in Thai behave as expected on the head-proximity theory.

3.3. Languages with Parallel Modification

One language which appears to display the set of properties in (38bi, biii) is French. While a few adjectives with special meanings may occur

prenominally (see Waugh (1977) for a thorough discussion), adjectival modification is typically postnominal. Multiple postnominal adjectives do not observe AOR:

- (49) a. COLOR, SIZE:
chien moyen blanc
dog medium white
 medium-sized white dog
- chien blanc moyen*
medium-sized white dog
- b. SHAPE, COLOR:
maison blanche carée
house white square
 square white house
- maison carée blanche*
square white house
- c. QUALITY, COLOR:
piano noir antique
piano black old
 old black piano
- piano antique noir*
old black piano

We have no evidence to suggest that such modifiers are indirect. However, there is some evidence that multiple French postnominal modifiers are parallel, and that we should therefore expect this lack of ordering constraints. In particular, there seems to be a preference for inserting *et* 'and' between each of the modifiers. In fact in (50d), the phrase is ill-formed without *et* according to our informant:

- (50) a. *chien moyen et blanc*
dog medium and white
 medium-sized white dog
- b. *maison blanche et carée*
house white and square
 square white house
- c. *piano noir et antique*
piano black and old
 old black piano

- (50) d. table grande et ronde
table big and round
 big round table

Note that this contrasts with English where placing *and* between the modifiers in the above translations sounds quite odd without some appropriate intonational break. Another option in French according to our informant is to use comma intonation to separate the adjectives. All of this suggests that multiple French postnominal adjectives are structurally parallel, and the data in (49) are therefore according to our expectations.¹¹

3.4. AOR in Celtic

Finally we turn to Celtic languages, which present an interesting challenge to the claim that the universal statement of AOR is in terms of head-proximity. We will present facts from Irish, the facts from Welsh being entirely similar. Guilfoyle (1987) argues that Irish noun phrases with possessive specifiers involve movement of the head noun to the left of the possessive. One argument for this is that the possessive, which is postnominal, is in complementary distribution with the definite article, which is prenominal. She suggests that the head fronts to assign Case to a DP specifier (a possessive). This movement is unnecessary with a non-lexical specifier such as the article. So, her analysis of (51b), with some simplification, is the structure in (51c):

- (51) a. an hata
the hat
 the hat
- b. hata an fhir
hat the man-GEN
 the man's hat
- c. [_{DP}[_Nhata], [_N· [_D· an fhir] _{tj}]]

In fact, one has to extend this analysis to move at least an N' since adjectival modifiers, which are postnominal in Irish with few exceptions, must also move with the head. The structure of (52a) would presumably be as in (52c):

- (52) a. leabhar uaine Sheáin
book green Sean-GEN
 Sean's green book
- b. *leabhar Sheáin uaine

- (52) c. [_{DP}[_N· leabhar uaine], [_N· [_D· Sheáin] _{tj}]]

This suggests that adjectives are underlyingly within the scope of specifiers (as indicated in (52c)) and we would therefore expect AOR to hold. This is indeed correct, but interestingly the linear ordering is the same as in English, while head-proximity would predict the reverse. The following examples show the strongly preferred orderings:

- (53) a. SIZE, COLOR:
 liathróid bheag bhuí
ball small yellow
 small yellow ball
- b. SIZE, PROVENANCE:
 cupán mór Sasanach
cup big English
 big English cup
- c. SHAPE, COLOR:
 pláta cruinn dearg
plate round red
 round red plate

One can account for these facts if, in addition to the N fronting proposed by Guilfoyle, there is fronting of the head within N':

- (54) [_N· liathróid, [_N· bheag [_N· bhuí _{tj}]]] (= 53a)
- Under this analysis, postnominal adjectives are really prenominal at a more abstract level of representation. This view is consistent with the extensive arguments for Celtic VSO languages that initiality across categories — in particular the sentence-initial placement of V and the noun phrase-initial placement of the nominal head — is derived by movement (Sproat, 1985; Guilfoyle, 1987). So it seems quite reasonable to propose that the placement of the head noun before its adjectival modifiers may also be so analyzed.¹² For languages like Mokilese, where, unlike Irish, non-lexical specifiers are postnominal, one could simply assume that the structure of the noun phrase is the mirror-image of that of a language with head-final noun phrases; thus, no movement is responsible for the head-initial effects. Furthermore, Mokilese is SVO, so there is no reason to suppose that there is any general head fronting in the language. For that language then, the assumption we are making for Irish would be gratuitous. What is interesting is that apparent violations of the head-proximity theory show up in Celtic languages, where head fronting is well motivated and the analysis proposed in (54) is thus not gratuitous. The distribution of such apparent violations thus lends support to the head-proximity theory.

