

Locality and Parameters again

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A significant issue in the theory of parameterisation is whether there is a parameter associated with the definition of locality, as proposed in Manzini and Wexler (1987), Wexler and Manzini (1987), or the relevant parameterisation effects are produced by other parameters, not associated with the definition of locality, as proposed in Pica (1987). In this paper I aim to show that the latter solution is inadequate, and hence the former solution remains necessary on descriptive adequacy grounds. The conclusion, if correct, is directly relevant to the psycholinguistic discussion revolving around the Subset Principle.

Remember that according to the formulation of the Subset Principle in Wexler and Manzini (1987) and Manzini and Wexler (1987), given a parameter p with values p_i and p_j , and the two languages L_i and L_j generated under p_i and p_j respectively, value p_i is selected by the language learner just in case two conditions are verified: first, L_i is compatible with the input data D ; second, if L_j is also compatible with the data D , then L_i is a subset of L_j . Obviously, under this formulation, the Subset Principle is void unless subset relations hold between the languages generated under the different values of a parameter. Furthermore, if the Subset Principle is to determine the order of learning in all cases, it is necessary that subset relations hold between the languages generated under each two values of each parameter. This latter requirement corresponds to the Subset Condition of Manzini and Wexler (1987), Wexler and Manzini (1987).

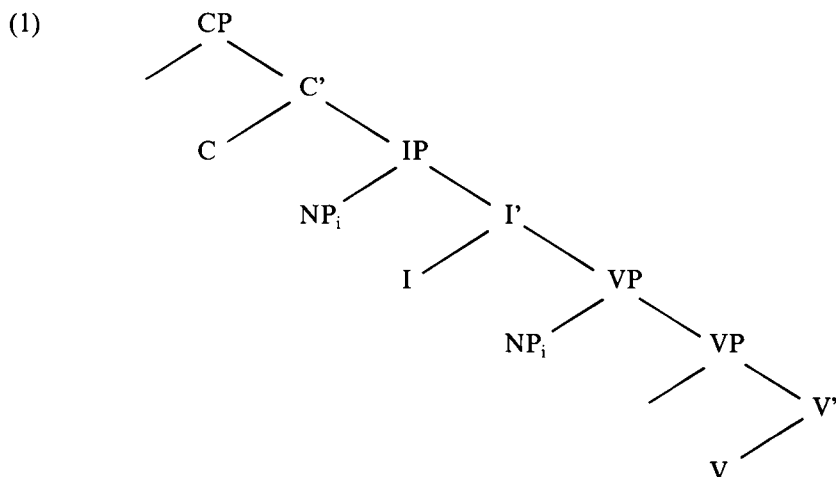
In order to show that the Subset Principle can be a sufficient condition for learning, it is necessary to show that the Subset Condition holds. This result is not proved in Manzini and Wexler (1987), Wexler and Manzini (1987); in fact, well established parameters such as the null subject parameter, as discussed notably in Hyams (1986), or head ordering parameters, violate the Subset Condition under any of their formulations. However the question arises whether the Subset Condition holds of at least some parameters; if so, the Subset Principle can be at least a necessary condition for learning. This latter question is answered positively in Manzini and Wexler (1987), Wexler and Manzini (1987) on the basis of the parameter associated with the definition of locality for binding. If on the other hand the alternative to this parameter provided in Pica (1987) is correct, then

there is no longer any argument for even the weak version of the Subset Condition, and the Subset Principle remains completely unsupported.

In the present study, I do not set out to uncover new evidence in favour of the subset theory of learning. What I will argue however is that at least the original evidence for it stands, in that precisely a locality parameter for binding of the type in Manzini and Wexler (1987), Wexler and Manzini (1987) is necessary, and an approach of the type in Pica (1987) is insufficient.

1. LOCALITY

To begin with, I assume that the basic structure of an English sentence is as in (1):



This is the structure proposed in Chomsky (1986a; b), except that the subject is taken to move to the Spec of IP position, where it can be assigned a Case, from a VP-adjoined position, where it can be assigned a theta-role, as in Sportiche (1988).

It is generally assumed that the locality theory for movement is based at least in part on a notion of government, which following Chomsky (1986b) is formulated as in (2) in terms of a notion of barrier:

- (2) β governs α iff
 there is no γ such that γ is a barrier for and γ excludes β

In Manzini (1988; 1989) it is argued that the locality theory for movement can be entirely based on the notion of government, if the notion of barrier

is in turn formulated as in (3)-(4). (3) defines a g-marker for α as a head which is a sister to α or to a maximal projection that α agrees with :

- (3) β g-marks α iff β is an X^0 and
 (i) β is a sister of α ; or
 (ii) β is a sister of γ and γ agrees with α

(4) defines a barrier for α as a maximal projection that dominates α and, if α has a g-marker, a g-marker for α :

- (4) γ is a barrier for α iff
 γ is a maximal projection, γ dominates α and
 if α is g-marked, γ dominates the g-marker for α

It is important to notice that (3)-(4) uses all and only the primitives used in the definition of barrier (and minimality barrier) in Chomsky (1986b), to the exclusion notably of the notion of subject. This in turn is the only crucial property of (3)-(4) for the present discussion; hence the conclusions that we will reach are essentially independent of the theory in Manzini (1988; 1989).

