Ā-INTERACTIONS AND FEATURE-GEOMETRIES*

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1 Introduction

Pesetsky (1982) observed that English *wh*-movement interacts not only with other *wh*-movement operations, but also with non-*wh* Ā-movement operations like relativization and topicalization. He proposed a generalized constraint against crossing Ā-movement paths, in what he called the *Path Containment Condition*. I will show that two otherwise unrelated phenomena — restrictions on remnant movement and scope restrictions on *wh*-in-situ — also involve crossing paths and should receive parallel treatment to the cases originally discussed by Pesetsky. I propose a featural analysis that captures all three cases, on which interactions among non-identical operations are the result of a featurally underspecified Ā-probe erroneously entering into an Agree relationship with the wrong goal.

2 Ā-Interactions

It was observed by Pesetsky (1982) that when a derivation consists of two or more Ā-operations, these dependencies can interact with each other in ways that sometimes lead to ungrammaticality. This is exemplified in (1)–(3) below.

(1) **UNCONTROVERSIAL INTERACTION: *wh...wh***
   a. [What subject]$_i$ do you know who$_j$ PRO to talk to t$_j$ about t$_i$
   b. *Who$_j$ do you know [what subject]$_i$ PRO to talk to t$_j$ about t$_i$

(2) **INTERACTION 1: *wh...Relativization***
   a. chess, which$_i$ I wonder who$_j$ you believe t$_j$ to play t$_i$ well
   b. *John, who$_j$ I wonder [what game]$_i$ you believe t$_j$ to play t$_i$ well

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(3) **INTERACTION 2: *wh...Topicalization***
   a. This problem$_i$, Mary knows who$_j$ PRO to consult t$_j$ about t$_i$
   b. *This specialist$_j$, Mary knows [what problems]$_i$ to consult t$_j$ about t$_i$

The first case involves two instances of *wh*-movement. The ungrammatical (1b) is arguably the most straightforward of the three: the two *wh*-phrases are indistinguishable as far as the interrogative C is concerned, so we expect that the one closest to the probe undergo movement first. This requirement is violated in (1b). The more surprising interactions are in (2b) and (3b). Here, we find Superiority-like effects with Relativization and Topicalization, although these elements are not obviously appropriate targets for the interrogative C in the first place. Pesetsky proposes that these patterns fall out from certain restrictions on Ā-movement paths. He observes that in all the well-formed (a) examples, the two movement paths are *nested*, as illustrated in (4a). The (b) examples all involve *crossing* movement paths (4b).

(4) a. This problem$_i$, Mary knows who$_j$ PRO to consult $_j$ about t$_i$
   b. *This specialist$_j$, Mary knows [what problems]$_i$ to consult t$_j$ about t$_i$

He formalizes this generalization in what he calls the Path Containment Condition, defined in (5):

(5) PATH CONTAINMENT CONDITION
   If two Ā-movement paths overlap, one must contain the other.

Kitahara (1997) was the first to suggest that the Path Containment Condition reduces to general locality principles. More specifically, we can understand the ungrammatical crossing-paths configurations as involving the schema in (6):

(6) (i) A head X c-commands another head Y
   (ii) Both X and Y have properties relevant for some Ā-operation α
   (iii) Y is targeted for this operation, even though X is a suitable target

In this paper, I discuss two configurations that involve the same schema as in (6). The first involves certain ungrammatical cases of remnant movement involving Ā-remnant-movement of a constituent following Ā-remnant-creating movement. The second has to do with scope restrictions on *wh*-in-situ in certain in-situ languages, where Ā-movement of the *wh*-containing constituent prevents the *wh*-phrase from taking scope outside of its moved container. I will first provide a featural account of Pesetsky's Path Containment Condition that builds on Kitahara's (1997) insights. I then discuss how this analysis extends to capture restrictions on remnant movement and *wh*-in-situ.

