Abstract

Much work has shown that wh-movement is subject to several kinds of locality restrictions cross-linguistically. In addition to being sensitive to intervening wh-phrases, wh-movement must proceed successive cyclically through various points in the clause, and in some cases, may not cross intervening arguments (see Branan & Erlewine 2022 for a recent overview). Sensitivity to intervening arguments is known to be quite fine-grained: according to Keenan & Comrie (1977) and others, languages might differ with respect to what kinds of arguments count as interveners for a wh-element, and might also treat arguments vs. adjuncts differently.

I propose that this cline of locality restrictions reflects how selection affects feature projection. Taking up a version of the projection rule from Zeijstra (2020), we find that unselected features project, in which case wh-phrases create their own barriers for extraction if their wh-features get too high. On this view, the distribution of wh-probes affects projection outcomes, determining which kinds of elements become trapped by projection of their features. The need to escape the domain of [wh] is proposed to capture the distribution of successive-cyclic movement and interactions with Voice in different languages. Importantly it is only the distribution, not the content or type of wh-probe that matters: assuming that languages might distribute wh-probes on different heads, we can capture different locality restrictions with the same ingredients in every language.

On projection and the shadow of [wh]

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Contents

1 Introduction

One puzzling fact about wh-movement cross-linguistically is that it seems to be subject to different constraints in different languages. This presents a challenge to theories of movement for the following reason: assuming that locality principles are properties of UG, we would expect the locality profiles of movement to be the same across languages, contrary to fact.

In this paper, I argue that the different locality profiles do not reflect different properties of movement or the probes controlling movement in different languages. Instead I suggest that different locality profiles can be generated from different distributions of the same set of probes, if we adjust our expectations about how phrases inherit the properties of their daughters. In other words, I propose

that a modified projection rule, combined with existing probing machinery, can help us understand the space of possible constraints on wh-movement.

This approach is inspired by a particular way in which wh-movement behaves differently in different languages, namely its variable sensitivity to intervening non-wh-phrases. In some languages, wh-movement is not sensitive to intervening non-wh-elements, while in other languages it apparently is.

To be more concrete, the classical description of wh-movement proposes that wh-movement can be disrupted by intervening wh-phrases, but that it cannot be disrupted by other phrases between the base and landing sites for movement. This classic description appropriately characterizes English wh-questions, where wh-phrases can move past intervening nominals, as in (1a), but not past intervening wh-phrases, as in (1b).

(1) a. What did Rachel buy t?
b. *What did who buy t?

Not every language tolerates wh-questions like (1a), however. In Tagalog, for example, wh-objects cannot front in a Voice that makes another phrase the "subject" or "pivot" of the clause. Instead, a Voice must be used that makes the wh-object the structural subject/pivot. Many have proposed that this Voice-related restriction on wh-questions reflects special properties of wh-movement in Tagalog, which unlike English, must be sensitive to intervening nominals (see e.g. Aldridge (2004, 2008); Branan & Erlewine (2022) for discussion of this treatment of Tagalog).

(2) Patient but not Agent Voice in Tagalog permits object wh-movement (subject/pivot underlined)
a. *Ano ang [nagsu∼sulat ang estudyante]?
what.NOM NOM AV.IPFV write NOM student
intended: 'What is the student writing?' (Hsieh, 2020, ex. 5b, p. 4)
b. Ano ang [s<in>u∼sulat ng estudyante]?
what.NOM NOM IPFV∼write.PV GEN student
'What is the student writing?' (Hsieh 2020, ex. 10b, p. 6)

A typological view of Tagalog-like restrictions on wh-movement reveals two parameters of variation: 1) whether the restrictions apply only to wh-DPs or to wh-elements of other categories as well, and 2) whether the restrictions apply only to internal arguments or to both internal and external arguments. I propose that these distinctions among the restrictions on wh-movement are teaching us something fundamental about how wh-phrases impact their local contexts. Changing parameters such as the base position of these elements and their category allows us to identify how different features such as [wh] and [category] interact with verbal heads.

I propose that a modified projection rule accounts for these effects: wh-phrases in certain contexts might create pied-piping contexts, in which the [wh] feature born on the wh-phrase projects to a higher position than we might have expected. In this context, the wh-phrase is not the most local target for wh-movement, in which case it is prevented from wh-moving to Spec CP. A-movement can rescue trapped wh-phrases when [wh] features project too high, accounting for interactions with Voice.

In short, projected [wh] can create barriers for wh-movement out of certain domains, without prohibiting A-movement out of those same domains. Thus, A-movement can enable elements to escape for the purpose of $\bar{A}$-extraction, without there being any explicit interaction between the two operations.

(3) Domain bearing [wh] is an island for wh-movement, but not for A-movement

a. Wh-movement blocked
   * $[_{CP}$ wh-phrase ... $[_{[wh]}$ ... ~~wh-phrase~~ ...]]
   wh-movement
b. A-movement licensed
   ✓ $[_{XP}$ wh-phrase ... $[_{[wh]}$ ... ~~wh-phrase~~ ...]]
   A-movement

Whether a phrase can wh-move therefore depends on its position relative to these [wh]-bearing domains. If a phrase is generated within such a domain, it may need a step of A-movement to enable its escape. If a phrase is generated outside of such a domain, by contrast, it needs no help wh-moving.

We will see that the creation of such domains bearing [wh], which block wh-movement out of them, is contingent on the distribution of wh-probes in a language. By varying the different possible distributions of wh-probes, we can derive these different profiles of interactions between wh-movement and Voice: the size and location of these barriers for wh-movement will affect which elements exhibit Voice-related restrictions when they wh-move in different languages.

