Licensing Conditions on Null Operators

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1. Parasitic Gaps and Null Operators

Parasitic Gaps (PGs) are now familiar objects on the syntactic landscape. A PG is an empty category in a Case-marked NP position that shares with Wh-trace the property of being A-bar bound but differs from Wh-trace insofar as it appears to have the privilege of occuring in positions that are in some sense inaccessible to movement. Thus the PG in (1,2) (represented as e) appears in a position that is locally governed and Case-marked by V (1) or P (2); the PG must be construed as a variable bound by the matrix Wh-phrase, implying that it is A-bar bound by that Wh-phrase; but the PG appears in an adjunct gerund (1) or purpose clause (2), from which Wh-movement to the matrix Comp is normally blocked. It is the latter sense in which the PG is parasitic; its grammaticality depends on the existence of a licensing "true" Wh-trace (t), which is not reciprocally dependent on the presence of the PG.

(1) Which book did John buy t [without reading e]
(2) What country did Morrocco attack t
[to win its independence from e]

The PGs in (1,2) must be construed as variables bound by the matrix Wh-phrases. In Chomsky's (1982) analysis, this follows from the fact that the PG, being an empty category (ec), must satisfy the general wellformedness condition on variables in (3):

(3) [e] is a variable iff it is in an A-position and is locally A-bar bound.

If the PGs in (1,2) could be construed as some other type of ec, then it might not be crucial for them to satisfy (3). But because of their local environment, they cannot be any type of ec other than a variable; they cannot be PRO (being governed) or NP-trace (not being locally A-bound by a non-O-position) or pro (not being locally identified by Agr). So the PG must be an A-bar bound variable, and if the matrix Wh-phrase is the only available A-bar binder, then the obligatory construal in (1,2) follows.

As noted above, PGs may occur in islands. The island status of the adjunct clauses in (1,2) can be attributed directly to the Subjacency Principle, given appropriate definitions of bounding nodes; see Belletti and Rizzi (1981), Marantz (1980), Chomsky (1984) for some relevant discussion. It can also be attributed to Huang's (1982) Condition on Extraction Domains (CED), or to the ECP applying to an intermediate trace that is forced by

Subjacency. The choice between these various alternatives is immaterial to the present discussion, since they share the essential property of appealing to some principle (Subjacency or the CED) that is construed specifically as a condition on the application of Move Alpha. Note, incidentally, that PGs may also occur in other types of Subjacency-related islands. In particular, they may occur in relative clauses, even if these are embedded within NPs in subject position:

(4) This is the type of book which [laymen [who try to read e]] usually can't understand t

The fact that PGs may occur within islands that are "inaccessible to movement" led Taraldsen (1981) and Chomsky (1982) to assume that PGs are in fact not derived by movement. In Chomsky's theory, a Wh-phrase must originate at D-structure in an A-position in order to acquire an index (and thereby function as an A-bar binder relevant to (3)); hence there must be a licensing Wh-trace in a position that is accessible to movement. But nothing prevents the free generation of an additional ec coindexed with the matrix WH-phrase and its trace, apart from the Bijection Principle on variable binding, proposed by Koopman and Sportiche (1982), and stated informally as (5):

(5) Each quantifier must (locally) bind exactly one variable, and each variable must be bound by exactly one quantifier.

If violations of (5) induce weak effects on acceptability judgments, the quasi-grammaticality of (1), (2), and (4) follows. Since the PGs within the islands are not the D-structure positions of the matrix Wh-phrases, there is no violation of Subjacency or the CED. An essential insight of this approach is that the distinction between true Wh-trace and parasitic gaps with respect to the standard island condition effects provides strong evidence for construing Subjacency (or CED) as a condition on the application of Move Alpha, rather than as a condition on S-structure representations.

Kayne (1983) has challenged this conclusion. His argument is based on the observation that a PG within an adjunct island must not be embedded within a subject island; similar effects with embedded adjunct islands are discussed by Longobardi (1984).

(6) Who did John describe t
[without PRO examining [any pictures of e]]
(7) *Who did John describe t
[without [any pictures of e] being on file]

Kayne argues that if PGs are not derived by movement, then the Subject Condition must follow from a condition on representations rather than from a condition on movement, given the contrast illustrated in (6/7).