4. THE COGNITIVE/SEMANTIC BASIS OF AOR

We have shown that AOR occur whenever the modification involved is direct and hierarchical, and we have also shown that the hierarchy is stated in terms of head proximity. One issue we have not addressed is the cognitive or semantic basis for AOR, the issue which has been by far the most discussed in the literature on this topic. Various approaches have been suggested, ranging from stipulating the ordering preferences as a (possibly universal) template (Lance, 1968; Goyvaerts, 1968; Quirk et al., 1972; Dixon, 1982; Nowicka-Schwartz, 1980); to introducing adjectives via ordered rules (Annear, 1964; Vendler, 1968); to accounts based upon considerations of semantics or processing (Whorf, 1945; Ziff, 1960; Martin, 1969a, b; Danks and Glucksberg, 1971). As an example of the latter approach, Whorf (1945) suggests that in English more 'inherent' attributes such as COLOR come after less inherent attributes such as QUALITY. With respect to the latter kinds of approaches it has been suggested (Posner, 1986; Bolinger p.c.) that more than one underlying semantic scale may be involved.

While it is not our purpose here to add significantly to previous work on this aspect of the problem we would like to briefly discuss the relationship between AOR and the well known semantic notion 'absolute' property.¹³ A prediction of most semantic or cognitive analyses of AOR of which we are aware is that adjectives which refer to absolute properties — adjectives such as COLOR or SHAPE, are closer to the head than adjectives which refer to relative properties such as SIZE or QUALITY. Indeed, it is fair to say that this distinction accounts for the most reliable aspects of the AOR.

In English this point shows up in the following way: reordering adjectives which differ in absoluteness seems to be much worse than reordering adjectives which do not differ in absoluteness. As Cooper and Ross (1975) note, other things being equal, the longer member of a collocation tends to occur after the shorter member:¹⁴

- (55) spit and polish, salt and pepper, dog and pony (show)

Now, among adjectives of the same absoluteness it is relatively easy to force reordering by the phonological constraints pointed out by Cooper and Ross:

- (56) a. QUALITY, SIZE: beautiful large house, large beautiful house
 b. SHAPE, COLOR: ?serpentine green shape, green serpentine shape

The first example in each of (56a, b) is the ordering predicted by the template given in the introduction of this paper. However, the orders with the longer adjective second are also available, even preferred in the

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second pair. What is interesting is that this reordering seems much less available when adjectives of differing absoluteness are involved:

- (57) a. QUALITY > COLOR: beautiful red house (*red beautiful house)
 b. SIZE > COLOR: oversize red peach (*red oversize peach)
 c. SIZE > SHAPE: oversize round table (*round oversize table)
 d. QUALITY > SHAPE: beautiful round sundial (*round beautiful sundial)

In Mandarin, absoluteness helps explain an otherwise puzzling fact. We have already seen that as many as two direct modifiers may occur in Mandarin. Now, while adjectives of QUALITY, SIZE, COLOR and SHAPE typically can all occur as direct modifiers, only certain interclass combinations are possible:

- (58) a. QUALITY:
 hǎo pánzi
good plate
 good plate
 b. SIZE:
 xiǎo pánzi
small plate
 small plate
 c. COLOR:
 hóng pánzi
red plate
 red plate
 d. SHAPE:
 yuán pánzi
round plate
 round plate
 e. QUALITY > COLOR:
 hǎo hóng pánzi
good red plate
 good red plate
 f. QUALITY > SHAPE:
 hǎo yuán pánzi
good round plate
 good round plate

(58) g. SIZE > COLOR:

xiao hong pánzi
small red plate
 small red plate

h. SIZE > SHAPE:

xiao yuán pánzi
small round plate
 small round plate

i. *QUALITY, SIZE:

*hǎo xiao pánzi
good small plate
 *xiao hǎo pánzi

j. *SHAPE, COLOR:

*yuán hóng pánzi
round red plate
 *hóng yuán pánzi

Examples (a–d) show that all of these adjectives can directly modify nouns. Examples (e–h) show that QUALITY > COLOR, QUALITY > SHAPE, SIZE > COLOR and SIZE > SHAPE combinations are possible. Examples (i–j) show that for some reason QUALITY, SIZE or SHAPE, COLOR combinations are not possible. The generalization is clear: two adjectives of the same absoluteness may not both directly modify a noun in Mandarin. That this is the right generalization is supported by the following data which show that (i–j) are possible if at least one of the adjectives is an indirect modifier:

(59) i'. hǎo-de xiao pánzi

good-DE small plate
 good small plate

xiao-de hǎo pánzi
small-DE good plate
 good small plate

j'. yuán-de hóng pánzi
round-DE red plate
 round red plate

hóng-de yuán pánzi
red-DE round plate
 round red plate

We suggest that these facts follow from an avoidance strategy in Mandarin. We have noted that in English, ordering constraints among adjectives of the same absoluteness are weaker than constraints on the ordering of adjectives of differing absoluteness. Assuming that this is universally true, it might be expected that speakers might tend to avoid using constructions which would necessitate some ordering decision for adjectives of the same absoluteness. Since Mandarin adjectives can quite generally occur as indirect modifiers, speakers of Mandarin can always avoid making this decision by making one of the adjectives an indirect modifier. We suggest that this avoidance strategy has become grammaticalized in Mandarin and explains the data we have just seen. English, which only has direct adjectival modification, cannot adopt such an avoidance strategy. Note that this account also explains the fact, noted in the introduction, that Mandarin allows at most two direct modifiers; clearly, in any combination of three direct modifiers, at least two of them would have to be of the same absoluteness, and thus any more than two direct modifiers would be ruled out by the avoidance strategy. As far as we know, this fact about Mandarin has not been otherwise explained.

5. FINAL REMARKS

We have discussed one aspect of the well-known AOR that has not received much attention in the literature, namely its cross-linguistic distribution. We have provided convincing evidence that the restrictions are universal, but that they apply only to direct hierarchical modifiers, that is, adjectives which assign their θ -roles directly to the head noun and are not syntactically parallel in the sense of Goodall (1987). A premise of this analysis is that adjectival modification cross-linguistically is not a unitary phenomenon but breaks down into various kinds, as we have argued. We have argued that AOR are universally stated in terms of head-proximity, rather than in terms of linear ordering; we also showed that this suggests an interesting and not unmotivated analysis of Celtic noun phrases. Finally, we discussed briefly one aspect of the semantic basis for the ordering restrictions, absoluteness, and showed its consequences for English and Mandarin direct modification.

One final remark is in order; while the universality of AOR is clear, and their cognitive or semantic basis has been well discussed if not fully understood, it is still unclear what the causal link between the various aspects of this problem is: why should absolute adjectives occur closer to the head? Why should AOR be sensitive to the kind of modification involved? Now, one could derive the restriction on AOR to direct hierarchical modification by suggesting that such ordering restrictions could only be stated over domains where each element of the domain directly θ -marks its sister and the whole structure is composed hierarchically. However, it is not clear from what general principles of grammar

such a stipulation would follow and it is not clear what phenomena besides AOR such a stipulation would account for. So, at this point, it seems we can do no better than simply to stipulate AOR on direct hierarchical modification as a universal phenomenon.

NOTES

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¹ Throughout the paper we indicate with ' $>$ ' the statement 'precedes on the hierarchy'; ' $X > Y$ ' means ' X precedes Y ' in English. We shall argue below that ' $>$ ' is actually universally interpreted as 'further from the head than' rather than 'precedes', though in English the two interpretations are indistinguishable. We shall use a comma (' X, Y ') when either the ordering is free or the ordering preference undetermined. Also, as will be obvious, semantic classes of adjectives are referred to by upper case words (e.g., COLOR).

² We do not include under the rubric of adjective ordering restrictions, the semantically motivated orderings analyzed by Levi (1975): *senatorial industrial investigations, industrial senatorial investigations*. In these cases there is no basic ordering; rather the ordering chosen depends upon the intended interpretation. In contrast, the ordering preferences we discuss are basic in the sense that one uses the prescribed orders unless one intends a special interpretation. So *brown small dogs* (with heavy accent on *brown*) is fine on the interpretation that small dogs form a discourse-relevant class and that the speaker wishes to refer to the brown members of that class. Also, see the discussion of parallel modification in section 2.3.