3 Proposal

Kitahara (1997) pointed out that Pesetsky's Path Containment Condition effects can be derived from general locality principles like the Minimal Link Condition (MLC). What distinguishes (1a) from (1b) above is that only the former obeys the MLC. While Kitahara only discusses the

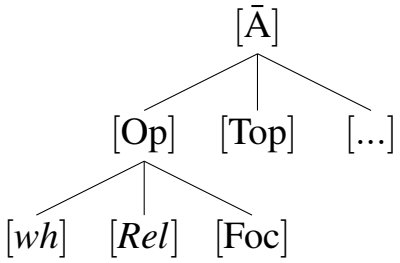
interactions among featurally identical cases, an extention to cases like (2) and (3) is possible, once you make the assumption that what is relevant for locality is the general *type* of movement, e.g. Ā, A, head.

However, once we look across languages, we find that such an extention will overpredict. A case in point is Topicalization, which, as we saw in (3), interacts with *wh*-movement in English. Accounts that ban Ā-movement over another potential Ā-mover in general would predict the ungrammaticality of (4b) to be universal. However, we find that *wh*-movement and Topicalization do not interact in Italian or German (Müller, 1996, Rizzi, 2004). An Italian example is given in (7) for illustration.

(7) Mi domando, il premio Nobel, a chi lo potrebbero dare
' I wonder, the NOBEL PRIZE, to whom they could give.' (Rizzi, 1997)

What is necessary to account for such cases, I will argue, is a more articulated feature-structure for Ā-elements and enough flexibility to permit variation with respect to the class of interveners. Researchers looking at various effects (e.g. the sensitivities to person hierarchy) in the φ-domain have developed and utilized richly articulated feature-structures to capture the effects in individual languages, as well as cross-linguistic variation (see e.g. Harley and Ritter, 2002, Béjar and Rezac, 2009, Preminger, 2011). These approaches posit hierarchies of features, with subclasses and superclasses and entailment relations among features within the hierarchy. Furthermore, it is assumed that probes may be relativized to more or less specific features, and that the way probes are relativized may vary across languages. Though less attention has been paid to feature-geometries in the Ā-domain, proposals along similar lines have been developed in e.g. Starke (2001), Rizzi (2004) and Abels (2012). Building on this work, I'll use a (simplified) feature-hierarchy as in (8).

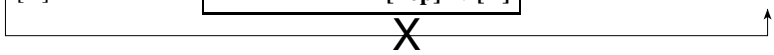
(8)



Crucially, the features lower in the hierarchy, i.e. the more specific ones, entail the higher, more general ones. Throughout, I will mark this entailment relation using the following convention: [SPECIFIC] → [GENERAL]. The advantage of having a more articulated feature geometry and allowing for relativized probing is that we can account for cross-linguistic variation while maintaining the universality of locality principles that forbid a probe from looking past potentially relevant goals and target lower ones.

Suppose C in English is a relatively flat probe that looks for [Ā]-features. Let us also assume that the topicalized phrase *the specialist* bears a [Topic]-feature and that *what problems* bears a [*wh*]-feature. Both [Topic] and [*wh*] will entail [Ā] under our system. Thus, a relationship between C and the *wh*, as schematized in (9), is impossible without violating locality principles, since *the specialist* also bears the relevant [Ā]-feature (by entailment). Assuming obligatoriness of Agree (see e.g. Preminger, 2012), C must Agree with *the specialist*. But were this relationship to occur in the first place, we would end up with an entirely different derivation, where *the specialist* appears in Spec, CP.

(9) [...[$\mathbf{C}_{[\bar{A}]}$ [to consult **the specialist**$_{\mathbf{[Top]} \rightarrow \mathbf{[\bar{A}]}}$ about **which problem**$_{\mathbf{[\textit{wh}]} \rightarrow \mathbf{[\bar{A}]}}$]]]



How might one explain the *lack* of similar interactions in Italian? Given that languages may vary with respect to the specificity of features on probes, we might say that the Italian C probes at an intermediate level; in (8), this level would be [Op]. In such a situation, we predict that interrogative C in Italian would interact with Focus and Relative operators, but not with Topics.

4 Crossing Paths Elsewhere

In this section, I discuss two unrelated phenomena — restrictions on remnant movement and restrictions on the scope of *wh*-in-situ — which, upon closer examination, seem to fall out from Pesetsky's crossing-paths constraint. I will show that the analysis developed here straightforwardly extends to these cases.