Of course, it is possible to argue conversely that if the Subject Condition follows from a condition on movement, then the PGs in (6,7) must be derived by movement. This is the position taken by Chomsky (class lectures,1984), who suggests that the PG in (6) must be the trace of a null operator (Op), which locally A-bar binds the PG from a position within the adjunct phrase. (See also Contreras (1984).) Op must be locally bound by an antecedent, which will normally be the licensing matrix Wh-trace. Because of a locality condition holding between Op and its local antecedent (Subjacency, according to Chomsky) Op must adjoin to the gerund in (6), as in (8):

(8) Who did John describe t
[without [Op [PRO examining [any pictures of e]]]]

A similar movement of the null operator in (7) would violate Subjacency (or CED) in (7), yielding the Subject Condition effect. This approach attributes an absolute island status to subjects and adjuncts; apparent counterexamples must involve local binding of a null operator across the adjunct or subject boundary.

Any account of (6/7) in terms of null operator movement must rely on the existence of some principle to force the presence of the null operator and rule out direct A-bar binding of the PG by the matrix Wh-phrase. This would follow if the Bijection Principle (5) holds absolutely, so that Op is required in order to locally bind the PG and avoid a Bijection violation. (The marginal status of the construction would then have to follow from some factor other than (5).) Alternatively, the existence of the null operator might follow from the assumption that every empty category must be subjacent to a local antecedent. If the PG is not subjacent to any matrix constituent (i.e. if subjects and adjuncts are absolute islands for Subjacency) then the adjunct or subject must contain a null operator. These two accounts of how the presence of the null operator is induced differ empirically with respect to constructions such as (9):

(9) Who did you convince t [that you would be happy to visit t]

This construction involves a "nonparasitic" PG, in that both empty categories are possible sources for the matrix Wh-phrase. If the null operator is induced solely to satisfy the requirements of bounding theory, then there is no need for a null operator in (8). But if the null operator is induced by virtue of the Bijection Principle, then (8) must involve a null operator, which presumably must originate within the complement clause. I will return to this point below.

Kayne's (1983) theory of PGs does not depend on the existence of any null operator; the essential insight of his Connectedness principle is that there is a direct connection between the PG and the matrix Wh-phrase as a result of the union of paths at S-structure. In Kayne's theory, a base-generated PG, like any governed category, is associated with a g-projection, and the island status of subjects and adjuncts follows from the failure of any g-projection originating within them to extend spontaneously from these constituents into the matrix. But if the maximal g-projection of a PG is directly dominated by a node of a co-indexed g-projection that connects to the matrix Wh-phrase, then the union of the two g-projections creates a direct g-projection path between the PG and the matrix Wh-phrase. According to this theory, the A-bar binding relation between the matrix Wh phrase and the licensing trace is not intrinsically different from the A-bar binding relation between the the matrix Wh-phrase and the PG; both binding relations satisfy the Connectedness Condition at S-structure. In other words, subjects and adjuncts are not absolute islands in the Connectedness theory, given the availability of union of g-projection paths. Since a PG can be directly bound by the matrix Wh-phrase, null operators are superfluous in this account.

The role of the null operator constitutes an empirical distinction between the two theories of bounding, which is to some extent independent of the question of whether the relevant island conditions follow from conditions on movement or conditions on representation. (The latter distinction is clouded somewhat in any case, if Subjacency is construed as an S-structure condition on the binding of the null operator.) The crucial empirical distinction concerns the status of the null operator, the presence of which is required only under an approach which claims that a PG cannot be locally A-bar bound by the matrix Wh-phrase, either because of the Bijection Principle (5) or because of a Subjacency-related locality condition on the binding of empty categories; cf. (9). In the next section, I will discuss certain facts concerning the interpretation of NP-internal PG constructions which provides independent empirical evidence for the existence of the null operator. Before discussing this, however, it is convenient to review a previous argument to this effect, due to Contreras (1984).