Consider then the locality theory for referential dependencies. The locality condition on anaphors in Chomsky (1981), Binding Condition A, states that an anaphor must have an antecedent in its governing category. A governing category for α is defined in turn as a category that dominates α , a governor for α and a subject accessible to α . Let us compare this definition of locality with (4). To begin with, there is no indication that a governing category need ever be a non-maximal projection; thus in this respect governing categories and barriers need never differ. Furthermore, a governing category must dominate a governor for α , while a barrier must dominate a g-marker for α , if α is g-marked. It is easy to check however that in our theory the notion of g-marker reconstructs the notion of governor in Chomsky (1981); thus in this respect the two definitions of locality do not differ either. The only difference between the two remains the notion of subject, which appears in the definition of governing category, but not in the definition of barrier.

If so, the definition of governing category γ can be given as in (5), which is the definition of barrier in (4) with the added requirement that γ must dominate a subject accessible to α ; in the first instance a subject can be taken to be accessible to α just in case it c-commands α :

- (5) γ is a governing category for α iff
 γ is a maximal projection, γ dominates α , γ dominates a g-marker for α
 and γ dominates a subject accessible to α

As for Binding Condition A itself, it can require that an anaphor must have an antecedent not excluded by its governing category, as in (6), thus maximising the similarity between its requirement and a government requirement:

- (6) Given an anaphor α , there is an antecedent β for α such that no governing category for α excludes β

Consider English *himself*. If it is in object position, *himself* can refer no further than the immediately superordinate subject, as in (7); if in subject position, *himself* gives rise to illformedness, as in (8):

- (7) John thinks that Peter likes himself
 (8) *John thinks that heself/ himself likes Peter

The facts in (7)-(8) are predictable on the basis of (5)-(6), but also on the basis of a government condition, stating that anaphors must have an antecedent that governs them. Consider first the object position. VP is a barrier for it, hence an anaphor in object position can only have an antecedent that is not excluded by VP, if government is to be satisfied. The VP-adjoined subject position in (1) satisfies this condition, and no position higher than it does. Thus it correctly follows that *himself* in (7) can only be bound by the embedded subject. Consider now the ultimate subject position, in the Spec of IP, as in (1). CP is a barrier for the Spec of IP, hence an anaphor in the Spec of IP must be bound internally to CP, if government is to be satisfied. However, all available positions in this domain are A'-position. Thus A-binding must violate government, and the ungrammaticality of (8) is correctly derived.

(7)-(8), then, do not necessitate recourse to the notion of subject, and therefore lend no support to the theory in (5)-(6) as opposed to (4). The notion of subject is in fact needed to account for this type of examples in Chomsky (1981; 1986a) but only because one subject position only is postulated, the Spec of IP, a VP-external position; this has been noticed also in Kitagawa (1986) and Sportiche (1988). Because of this, and because under any definition of locality based only on the notion of maximal projection (and governor/ g-marker) VP is a locality domain for the direct object, the notion of subject must be referred to in order to allow the

locality domain of the direct object to include the immediately superordinate subject as well.

With a pronoun such as *him* substituted for the anaphors in (7)-(8) the grammaticality judgements are of course reversed, as in (9)-(10):

(9) John thinks that Peter likes him

(10) John thinks that he likes Peter

(10) is wellformed with *John* as the antecedent for *him*, while (9) is wellformed with *John* again, but not *Peter* as the antecedent. According to Chomsky (1981), this behaviour is again accounted for by a condition formulated in terms of the notion of governing category in (5), Binding Condition B; following the format of Binding Condition A, as in (6), Binding Condition B can be rendered as in (11):

(11) Given a pronoun α , there is no antecedent β for α such that no governing category for α excludes β

As in the case of (5)-(6), the theory in (5) and (11) can account for the data, in this case (9)-(10); but an account is equally possible in terms of a government condition. Consider first a pronoun in object position, as in (9). Its first barrier is VP, which under the theory of phrase structure in (1) contains a subject position. It follows that the pronoun is correctly predicted to be disjoint in reference from the immediately superordinate subject, if the condition on it is that it cannot be governed by its antecedent. Similarly, consider the subject pronoun in (10), ultimately in the Spec of IP position. IP is not a barrier for the subject, if it is g-marked by C; but CP is a barrier for it. Hence the superordinate subject is correctly predicted to be a possible antecedent for the pronoun, since it does not govern it.