4.1 Remnant Movement

Remnant movement configurations involve the movement of some XP *after* a subconstituent YP contained within it had already undergone movement. A well-known restriction on remnant movement, as first observed by Müller (1996) and Takano (1994), is that the operation is banned if the remnant-creating movement is of the same type.

(10) **MÜLLER-TAKANO GENERALIZATION**
A configuration of the form "[$_{XP}$ ...t_{YP}] ... YP ... t_{XP}]" is allowed only if the movements targetting XP and YP are of different types.

Pesetsky's Path Containment Condition addressed asymmetries in grammaticality in derivations with two same-type movement paths, where one moving element c-commanded the other. Sauerland (1996) and Kitahara (1997) observe that the Müller -Takano generalization describes the *domination* counterparts of Pesetsky's (1982) original crossing-paths environments. Suppose we have a configuration in which XP dominates YP. Sentences in which XP moves and then YP moves, as in (11a), are well-formed, whereas the reverse cases, where YP moves first and then XP moves, as in (11b), are not.

(11) a. ?[Which student]$_i$ did Rachel ask [what picture of t_i]$_j$ PRO to put up t_j?
b. *[What picture of t_i]$_j$ did Rachel ask [which student]$_i$ PRO to put up t_j?

The basic insight here is that the remnant movement example in (11b) seems to exemplify the same constraint as the crossing-paths derivations. The ungrammatical example in (11b) has all three properties in (6) above. This is because in configurations where XP dominates YP, X will necessarily be higher than Y. Now, suppose XP and YP must undergo the same type of movement. In these cases the heads X and Y will have similar enough featural makeup to be targeted by the same probe. In this configuration, the remnant-creating movement, i.e. movement of the subconstituent YP, cannot take place because X is a higher suitable goal for the initial remnant-creating operation than Y.

Given the parallels, it seems desirable to give a unified account of the crossing-paths effects and restrictions on remnant movement. If ungrammaticality in both cases reduce to the same

underlying principle, we should be able to import the analysis sketched in §3 wholesale to the remnant movement cases. In fact, doing so makes a welcome prediction. I had suggested earlier that the German interrogative C interacts with a proper subset of features that the English counterpart does. We then expect that English and German also vary with respect to what kinds of remnant movement they allow. This prediction is borne out. English, which we saw bans *wh*-movement over a phrase that bears a [Topic]-feature, also bans remnant-creating *wh*-movement over a container phrase that is itself endowed with a [Topic]-feature (12). German, on the other hand, was permissive with *wh*-operations crossing a Topicalizable element and continue to be permissive with *wh*-operations crossing a Topicalizable container-phrase (13).

(12) *[Ready to marry t_i]$_j$ I wonder [who]$_i$ John is t_j

(13) **German** (Müller 1997)
?[Bücher zu lesen]$_1$ weiβ ich nicht [warum sie t_1 versucht hat]
[books to read] know I not [why she tried has]

4.2 *Wh*-in-situ Scope Restrictions

The previous subsection suggested that restrictions on remnant movement can be understood as Path Containment Condition effects. In this subsection, I show that the Path Containment Condition applies also to configurations that do not involve multiple instances of movement. Specifically, I will argue that the ban on crossing paths can be invoked to explain locality restrictions on long-distance *wh*-in-situ in certain languages.

While it is generally thought that *wh*-in-situ, like overt movement, is potentially unbounded, certain languages have been argued to have locality restrictions specific to the *wh*-in-situ strategy. In these languages, in-situ *wh*-phrases cannot take scope outside of certain clauses that are otherwise transparent for operations like overt extraction and variable binding. Here, I will focus on two South Asian languages, Hindi (Indo-Aryan) and Malayalam (Dravidian). Consider the long-distance question formation attempts in (14) and (15). In both cases, the in-situ *wh*-phrase inside the embedded clause fails to take matrix scope, resulting in an ungrammatical structure.

(14) HINDI
*Wajahat maan-taa hai [ki Rima **kis-ko** pasan kar-tii]
Wajahat.m believe-HAB.MSG be.PRS.SG [that Rima who-ACC like do-HAB-F]
'Intended: Who does Wajahat believe Rima likes?' (Bhatt 2003)

(15) MALAYALAM
*[Sita **eethu pustakam** vaayich-ennu] Raman vicaarichu?
[Sita which book read-COMP] Raman thought
Intended: 'Which book did Raman think Sita read?'