Contreras observes that if a variable must be A-free within the domain of the operator that binds it, then PG constructions such as (1,2) must involve a null operator within the adjunct. This follows from the observation that the licensing trace in the matrix object position must be assumed to c-command the PG within the adjunct, contrary to previous claims. The evidence comes from the fact that analogous structures involving a pronoun in the position of <u>t</u> and an R-expression in the position of <u>e</u> exhibit Condition C effects, in the sense of Chomsky (1981):

(10) a. *John bought <u>them</u> without reading <u>the books</u>
  b. *Morroco attacked <u>them</u> to win independence from <u>the French</u>

Note that similar Condition C effects obtain with respect to complement structures analogous to (8):

(11) *I convinced <u>him</u> that I would be happy to visit <u>John</u>

If (10, 11) represent a genuine Condition C effect, then the presence of a null operator within the adjunct or complement clause is necessary in order to explain the grammaticality of (1,2) and (9). For if the matrix Wh-phrase were the operator directly binding the PG, we would expect a comparable Condition C effect, since the licensing trace A-binds the PG. On the other hand, if the adjunct or complement clause contains a null operator, which locally A-bar binds the PG, then the absence of any Condition C effects is expected. This follows from the fact that Condition C only holds for variables within the c-command domain of the operator that binds them (cf. (3)); this is known on the basis of "Object Deletion" (eg. <u>tough</u>-movement) constructions, which are derived by movement of a phonetically null [+Wh] operator; cf. Chomsky (1977, 1981). In this respect, a null operator must be distinguished from the trace of Wh-movement in Comp:

(11) *Who did he say [[e] [t was leaving]]

The contrast between (12) and (8/9) indicates that the null operator, unlike trace in Comp, has the status of a true independent operator with respect to the definition of the domain of Condition C. If null operators are freely available in PG constructions, as Contreras's observation implies, then this provides indirect support for the "absolute island" approach.

<u>2. Null Operators Inside NP</u>

Further support for the true operator status of a null operator in PG constructions comes from the distribution and interpretation of PGs inside NPs. Although the general distributional properties of PGs in adjunct clauses are by now fairly well understood, the same is not true of PGs appearing inside NPs. Although these are often grouped together, I believe that in fact there are two distinct paradigms of NP-internal PG constructions, involving quantificational and nonquantificational heads. We will concentrate in this paper on PG constructions involving nonquantificational heads, of the type illustrated in (13); for a fuller discussion of the quantificational paradigm, see Stowell (in preparation).

(13) a. Who did [your stories about <u>e</u>] amuse <u>t</u>
     b. Who did you give [Greg's's pictures of <u>e</u>] to <u>t</u>

In these sentences, the PG <u>e</u> appears within a noun phrase -- either a subject NP or a direct object NP. Unlike the previous cases, these PGs are not c-commanded at S-structure by the licensing matrix Wh-trace, as the absence of Condition C effects in (14) illustrates:

(14) a. [My stories about Jim] amused him
     b. I gave [Greg's picture of Martha] to her

As noted by Clark (1983), PGs inside NPs also have a special property concerning their interpretation, which distinguishes them from other PG constructions. Specifically, the PG constructions in (13) admit an interpretation of multiple interrogation, analogous to that found in cases involving overt Wh-in-situ. Thus (13) naturally anticipates an answer such as (15):

(15) a. My stories about Jenny amused Jim
     b. I gave Greg's's pictures of Martha to Daniel

This multiple interrogation reading is not available with the standard adjunct or complement PG constructions; thus (1) and (9) do not anticipate answers such as those in (16):

(16) a. ?John bought Ulysses without reading Dubliners
     b. ?I convinced Kitty that I would be happy to visit Hogan

Moreover, the multiple interrogation reading is not always available with NP-internal PG constructions, as we shall soon see. But it is possible in (13). Why should this be so?

It is useful to recall that the syntactic structure normally associated with Multiple Interrogation (MI) involves two or more overt Wh-phrases, with one appearing in Comp and the other(s) ocurring in situ at S-structure (in English). Thus (17a), but not (17b) or (17c), has a MI reading:

(17) a. Who thinks that John saw who?
     b. Who thinks that John saw someone?
     c. Who thinks that John saw him ?

Bounding theory can account for this by appealing to the following standard assumptions:

(18) (i) The semantics of interrogation is associated with the LF representation of a Wh-quantifier phrase in a [+Wh] Comp A-bar binding a variable in an A-position.

(ii) Wh-in-situ undergoes movement to a [+Wh] Comp in the mapping from S-structure to LF.