As far as the object and subject position of a sentence are concerned, or in general sentential positions, it appears then that Binding Conditions A and B can be formulated in terms of the notion of government, as in (12), and do not require reference to the notion of governing category in (5):

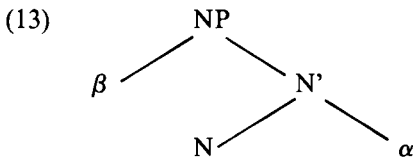
(12) A. Given an anaphor α , there is an antecedent β for α such that β governs α
 B. Given a pronoun α , there is no antecedent β for such that β governs α

There is however a type of data in favour of the Binding Theory in (5)-

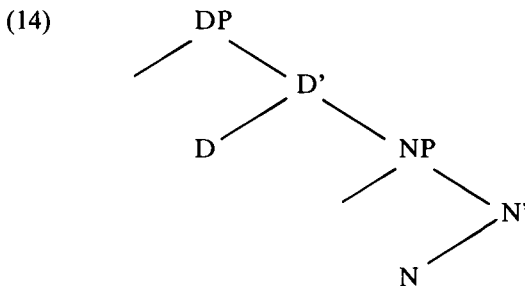
(6) and (11) that has not been considered so far. These data, involving NP-internal positions will be considered in the next section, where I will conclude that anaphors are indeed associated with the notion of governing category, though pronouns are associated with the notion of barrier. Thus the notion of governing category cannot be reduced to the notion of barrier, and viceversa.

2. ENGLISH ANAPHORS AND PRONOUNS

Suppose we assume that NP's have a structure of the type in (13), where α is the NP's object, and β the NP's subject:



In the light of recent discussions of the internal structure of NP's, notably English NP's, as in Abney (1987), it is doubtful that (13) and not a more complex structure is to be postulated. I choose (13) simply for convenience; the results obtained for (13) should in turn be extendable to a structure such as (14), where D(et) is also a head:



This is especially true if in (14) the position of the subject is originally in the Spec of NP, and Case reasons impel movement to the Spec of DP. If so (13) represents not so much an alternative to (14), as a substructure of (14).

If the subject in (13) is realised, then an anaphoric α must be bound within NP, in (13) by β . This is seen, with the English reflexive *himself*, in examples of the type of (15), where NP itself is in object position:

- (15) John likes [Peter's pictures of himself]

It is not difficult to see that in this case the correct predictions follow under both our definition of barrier and the definition of governing category. Under the former, NP is a barrier for because it is a maximal projection that dominates α and the g-marker of α , namely N. Under the latter, NP is a governing category for α for the same reasons and because it also dominates a subject that c-commands α . Thus if an anaphor must have a binder not excluded by its governing category, *himself* in (15) must be bound by *Peter's*; the same result follows if an anaphor must have a binder that governs it.

Consider now the case in which in (13) is not realised, as in (16), which exactly reproduces (15) but for the absence of the subject *Peter's*; crucially, it is not necessary to the wellformedness of (16) that the subject of the NP is interpreted as referentially dependent on *John*:

- (16) John likes [pictures of himself]

Consider then the definitions of barrier and governing category. Under the definition of barrier, the notion of subject, hence its presence or absence in any given structure, is altogether irrelevant. Thus NP is a barrier for α , whether β is present or not. On the basis of the principle that an anaphor must have a binder that governs it, *himself* in (16) is then incorrectly barred from being referentially dependent on the sentence's subject, *John*, which is NP-external.

The correct predictions, on the other hand, follow under the definition of governing category. If β is missing, NP is not a governing category for α for the simple reason that it does not have a subject. Rather the governing category for α is the first maximal projection that does have a subject, namely VP or IP. The prediction then is that α can be bound by this subject; hence concretely that *himself* in (16) can be bound by *John*.

In short, our discussion so far indicates that if NP-internal positions are considered, a correct account of anaphoric dependencies can only be given under a definition of locality making reference to the notion of subject. Let us then consider the remaining examples in the *himself* paradigm. In (17)–(18), *himself* is again in the object position of an NP, in particular of an NP with a subject in (17) and of a subjectless NP in (18); however the NP itself is in subject position, rather than in object position:

- (17) John thought that [Peter's pictures of himself] were on sale

- (18) John thought that [pictures of himself] were on sale

The embedded NP in (17) is a governing category for *himself*, since it is a barrier for it and furthermore it contains a subject accessible to it. In (17) then *himself* is required to be bound within NP; this correctly predicts that it can be bound by *Peter*, but not by *John*. In (18) on the other hand the embedded NP does not contain a subject accessible to *himself*, nor do the embedded IP and CP. Only the superordinate VP contains a subject accessible to *himself*. Hence binding of *himself* by *John* is correctly predicted to be wellformed. Remember that an accessible subject is simply defined as a c-commanding subject. If c-command is not defined between two positions one of which dominates the other, the subject of the embedded IP in (18) does not c-command *himself* because it contains it; hence it is not accessible to it.