Though this phenomenon is sometimes described as clause-boundedness of *wh*-in-situ (see e.g. Simpson and Bhattacharya, 2000), Dayal (1996) shows for Hindi and Aravind (2016) shows for Malayalam that the relevant factor is clause position. Both Hindi and Malayalam are SOV languages, but clauses can and sometimes must appear in a peripheral position. In Hindi, this position is to the right of the verb and in Malayalam, it is to the left of the matrix subject. Finite

clauses obligatorily move. The examples in (14) and (15) are therefore confounded, since we cannot tease apart which factor — finiteness or clause position — is directly responsible for scope-blocking. Disambiguating evidence comes from non-finite clauses, which can optionally remain in-situ. Here, we find an asymmetry in the ability of the *wh*-phrase to take wide scope — it is possible when the clause is in-situ, but impossible when the clause has moved.

(16) HINDI

a. **Preverbal complement clause: wide-scope possible**
tum [**kyaa** paRhnaa] caahte ho
you [what read.INF] want PR
'What do you want to read?'

b. **Extraposed complement clause: wide-scope blocked**
*tum caahte ho [**kyaa** paRhnaa]
you want PR [what read.INF]
Intended: 'What do you want to read?' (Dayal 1996)

(17) MALAYALAM

a. **Preverbal complement clause: wide-scope possible**
Raman [**eethu pustakam** vaayikk-aan] shramichu?
Raman [which book read-INF] tried
'Which book did Raman try to read?'

b. **Fronted complement clause: wide-scope blocked**
*[**eethu pustakam** vaayikk-aan] Raman shramichu?
[which book read-INF Raman tried?
Intended: 'Which book did Raman try to read?'

I will argue that the pattern here, like remnant movement, is a crossing-paths effect. This claim is surprising at first blush, since the *wh*-in-situ cases, unlike all other examples we have seen so far, do not involve two movement paths.[1] However, I will suggest that locality considerations like Minimality need not be thought of as a specialized property on movement relations, but rather a general property of probe-goal relations in general. In this spirit, we should think of it as a generalized constraint on Agree, as defined in (18).

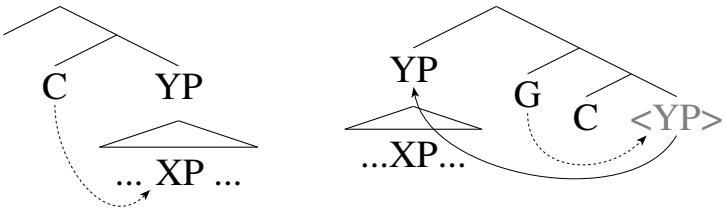
(18) **GENERALIZED MINIMALITY**
A probe must Agree with the closest possible goal bearing the relevant features.

Aravind (2016) demonstrates that the displaced clauses behave as though they underwent Ā-movement to a left-peripheral position. Clausal movement displays island sensitivity, obligatory reconstruction effects and the ability to license parasitic gaps. If this description is correct, then the illicit configurations — i.e. the ones in which wide scope is blocked — involve two Ā Agree-dependencies: one between the *wh*-element and interrogative C and another between the head of the moving clause and some designated left-peripheral head targetting this clause. The configuration is schematized in (19).

[1] Independent diagnostics like Focus-Intervention effects and lack of island sensitivity suggest that the in-situ *wh*-phrases in these languages do not undergo covert movement.