(iii) QPs such as someone may undergo QR, adjoining to S, or to any maximal projection, following May (1985).

(iv) A pronoun which is A-bound by a variable V is interpreted semantically as a variable whose value covaries with that of V.

From (ii) it follows that who undergoes movement to the matrix Comp in (17a); from (iii) it follows that someone may adjoin to the embedded S in (17b). Hence the LF representations for (17) will be those of (19):

(19) a. [Wx (x:human), Wy (y:human) [x thinks [John saw y]]]]
b. [Wx (x:human) [x thinks [Ey (y:human) [John saw y]]]]]
c. [Wx (x: human) [x_i thinks [John saw him_i]]]

From (iv) it follows that him in (19c) can be construed semantically as a variable bound by a Wh-quantifier. In this respect, it is similar to the variable in (19a). But it differs from the variable in (19a) insofar as it is only parasitically a variable; in order to be so construed, it must be A-bound by a licensing co-variable. The fact that the variables in (19a) are completely free with respect to each other is crucial to the semantics of multiple interrogation. Let us assume that this independence is reflected formally as follows: each variable in (19a) is bound by a distinct Wh-operator, and each operator-variable pair has a distinct referential index. The LF representation (19b) is similar to (19a) insofar as it also contains two non-co-indexed variables. But whereas both variables in (19a) are bound by a Wh-quantifier, this is only true of one of the variables in (19b); this difference accounts for the fact that only (19a) has the semantics of multiple interrogation, given the assumption (18i).

Let us now return to the semantics of (13). These sentences allow a MI reading despite the fact that there is only one overt Wh-phrase, namely the Wh-phrase that has moved to the matrix Comp. This is the interpretation that we would expect to be associated with sentences in which the PGs in (13a,b) are replaced with overt Wh-phrases in situ. Interestingly, these sentences are ungrammatical:

(20) a. *Who did [your stories about who] amuse t
b. *Who did you give [Greg's pictures of who] to t

The ungrammaticality of (20a) follows from Kayne's Connectedness condition if Wh-in-situ must be connected to Wh-in-Comp. It also follows from the assumptions (18i) and (18ii) if subjects are absolute islands for movement, including LF-movement. The parallel status of (20b) would follow from Connectedness if the "object" NP is actually the subject of a special kind of small clause (in the spirit of Kayne (1984); it also follows if all (definite) NPs, and not just subject NPs, are absolute islands for movement to Comp. Thus (20) is ruled out at LF for the same reason that (21) is ruled out at S-structure:

(21) a. *Who did [your stories about t] amuse who
b. *Who did you give [Greg's pictures of t] to who

In (21), where the trace has switched places with Wh-in-situ, the movement of who to Comp in the mapping from D-structure to S-structure has violated whatever principle is responsible for the island status of the subject position.

Apparently, there is no island violation in (13), suggesting that the relation between the PG and the matrix Wh-phrase is not subject to this principle. Let us consider what this means within the context of each approach. Within the Connectedness-based approach, (20/21) can be interpreted as follows. First, both Wh-in-situ and Wh-trace must be connected to Wh-in-Comp. Second, G-projections do not extend out of subject NPs. Finally, a g-projection path of Wh-in-situ cannot unite with a G-projection path of Wh-trace, perhaps because of a parallelism constraint on A-bar binding of the type suggested by Kayne (1983) and Safir (1984). The grammaticality of (13) must indicate that the G-projection path of the PG is permitted to unite with the G-projection path of the trace. But (13) permits (for some speakers, requires) a MI reading, in which the variables have distinct indeces. Therefore coindexing cannnot be a precondition for union of G-projection paths. (This assumption is necessary anyway to account for Wh-in-situ.) But if coindexing is not a precondition for G-projection paths, then the lack of a MI reading in adjunct and complement PG constructions (1,8) is unexplained; recall (16).