Consider on the other hand an ungrammatical example of the type of (8) again, where *himself* is in the subject position of a sentence:

- (8) *John thinks that [heself/ himself likes Peter]

Himself must be accessible to itself if the embedded IP is to be a governing category for it and illformedness is to be correctly predicted. Suppose then we assume that no position can dominate itself. It follows that any position can c-command itself. Hence if an accessible subject is simply a c-commanding subject the correct predictions follow. Examples of the type in (7), where *himself* is in the object position of a sentence, are also straightforwardly derived:

- (7) John thinks that [Peter likes himself]

The embedded VP contains a subject accessible to *himself*, namely *Peter*; hence it is correctly predicted that *Peter* but not *John* can bind *himself*.

Consider finally anaphors in the subject position of a nominal, as in (19)-(20); *each other* is exemplified, rather than *himself*, because of the lack of a genitive form for *himself*, which we can treat as purely accidental. It is easily checked that *each other* otherwise has the same distribution as *himself*:

- (19) John and Peter like [each other's pictures]

- (20) John and Peter thought that [each other's pictures] were on sale

By our definition *each other* in (19) is accessible to itself, exactly as in (8). Notice however that in (19) there is an independent reason why the matrix VP but not the embedded NP is a governing category for the

reciprocal. The reason is that in (19) the matrix verb is the g-marker for *each other* in the Spec position of NP. NP then is not a governing category for *each other* because it does not dominate its g-marker. Rather, the first category that dominates the g-marker for *each other* is the matrix VP, and this is its governing category. The correct predictions then follow, in particular that *each other* can be bound by the matrix subject.

As for (20), our theory predicts its ungrammaticality. Notice that *each other* does not have a g-marker in (20), since NP, being in subject position, is not a sister to a head. NP itself then is a barrier for *each other*, and since *each other* is accessible to itself by our definitions so far, NP is its governing category. Since of course no antecedent is available for it within NP, ungrammaticality is predicted to follow. In fact sentences of the type in (20) appear not to be worse than their counterparts in (18).

However, leaving this problem aside, we have verified that the fundamental data relating to English anaphors, including *himself* and *each other*, are correctly predicted by our theory under a subject-based definition of locality. In doing so, we have also shown that at least in the cases considered so far the notion of accessibility can be reduced to that of c-command. Remember that in Chomsky (1981) accessibility is defined in terms of c-command and of the i-within-i constraint; in particular, β is said to be accessible to α in case it c-commands α and it can be coindexed with it under the i-within-i constraint. If we are correct the second part of this definition can be eliminated altogether. Similarly, in Manzini (1983) γ is said to be a locality domain for α just in case two independent conditions are satisfied, which can be expressed as follows: first, γ dominates a subject that c-commands α , and second, this subject is accessible to α in the sense that it does not violate the i-within-i constraint. In case the second condition is not satisfied, no locality domain for α is defined. If we are correct the whole definition of accessibility must reduce to the first of these two conditions.

Nothing that I have said so far touches yet on pronouns. If an anaphor and a pronoun in a language are associated with the same definition of locality, and if locality theory is in fact a biconditional to the effect that an element is anaphoric just in case it is bound within that locality domain, we expect the pronoun and anaphor to have complementary distribution in the language. This is the prediction in Chomsky (1981) for English, and as is well known the prediction fails.

Consider first a pronoun in the object and subject position of a sentence, as in (9) and (10) again:

(9) John thinks that [Peter likes him]

(10) John thinks that [he likes Peter]

In sentential positions there is in fact complementary distribution between anaphors and pronouns in English; hence the correct predictions for pronouns can be obtained under the subject-based definition of governing category as for anaphors. In particular, the embedded VP is the governing category for the pronouns in (9)-(10) and disjoint reference between the pronoun and *Peter* in (9) is correctly predicted.

Consider then a pronoun in the subject position of an object NP, as in (21); this is a clear case of noncomplementary distribution of pronouns and anaphors in English:

- (21) The boys saw [their pictures]

By the subject-based definition of locality, the embedded NP is not a governing category for the pronoun in (21), for the same reasons for which it is not for an anaphor. This of course yields the incorrect prediction that *their* is disjoint in reference with *the boys*.

Suppose on the other hand the pronoun had no g-marker in (21). Then, the embedded NP would be a barrier and a governing category for it, *their* being a subject and accessible to itself, and the correct predictions would follow. Thus we should be able to construct a theory under which the g-marker for the Spec of NP is relevant if the Spec of NP is anaphoric, but not if it is pronominal. The simplest way to achieve this result is to assume that resort to a g-marker is optional in all cases. Concretely, suppose the definition of barrier is to be modified as in (22), and the definition of governing category is modified accordingly:

- (22) γ is a barrier for α iff
 γ is a maximal projection, γ dominates α ,
 (if α is g-marked, γ dominates a g-marker for α)

Within (22) reference to the notion of g-marker is optional. Making g-markers optional amounts to saying that the first maximal projection that dominates a position can always count as its barrier; however if the position under consideration has a g-marker its barrier can be extended to include this g-marker.