(19) **Illicit long-distance *wh*-in-situ**

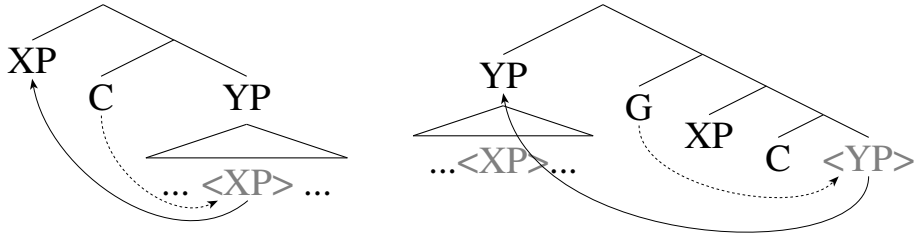
C agrees with XP **G agrees with & attracts YP**



Observe that this derivation parallels the remnant-movement configuration, schematized in (20) in an important respect: in both cases, a dependency must be established with a lower element *skipping over* the head of a phrase dominating it.

(20) **Illicit remnant movement**

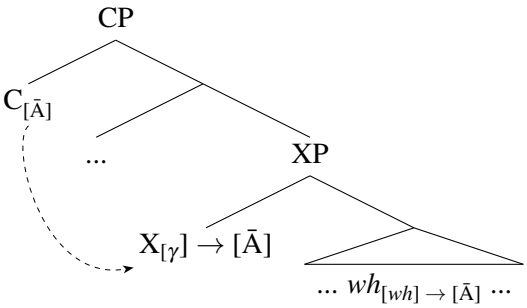
C agrees with & attracts XP **G agrees with & attracts YP**



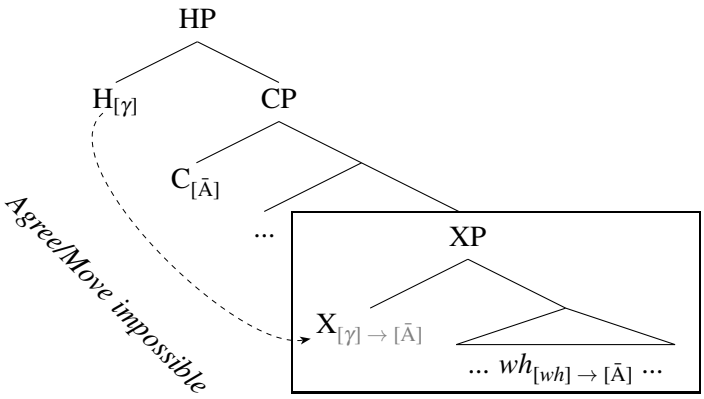
In remnant-movement configurations, we saw that if YP happened to be endowed with features relevant for the probe intended to drive the remnant-creating operation, the resulting structure is ungrammatical. The same logic, I argue, applies in the *wh*-in-situ configurations. Specifcally, if the head of the clause bears features relevant for interrogative C, then C cannot ignore the intervener and establish a relationship with the embedded *wh*-phrase. I will suggest that this is precisely what goes wrong in the restricted-scope cases.

Interrogative C in Hindi and Malayalam is a flat probe looking for [Ā]-features. The head of the movable clause bears the requisite features — for concreteness, let us call it [γ] — which triggers movement of clauses and is in the Ā-family. The higher interrogative C cannot Agree with the [*wh*]-feature bearing head in the presence of the closer, [Ā]-feature-bearing clause head. However, if C Agrees with the head of the clause instead, the higher head's ability to target the clause-head would be blocked and the embedded clause will be prohibited from undergoing the necessary movement.

(21) 1. C AGREES WITH X



2. H CANNOT AGREE WITH X



4.3 Nested Paths

Pesetsky (1982) observed a contrast between crossing paths and dependencies involving *nested* paths, as in (22).

(22) This problem$_i$, Mary knows who$_j$ PRO to consult $_j$ about t$_i$

On the present analysis, nested paths are acceptable because they involve multiple dependencies each of which obeys locality. On this view, the nested-path counterpart to the illicit remnant movement configurations we saw in §4.2 would be cases like (11a), repeated below, involving sub-extraction from a moved constituent. Though they do not involve nested paths per se, these cases are predicted to be acceptable, as the first target for movement is the constituent *dominating* the second mover.[2]

(23) ?[Which student]$_i$ did Rachel ask [what picture of t$_i$]$_j$ PRO to put up t$_j$?

We find grammatical long-distance *wh*-questions in Malayalam and Hindi, which are similar in having a nested path configuration. In Malayalam, a common strategy to form the intended long-distance question, repeated from above in (24), is to form a cleft question (25).