A similar paradox arises within the "absolute island" theory. The contrast between (13) and (20/21) indicates that the PG in (13) cannot be the trace of movement to the matrix Comp, regardless of whether the movement takes place at S-structure or LF, since the NP containing the PG must be an absolute island for movement at both levels, in order to account for (20/21). Since the PG is not subjacent to the matrix Wh-phrase, it must be the trace of an NP-internal null operator, rather than the trace of the matrix Wh-phrase. As in the case of the adjunct gerunds, it is not obvious where the null operator appears at LF; for the sake of concreteness, I will assume it must adjoin to NP, due to the same locality condition operative in the adjunct examples. Since (13) permits a MI reading, the PG must function at LF as a variable bound by a Wh-operator, i.e. the null operator 'Op' must be a null version of overt Wh:

(22) [Wx (x:human) [[Wy (y:human) [your stories about y]] amused x]

The availability of the MI reading provides striking support for the hypothesis that the null operator in the PG construction is a true Wh-operator, further distinguishing it from trace in Comp. Insofar as the null operator has the status of an independent Wh-quantifier, the "absolute island" approach has the basis for an account of (13).

Still unexplained, however, is the fact that the MI reading is unavailable in the adjunct and complement PG constructions in (1) and (8). The null operator itself provides a plausible account of this, in terms of the relation between the null Wh-operator and its antecedent. Compare (22) with (23), the LF of the adjunct PG construction in (1):

(23) [Wx (x: book) [John bought x
                    [without Wy (y: book) [PRO reading y]]]]

It was noted above that the PG in (23) is A-bound by the licensing trace, while this is not the case in (22). More to the point, however, is the fact that the null Wh-operator is locally A-bound in (23) but not in (22). In (22), the only category that binds the null Wh-operator is the matrix Wh-operator. What is the nature of the binding relation involved in the binding of a null operator? In (22) it seems that while the null operator functions as an independent Wh-quantifier, it is dependent upon its antecedent for the assignment of its range. In (22), the antecedent of Wh is the overt matrix Wh-phrase. The range of the matrix Wh-phrase is the set of human individuals, and the range of the null Wh-operator is the same. This would follow from (24):

(24) <u>Range Assignment Principle (RAP)</u>
     The range of a null quantifier is determined by
     its local (A or A-bar) binder.

The RAP is stated informally, and I will reserve a discussion of its precise formal instantiation for a longer study of this topic (Stowell, in preparation). The essential idea is that a null Wh-phrase must copy its range description from that of its antecedent, thus ruling out (25) as a possible answer for (13a):

(25) My stories about my vacation amused Jim

Although the ranges of the overt and null Wh-quantifiers are identical, they still function as independent quantifiers, licensing the MI reading. Consider now how (24) will apply to a structure involving a null operator that is A-bound by a referential NP, as in a <u>tough</u>-movement structure:

(26) John$_i$ is easy [Op$_i$ [PRO to please t_i]]

Here, the range of the null operator is the set denoted by its antecedent <u>John</u>. Note that the null operator Op in this structure lacks the interpretation of a true Wh-quantifier. This would follow from (27):

(27) For any null operator Op, the feature value [$\pm$Wh]
     must be identified by the local antecedent of Op.

In (22), the local antecedent (i.e. the local A-bar binder) has the feature [+Wh]; hence the feature [+Wh] on Op is identified, satisfying (27). In (26), however, the local antecedent of Op is <u>John</u>, which is [-Wh]; hence only the feature value [-Wh] can be locally identified on Op. Consider now (23), the LF representation for (1). Although (23) represents Op as a Wh quantifier, this cannot literally be correct, given (27). Assuming that Contreras is correct, the local antecedent for Op in (23) is the matrix Wh-trace. But Wh-trace is a variable rather than a quantifier, and has the feature [-Wh]. Therefore Op in (23) must also have the feature [-Wh], in order to satisfy (27). This will be true quite generally for adjunct and complement PG constructions, insofar as Contreras's argument based on Condition C effects extends to these cases (recall (10, 11).)

The distinction between (22) and (23) with respect to (27) explains the lack of a MI reading in (1); unlike the PG in (13a), the PG in (1) cannot be locally bound by a [+Wh] quantifier, ruling out the MI reading. Rather, the null operator in (23), like that in (26), is a [-Wh] quantifier, whose range is the set denoted by its local A-binder. We can assume that when the local A-binder is a variable, the set defining the range of Op must be the same as the current value of the variable; thus the referential properties of Op with respect to its range bears the same relation to the c-commanding variable as a pronoun bears to a variable that binds it. (This may indicate that the null operator has the status of a null pronominal (pro or PRO), which would provide the basis for an account of the behavior of adjunct PG constructions with respect to Montalbetti's (1984) Overt Pronoun Constraint; cf. Stowell (1985), Cinque (1984).)