It is easy to see that the locality domain defined by reference to a g-marker is always wider than the locality domain defined without reference to it. If so, in the case of anaphors the availability of both locality domains is equivalent to the availability of the wider one only. For, all referential dependency links allowed under the narrower definition of locality are allowed under the wider one as well, though the reverse does not hold. In the case of pronouns conversely we expect the availability of both to

be equivalent to the availability of the narrower one. Indeed all referential dependency links allowed under the wider definition are also allowed under the narrower, and not the reverse.

If the notion of *g*-marker is taken into account in (21) the matrix VP is the governing category for the pronoun; if the notion of *g*-marker is not taken into account, the embedded NP is. In the first case, coreference between *their* and *the boys* is predicted to be impossible; but in the second case coreference between *their* and *the boys* is correctly allowed. Consider then a pronoun in the subject position of an NP which is itself in subject position, as in (23):

(23) The boys thought that [their pictures] were on sale

If we are correct, the anaphoric counterpart to (23) is illformed. If so, the wellformedness of (23) under any interpretation is correctly predicted whether the notion of *g*-marker is taken into account or not. In the first case the locality domain for the pronoun is the same as for the anaphor, and complementary distribution is predicted. In the second case the locality domain for the pronoun is simply the embedded NP, and no disjoint reference is predicted to arise.

Consider finally a pronoun in the object position of an NP, as in (24):

(24) The boys thought that [pictures of them] were on sale

(24) and its anaphoric counterpart appear to be both wellformed; thus this appears to be again a case of non-complementary distribution of pronouns and anaphors. Furthermore, the optionality of the *g*-marker requirement does not help in these cases, since the *g*-marker for the pronoun or anaphor, *N*, is internal to the first maximal projection that dominates them.

However, it is crucial to the wellformedness of the anaphoric counterparts to (24) that the subject-based definition of locality is chosen. The reason is that the first subject accessible to the object of the embedded NP is the matrix subject. One way of deriving the noncomplementary distribution of pronouns and anaphors in examples of the type in (24) is to have recourse to our notion of barrier for pronouns, because NP is a barrier for the pronoun in (24), and under it no disjoint reference patterns are predicted to arise with them. The predictions for the examples in (21) and (23) remain unchanged, as can be easily checked; as for sentential positions, we have already seen that the subject-based definition of locality and our definition of barrier are always equivalent.

The last example to be considered involves a pronoun in the object position of an NP again, where the NP however is in object position, as in (25):

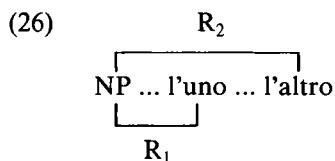
- (25) The boys saw [pictures of them]

Again the optionality of g-markers is irrelevant here, as in (24). If the pronoun is associated with our definition of barrier, as required by (24), its locality domain is the embedded NP, hence no disjoint reference patterns are predicted to arise.

In summary, if what precedes is correct, once NP-internal positions are taken into consideration, English anaphors must be associated with the subject-based definition of governing category, pronouns with the definition of locality domain corresponding to our notion of barrier.

3. ITALIAN RECIPROCAL CONSTRUCTIONS

The existence of two separate notions of locality domain corresponding to our definition of barrier and to the definition of governing category appears to be confirmed by the Italian reciprocal *l'uno l'altro*. The Italian reciprocal consists of two elements, *l'uno* ('the one'/'each') and *l'altro* ('the other'), which occupy two different types of positions and enter two different types of dependencies. *L'altro* behaves like a lexical anaphor, surfacing in A-position and entering referential dependencies with other elements in A-position; *l'uno* behaves like a floating quantifier. Schematically, configurations of the type of (26) appear to be created, where R2 corresponds to the referential dependency between *l'altro* and its antecedent NP; while R1 expresses the dependency between *l'uno* and NP:



It is important to stress at this point that our purpose is not to give a full account of reciprocal constructions, either universally or for the Italian type. Rather, what I am interested in is whether *l'uno l'altro* in NP-internal position requires a subject-based definition of locality or rather our definition of barrier. What I will conclude is that *l'uno* behaves according to our definition of barrier, *l'altro* according to a subject-based definition of locality.

An issue that can be largely disregarded here is whether there is indeed a dependency corresponding to R_1 in (26); or there is only a dependency corresponding to R_1^* in (27) and created at LF by *l'uno* moving to take scope over NP. There is no doubt that (27) must be the LF for something like (26); the question is whether R_1 has also an existence of its own, or only R_1^* does:

- (27) $l'uno_i$ (NP ... t_i ... *l'altro*)
└──────────┘
 R_1^*

Two observations are in order before we dismiss the issue. First, if *l'uno* at LF takes scope immediately over NP, the locality properties of R_1^* are exactly the same as the locality properties of R_1 . Thus (26) and (27) are equivalent in this respect. Second, accepting that something like R_1^* characterises the quantifier part of a reciprocal in English as well, as argued for instance in Heim et al. (1988), and that LF is not parameterised, the only hope of accounting for the discrepancies that we will see exist between Italian and English is at s-structure. Thus (26) and (27) are not equivalent in this respect, and there is perhaps a reason why R_1 must be postulated as an s-structure dependency.