(24) **Canonical question:** *wh*-containing CP undergoes fronting.

∗[Sita **eethu pustakam** vaayich-ennu] Raman vicaarichu?
Sita which book read-COMP Raman thought
Intended: 'Which book did Raman think Sita read?'

(25) **Cleft question:** *wh*-containing CP undergoes clefting.

[Sita **eethu pustakam** vaayichu ennu] aane Raman vicaarich-athe?
Sita which book read COMP COP Raman thought-NOMNL
'Which book was it that Raman thought Sita read?'

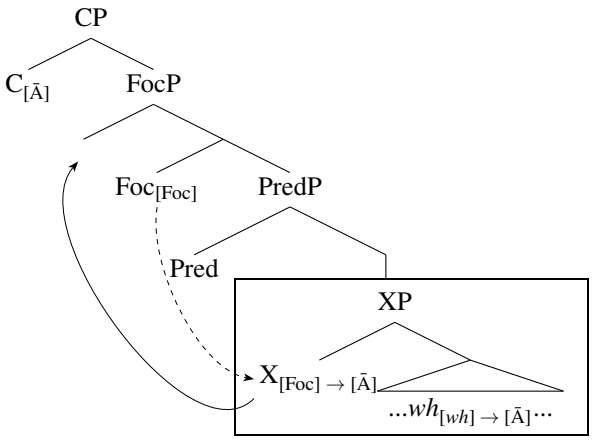
In both cases, the *wh*-containing clause undergoes Ā-movement. The crucial difference between the two is that in cleft-questions, the generalized Ā-probe on interrogative C conducts its

[2]It should be noted, however, that subextraction of the sort in (23) is often also ill-formed and was argued to be ruled out by an independent constraint in e.g. Wexler and Culicover (1981).

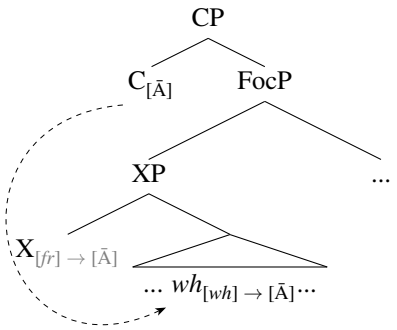
search *after* clausal clefting has taken place. It is analogous to the subextraction cases represented in (11a) above. Under the present account, the grammaticality of these cases is due to the fact that by the time the generalized [Ā]-probe begins its search, the intervening features on the head of the clause have already been rendered inactive. This is schematized in (26).

(26) **Cleft questions**

Foc Agrees w/+Attracts XP



C Agrees with *wh*



In Hindi, Ā-scrambling of the *wh*-phrase can also rescue otherwise ungrammatical *wh*-questions, as shown in (27). The logic here is fully parallel to clefting in Malayalam. Scrambling is generally taken to involve movement to a position below C, in which case the probe responsible can trigger movement of *wh*-phrase out of the c-command domain of the clause-head bearing [Ā]-features and closer to interrogative C. Thus, when interrogative C probes, the *wh*-phrase is the first [Ā]-feature-bearing element it encounters.

(27) a. *tum soch-te ho [ki **kaun** aa-egaa]?
you.PL think-HAB.MPL be.PR.2PL [that who come-FUT.3MSG]
'Who do you think will come?'

b. **kaun**$_i$ tum soch-te ho [ki t_i aa-egaa]?
who you.PL think-HAB.MPL be.PR.2PL [that come-FUT.3MSG]
'Who do you think will come?' (Dayal 1996)

5 Conclusion

In this short paper, I discussed a number of different environments in which Pesetsky's (1982) Path Containment Condition makes an appearance. I proposed a feature-geometric approach to capture variation with respect to the kind of elements that can serve as an intervener in a given language. Note that this type of approach predicts three possibilities with respect to feature-specifications and resulting interactions:

(a) A flat probe; all features in the relevant class may intervene
(b) An intermediate-level probe; a subset of the features in the relevant class may intervene

(c) A maximally-specified probe; only point-by-point identical features will intervene

An important open question, which I leave for future work, is whether all possible combinations predicted by the geometry are in fact attested.

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