One surprising aspect of the analysis sketched above is that the null Wh operator in (22) need not actually occur in the matrix [+Wh] Comp in order to be construed as an interrogative operator. Recall that the null operator must be NP-internal at LF, because subject NPs are absolute islands for both syntactic and LF movement in (20/21). The possibility of normal interrogative construal suggests that being situated in a [+Wh] Comp at LF is not a criterial property of interrogative Wh. A reasonable alternative is (28):

(28) A Wh-quantifier has interrogative construal iff it appears in an A-bar position at LF and if its minimally c-commanding Comp is [+Wh].

This is true in (22), but not, eg. in the case of a Wh-operator that appears at LF in an A-bar position within a [-Wh] S-bar. Note that (28) may be required on independent grounds in order to account for languages such as Hungarian, in which the interrogative Wh-quantifier appears in the S-internal Focus position rahter than in Comp; cf. Horvath (1981).

The fact that the null operator is locally bound by the Wh phrase in Comp has an additional consequence. This concerns the nature of the locality principle governing the binding of the null operator. Specifically, the claim that this binding relation must observe Subjacency appears to be incompatible with the claim that Subjacency alone is responsible for the Subject Condition. This is because the binding of the null operator, unlike the LF movement of Wh-in-situ, is immune to the effects of the Subject Condition. The ultimate resolution of this conflict is beyond the scope of this paper; for fuller discussion see Stowell (in preparation). For concreteness, however, I will assume that the null operator is in fact subjacent to its antecedent in (22), and that the Subject Condition follows from the CED, or from Connectedness, or from the interaction of Subjacency with some version of the ECP.

The NP-internal PG construction has another interesting property, which supports the view that a null Wh-phrase is involved. The antecedent Wh-phrase must be a simple Wh-phrase (i.e. who or what; it may not be of the form [which-N']:

(29) a. ?Which soldiers did [your stories about e] amuse t
b. ?Which artists did you give [Greg's pictures of e] to t

In this respect, the null operator behaves similarly to overt Wh-in-situ:

(30) a. Who saw who
b. Which soldiers saw which artists
c. Who saw which artists
d. ?Which soldiers saw who

Whatever the ultimate explanation for (30), it can most naturally be extended to account for (29) if it is assumed that a null Wh-operator must correspond to overt who or what, and not to overt [which-N']. This implies that the null operator cannot literally "copy" its range from its antecedent. Rather, the null operator must simply be inherently specified as [±Human], and this feature must be subject to the same identification requirement as the [±Wh] feature discussed above with respect to (22/23). In other words, the null operator is simply an empty category which is intrinsically assigned a set of features, including [±Wh], [±Human], [±Plural], etc.; these features must be locally identified by an antecedent to which the empty category is subjacent.

The basic range of properties of (nonquantificational) NP-internal PG constructions supports the hypothesis that PG constructions involve a null operator. The null operator is an empty category with a complex of the familiar Phi-features and in addition a specification for the features [±Wh], [±Human]. These features must be identified by a locally binding antecedent with the same feature specifications, to which the null operator is subjacent. Nevertheless, the null operator has the potential to function as a true independent interrogative operator, resulting in a reading of multiple interrogation. This reading is unavailable, however, if the local antecedent is [-Wh], as is the case in adjunct and complement PG constructions.

Insofar as it provides a principled basis for an account of the environments in which the MI reading is possible, the null operator hypothesis derives empirical support from the range of phenomena that it helps to explain. So too do the principles responsible for inducing the presence of the null operator, although it is not clear that the facts discussed here provide evidence in choosing between these hypotheses. The status of Subjacency is also open to question, but it is clear that Subjacency cannot singlehandedly derive the Subject Condition (which applies to syntactic and LF movement) and simultaneously derive the locality effects on the binding of the null operator. One possibility is that Subjacency constitutes the correct locality condition on the identification of the features of the null operator, and that the Subject condition (and presumably the island status of adjuncts) follows from the CED, or Connectedness, or some version of the ECP applying to intermediate traces.

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