Given this background, consider an NP in the object position of a sentence. *L'uno* can float either NP-externally or NP-internally. If *l'uno* floats NP-externally, the sentence is wellformed, provided NP is otherwise subjectless. Relevant examples are of the type in (28). Notice that in our examples the NP containing (part of) the reciprocal is systematically made into an accusative subject of a small clause, rather than into an object; this is to avoid as much as possible readings with the reciprocal taken as an argument of the verb:

- (28) *Quei pittori considerano l'uno* [_{NP} *i ritratti dell'altro*] *ammirevoli*
 Those painters consider each the portraits of the other admirable

(28) does not chose among locality domains for *l'uno*, which I assume is VP-internal. By our definition of barrier its locality domain is VP, the first maximal projection that dominates it. The subject *quei pittori* ('those painters') is then predicted to be a possible antecedent for it, correctly. The same correct prediction, that the subject of the sentence is a possible antecedent for *l'uno*, follows however under a subject-based definition of governing category, since in this case the subject itself defines the governing category.

Consider now *l'altro*. Under a subject-based definition of locality, the locality domain for *l'altro* is defined by the subject of the sentence, and

binding of *l'altro* from an NP-external position is correctly predicted to be possible. Under our definition of barrier, however, the locality domain for *l'altro* is NP; thus binding of *l'altro* by the subject of the sentence, which is NP-external, is incorrectly predicted to be impossible. Examples of the type of (28) seem then to argue in favour of a subject-based definition of locality for *l'altro*.

The prediction is that adding a subject to the NP in (28) produces a sentence where *l'altro* cannot refer NP-externally, since NP is now the locality domain for *l'altro* under a subject-based definition as well. As *l'uno* is still NP-external and can only have an NP-external antecedent, this in turn should produce an ungrammatical sentence. The prediction seems to be correct, as in (29), where the pronominal subject of NP can indifferently be taken to be coreferential with the subject of the sentence, or not; judgements of this type are confirmed in Belletti (1983):

- (29) *Quei pittori considerano l'uno [_{NP} i loro ritratti dell'altro] ammirevoli
 Those painters consider each their portraits of the other admirable

Consider now the cases, crucial to the determination of the locality domain for *l'uno*, where this floats NP-internally. These are exemplified in (30)–(31), where (30) differs from (31) in that an overt subject is present in NP:

- (30) Quei pittori considerano [_{NP} i loro ritratti l'uno dell'altro] ammirevoli
 Those painters consider their portraits each of the other admirable
- (31) Quei pittori considerano [_{NP} i ritratti l'uno dell'altro] ammirevoli
 Those painters consider the portraits each of the other admirable

(30) represents by far the easier of the two examples, though again it does not distinguish between locality domains for *l'uno*. The locality domain for *l'uno* is NP, both under our definition of barrier, since NP is the maximal projection that dominates *l'uno*, and under a subject-based definition of governing category, since NP has a subject. Hence the only possible antecedent for *l'uno* is the subject of NP, *loro* ('their'). This of course is also true for *l'altro*, which we have just seen to be associated with the subject-based definition of locality. The prediction correctly is that if the subject of NP, which is pronominal, is interpreted as coreferential with the subject of the sentence, so is the reciprocal; but not otherwise.

Consider now (31). Contrary to examples of the type of (28), which are generally judged wellformed, examples of the type of (31) give rise to contradictory judgements. Certainly (31) has a wellformed interpretation under which an empty or implicit subject of NP binds *l'uno* and *l'altro*, and this subject in turn can or not refer to the subject of the sentence. Of course, this interpretation is irrelevant here, reducing essentially to that in (30), with an empty category or an implicit argument substituted for the lexical pronoun.

The relevant interpretation is that under which *l'uno* and *l'altro* are bound by the subject of the sentence, but not by the subject of the NP; in other words, the admiration is reciprocal, not the portraying. If we accept the judgement in Belletti (1983), then under this interpretation examples of the type in (31) are illformed. This in turn cannot be predicted if the locality domain of *l'uno* is subject-based. For, under a subject-based definition, if NP has no subject, or no subject distinct from *l'uno l'altro*, the locality domain for *l'uno* is clearly the sentence. Hence binding of *l'uno* by the sentential subject is predicted to be possible, incorrectly.

Suppose then we take our notion of barrier as defining the locality domain for *l'uno*. The barrier for *l'uno* is of course NP under our definition, since NP is a maximal projection that dominates it. *L'uno* must then be construed with an antecedent within NP. Since in sentences of the type of (31) its antecedent, the sentential subject, is NP-external, we correctly predict ungrammaticality. Thus, the locality domain for *l'uno* must be defined by our notion of barrier.