³ Zhu (1956) shows that many de-less modifier constructions are lexicalized and that there are certain restrictions on the use of de-less modifiers. However, de-less modification is largely productive; indeed none of the examples in this paper are lexicalized and all of those involving non-intensional adjectives are interpreted compositionally.

⁴ 'A' can of course be an AP as in *very nice man*; in such cases the AP would inherit the θ -role(s) of its head, which would be assigned to the modifiee. Also, we should note that Abney (1987) gives a novel analysis of English noun phrases with prenominal adjectives in which the adjective is the syntactic head of the construction and the modifiee is the complement of the adjective: $/_{AP} \text{very } /_{AP} \text{nice man}$. This analysis, if correct, will nonetheless not affect our distinction between direct and indirect modification, so we will not consider it further.

⁵ See Fukui (1986, pp. 40–50) for arguments that structures in English with multiple modification are hierarchical, and also see J. Huang (1982, pp. 62–73, in particular) for arguments that multiple prenominal modification structures in Mandarin are also hierarchical.

⁶ We note that both claims have been made in the literature. The processing model of Martin (1969a) predicts that distance from the head should be the relevant factor; he argues that the prediction is borne out in Indonesian. On the other hand the model of Danks and Glucksberg (1971) predicts left-to-right ordering as the relevant factor.

⁷ We adopt throughout the terminology of Abney (1987) — and see also Kuroda (1986)

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— wherein full noun phrases are called D(eterminer) P(hrase) and N's (projections of N which have undischarged nominal θ -roles) are called NPs. We do this merely for consistency with current GB usage since it does not affect our analysis. Note also that our diagrams do not indicate the full richness of structure assumed by such analyses.

⁸ The content of this idea that specifiers 'close off' noun phrases is discussed in Fukui (1986; see p. 201, for example).

⁹ Note that polysyllabic adjectives such as *piányí* 'cheap' do allow apparently de-less forms to precede modifiers with *de*:

piányí hǎokàn-de shū
cheap interesting-DE book
interesting cheap book

However, this is due to a stylistic rule which optionally deletes *de* in minimally disyllabic modifiers when the modifier in question occurs in a string of *de*-modifiers, the last *de* of which must be retained. The same rule allows deletion of *de* in relative clauses as well:

xǐhuān chī yú hǎokàn-de nèige rén
like eat fish good-looking-DE that person
that good-looking person who likes to eat fish

The absence of *de* in the above case cannot be due to the possibility of treating a relative clause as a direct modifier since a relative clause which directly precedes the head noun is always marked with *de*. This argues that there is a general stylistic rule of *de*-deletion as suggested above.

¹⁰ C. Huang also notes such examples, but does not provide an analysis for them. The terms 'inalienable' and 'salient' are approximate; the point is that the property involved must apparently be non-transient, unlike *just arrived*.

¹¹ There are of course postnominal modifiers in English; see among others Bolinger (1952). It is unlikely that such cases involve hierarchical modification since, at least when there is more than one such modifier, some sort of coordination is required. As we would expect, ordering preferences are weak, if they exist at all: *a man dark and tall, a man tall and dark* (cf., *a tall dark man, ??a dark tall man*).

¹² Note that the head movement proposed here does not violate Baker's (1988, p. 53) Head Movement Constraint: An X^0 may only move into the Y^0 which properly governs it. Baker derives this principle from the ECP as a constraint on movement of a head out of the maximal projection which it heads; only under the conditions of the Head Movement Constraint may the X^0 be antecedent governed. In our case there is no problem since there is no intervening maximal projection which could function as a barrier (Chomsky, 1986) for antecedent government.

¹³ See, again, the discussion at the beginning of section 2.1. We note that Martin (1969a, b) uses the term 'absoluteness' to refer to a scale of the amount of computation involved in determining the appropriateness of a particular attribute. We will not be using 'absolute' in this sense. The appropriateness of the notion of absolute property was pointed out to us by J. Higginbotham.

¹⁴ D. Bolinger has suggested to us that the correct metric is sonorosity rather than length.

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