Another prediction which follows from our hypothesis that Italian reciprocals are associated with our notion of barrier is that they can never be found in NP's which are in (nominative) subject position unless they are bound NP-internally. In this case, the facts are well established, as in (32):

- (32) *Quei pittori pensano che [_{NP} lo stile l'uno dell'altro] sia ammirevole
Those painters think that the style each of the other is admirable

There is of course no prohibition against having English reciprocals, or reflexives in examples of the type in (32); which follows if they are associated with a subject-based definition of locality. On the other hand, examples of the type of (33) are predicted to be wellformed, if *l'altro* is associated with a subject-based locality domain:

- (33) Quei pittori pensano l'uno che [_{NP} lo stile dell'altro] sia ammirevole
Those painters think each that the style of the other is admirable

The status of (33) is extremely difficult to assess. It appears however that if there is a violation in (33) it does not give rise to uninterpretability judgements as (32) does. Thus we can tentatively take (33) to confirm our account.

4. PARAMETERS IN LOCALITY THEORY

If the conclusions in Manzini (1988; 1989), as summarised in section 1, are correct, chain dependencies are associated with the definition of barrier in (4). On the other hand, in section 2 I have argued that referential dependencies involving English anaphors and pronouns can be associated with our notion of barrier or with the subject-based definition of governing category in (5). In section 3 the existence of two separate locality domains corresponding to our notion of barrier and to the subject-based definition of governing category has further been argued for on the basis of the Italian reciprocal *l'uno l'altro*. Of course, the existence of more than one definition of locality for referential dependencies leads us to the issue of whether there is a locality parameter and whether the two notions of locality considered so far are values of this parameter.

The parameters that we will be concerned with fall essentially into two types. The first type of parameter is what we can refer to as an ad hoc parameter, i.e. a parameter built into the theory of locality for the sole purpose of accounting for locality effects. The second type of parameter is a non-ad hoc one in the sense that though it derives locality effects, it is not associated with the theory of locality itself.

The first type of parameter is found in Manzini and Wexler (1987), Wexler and Manzini (1987) and, before that, in Yang (1984). The theory's starting point is the subject-based definition of locality in (5). The idea is that as the definition in (5) refers to the notion of subject, so other definitions of locality can refer to other opacity creating elements, such as I, finite Tns, referential (i.e. non-subjunctive) Tns, etc. Once the locality theory for chains is taken into consideration, as in section 1, the picture that emerges is that there is a basic definition of locality, as in (4), to which various opacity elements are added for referential dependencies. This is the picture arrived at in Koster (1986).

The values of the locality parameter, i.e. the various opacity creating elements, are not associated with languages but with single lexical items in a language. Thus the Icelandic reciprocal has much the same form and locality properties as English *each other*, but the Icelandic reflexive *sig* obeys altogether different locality constraints. This is consistent with the general hypothesis, first put forward in Borer (1984), that parameter learning is part of the learning of the lexicon of a language; a restrictive version

of it surfaces in Manzini and Wexler (1987), Wexler and Manzini (1987) as the Lexical Parameterisation Hypothesis (see Newson, this volume, for discussion). Thus the locality parameter is consistent with the one generally accepted restriction on parameters so far proposed. The various values of the locality parameters can indeed be conceived of as features, associated with lexical items in the way other features are.

Furthermore, the values of the locality parameter define languages each of which is a subset, or a superset, of each of the others; they are therefore ordered in a markedness hierarchy by the Subset Principle. Notice that if this is the case the result that locality is not parameterised for traces, though it is for other elements, can be derived directly from the fact that parameters are associated with lexical items. For, if the unmarked value of a parameter is conceived of as the default value, empty categories are necessarily associated with it. Thus the fact that no variation ever involves traces appears to provide evidence that markedness hierarchies are present at least to the extent that the unmarked setting of a parameter is distinguished from the marked setting(s). In turn the definition of markedness on the basis of the Subset Principle is supported to the extent that it in fact predicts the correct value to be the unmarked one.

Remember on the other hand that we ultimately intend to formulate the locality parameter so that (4) becomes the basis of a definition of locality to which the notion of subject, as in (5), and possibly other opacity creating elements, can be added as different settings of a parameter. Under this picture another obvious definition of markedness can be suggested to apply, independent of the Subset Principle. Since all definitions of locality include (4) as one of their subparts, (4) is in fact universal. If so, (4) can be unmarked for the simple reason that it is part of universal grammar; other values are then marked for the simple reason that they can only be obtained by 'manual' alteration of the inbuilt programme, where the alteration takes the restrictive form of addition, and not deletion, of information. Again the association of chains with (4) as the unmarked setting for locality follows.

Notice that the choice between the subset based definition of markedness hierarchies and the one tentatively sketched here is an entirely empirical one, since it is obvious that their predictions must be at variance with one another. For instance, one of the striking properties of the markedness hierarchies defined by the Subset Principle is that they differ for anaphors and pronominals; in fact the markedness hierarchy for pronominals is the mirror image of the markedness hierarchy for anaphors. Under a definition of markedness of the type we are envisaging, (4) represents the unmarked value across any other linguistic categorisations.

This, however, and other questions of a psycholinguistic nature, cannot be settled within the limits of this investigation. Rather, the question that

I intend to settle is the purely linguistic one, concerning the adequacy of ad hoc and non-ad hoc models of locality parameters. In short, if the discussion that precedes is correct, there is a parameterised definition of locality of the form in (34), where the requirements corresponding to the definition of barrier must be invariably satisfied and various additional opacity-creating elements form additional optional requirements:

- (34) γ is a locality domain for α iff 0. γ is a maximal projection, γ dominates α , (if α is g-marked, γ dominates the g-marker of α) and
1. γ dominates a subject accessible to α ; or
 2. etc.

If the notion of government is defined in terms of locality domain, as in (34), rather than in terms of barrier, it follows that not only the conditions on movement, but also the Binding Theory, as in (12), can be formulated as government conditions, completing the unification of locality theory with respect at least to the notion of locality referred to.

Let us then consider what we have referred to as the non-ad hoc approach to the locality parameter, represented notably by Pica (1987). According to Pica (1987), as well as Chomsky (1986a), lexical anaphors move at LF; Binding Theory, or ECP, holds of the anaphor trace link, rather than of the anaphor and its antecedent. According to Pica (1987), there are essentially two types of anaphors, anaphors like *each other* or *himself* which are descriptively associated with a subject-based definition of locality, and anaphors of the type of Icelandic *sig*, that are descriptively associated with a referential Tns opacity element. The long-distance binding effects with anaphors such as Icelandic *sig*, whose opacity creating element in terms of a definition like (34) is an indicative Tns, follow from the fact that they are X's and they move at LF from head to head. This leaves us then with anaphors of the type of *himself* or *each other*, which are XP's and whose movement is strictly local. The strict locality of the movement of these anaphors follows again from the fact that these anaphors move according to their categorial type, if Pica (1987) is correct.

Unfortunately, the theory encounters serious execution problems. Consider in particular XP anaphors. If XP anaphors move according to the XP type, only two possibilities are open: either they move to A-position or they move to A'-position; but both options are highly problematic. If they move to A-position, it is indeed expected that they display strictly local binding effects; but in general there will be no A-position for them to move into. If they move to A'-position, then there appears to be absolutely no reason why they couldn't move successive cyclically, thus producing long-distance binding effects once more.

I do not want to imply that these problems are insoluble; only that their solution will involve a complication of the grammar. If so, the potential simplicity argument for what I have called non-ad hoc theories would disappear. What is crucial to our argument however is that the parameter derived in Pica (1987) is a two-way parameter, between short-distance and long-distance dependencies. If Manzini and Wexler (1987), Wexler and Manzini (1987) are correct, there are of course many more values to the parameter; but leaving these aside, on the basis solely of the new evidence presented here, we must conclude that the parameter that is needed for observational adequacy is at least a three-way one, the short-distance value of Pica (1987) splitting into a subject-based and a non-subject-based value. Notice that a parameter to this effect can presumably be added to the theory in Pica (1987); but this only illustrates our point further, namely that a locality parameter is required in any case.

In fact, a desirable property of the theory in Pica (1987) is that it links the locality domain of anaphors and pronouns with their ability or inability to take antecedents other than subjects. In particular, it appears to be a fact that anaphors whose opacity element is a subject, do not necessarily have a subject as their antecedent; on the other hand, long-distance anaphors are subject oriented. The link between long-distance binding and subject orientation follows if the landing site for a long-distance anaphor, which is an X^0 and moves head-to-head, is I. This still needs to be stipulated within the theory, but it at least provides a natural basis for linking antecedence and locality.

By contrast, the theory in Manzini and Wexler (1987), Wexler and Manzini (1987) cannot derive the link between long-distance binding and subject orientation. Rather, the subject orientation of certain anaphors is treated as a second parameter, the antecedent parameter. Thus it is likely that at least this aspect of the theory in Pica (1987) is correct. This however leaves our present argument unchanged. Once more, our argument is simply that a crucial feature of the theory in Manzini and Wexler (1987), Wexler and Manzini (1987) must be retained, namely parameterised locality domains.

Any modification of the original conception of the locality parameter in order to take into account at least the link with the antecedent parameter must in turn raise the question whether the argument in favour of the Subset Principle is preserved. In the meantime, however, our provisional conclusions are supportive of the Subset Principle. If the necessity of a parameter of the type in (34) is demonstrated, the original argument in favor of the Subset Principle stands at least for the time being.

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