An outline of the paper is as follows. In §2, I discuss the primary empirical generalization that motivates the account taken up in §3. In §3, I take up a formulation of the projection rule advanced in Zeijlstra (2020), and show that it makes surprising predictions about the distribution of [wh]-features. I then show that the framework produces a space of possible configurations of wh-probes, which produces the variable interactions between wh-movement and Voice across languages. In §4, I show how the distribution of wh-probes also affects other properties of wh-movement in languages, such as the profile of multiple questions and the distribution of successive cyclic movement. §5 shows how the analysis builds on existing work in the pied-piping literature. §6 concludes.

2 The empirical layout

In this section, I motivate the basic empirical generalization that this paper hopes to explain. The main observation is that languages' wh-movement/Voice interactions follow three distinct patterns, which I'll call the English-type, Tagalog-type, and Dinka-type patterns respectively.

In English-type languages, wh-movement does not appear to interact with Voice at all; any element, argument or adjunct, may wh-extract without first undergoing promotion via Voice alternation. In Tagalog-type languages, wh-movement interacts with Voice in some contexts but not others; some elements may wh-extract in any Voice, while others are required to promote before they can wh-move. Lastly, in Dinka-type languages, wh-movement interacts with Voice maximally; every element must undergo promotion via Voice alternation in order to wh-move.

I will argue that a way of characterizing these differences between languages has to do with how high an element needs to be in the clause in order to wh-move. Descriptively, suppose there is some point in the clause, above which things can wh-move and below which things cannot. We can describe these languages according to where that point is. In English-type languages, that point would be very low, allowing any element that merges into a structure to be base generated above it, and thus accessible for wh-movement. In Tagalog, that point might be somewhere in the middle of the clause, allowing things base generated above it to wh-move, but requiring things below it to promote first before becoming accessible to wh-movement. In Dinka, that point would be very high, above the base position of any of element, thus requiring everything to promote before wh-moving.

2.1 English-type

As the English-type pattern is very well-known, I'll outline it briefly. I assume that the active Voice in English corresponds to a structure in which the external argument has promoted to Spec TP. The fact

that the external argument is in Spec TP in (4) appears to be irrelevant to the processes underlying wh-movement, however. The active example in (4) has several elements in it, both arguments and adjuncts, and we can see that any of these elements may wh-extract, without needing to alter the Voice of the clause.

(4) Sue told Alfred about the book while standing on her head.
   a. Who told Alfred about the book while standing on her head?
   b. Who did Sue tell about the book while standing on her head?
   c. (About) What did Sue tell Alfred (about) while standing on her head?
   d. How/when did Sue tell Alfred about the book?

Many languages are like English in this respect (we will discuss some others in §4). In these languages, if there is a domain that is opaque for wh-movement, it is either below all of the relevant elements that want to move, or can be escaped without a Voice alternation.

2.2 Tagalog-type

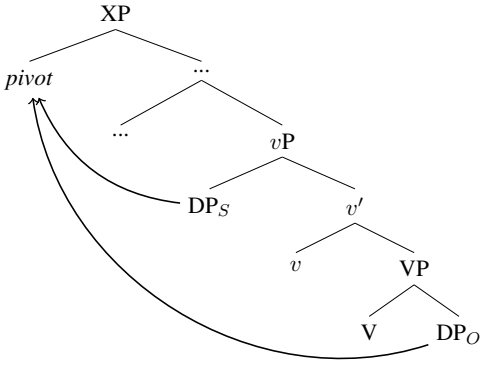
In this section, we will look at two languages in detail, Tagalog and Malay, which have very similar wh-movement profiles. Both show mixed interactions with Voice; some elements restrict the Voice of the clause when they wh-move while others do not. More specifically, we find that wh-direct objects are sensitive to Voice, while obliques, adjuncts, and external arguments are not.

Starting with Tagalog, Tagalog has a rich Voice system that tracks the grammatical function of the so-called "pivot" of the clause, which is marked with nominative case. The examples in (5) show the Voices in Tagalog that are used for different pivots (bolded). Following Hsieh (2020), I will refer to the Voice in (5a) as the *Agent Voice* (AV) because it makes the agent the pivot, the Voice in (5b) the *Patient Voice* (PV) because it makes the patient the pivot, the Voice in (5c) the *Locative Voice* (LV) because it makes locatives and goals the pivot, and the Voice in (5d) the *Conveyence/Circumstantial Voice* (CV), which is used to make a variety of non-subjects the pivot, including embedded arguments and some obliques.

(5) Tagalog Voices (Hsieh, 2020, ex. 7, p. 35)
   a. B<**um**>i∼bili **ako** ng tsokolate.
      AV.IPFV∼buy 1SG.NOM GEN chocolate
      'I'm buying/I buy chocolate.'
   b. Bi∼bilh-**in** ko **ang tsokolate**.
      FUT∼buy-PV 1SG.GEN NOM chocolate
      'I will buy the chocolate.'
   c. Bi∼bilh-**an** ko ng tsokolate **si Sisa**.
      FUT∼buy-LV 1SG.GEN GEN chocolate NOM.P Sisa
      'I will buy Sisa the chocolate.'
   d. **I**-pa∼pa-bili ko kay Crispin **ang tsokolate**.
      CV-FUT∼CAUS-buy 1SG.GEN OBL.P Crispin NOM chocolate
      'I will make Crispin buy the chocolate.'

It is often argued that in each case, the pivot is sort of like a surface subject in that it occupies a higher position in the clause and receives nominative case. The exact landing site of promotion to pivot-hood is somewhat debated (Outer Spec vP in Aldridge 2004, 2008; Rackowski & Richards 2005 vs. Spec AgrP in McGinn 1988; Hsieh 2020), however, and is also not crucial for our purposes, so I will merely assume that pivots generally undergo movement to some position that c-commands all of the other arguments in the clause, as schematized in (6).

(6) Tagalog pivots raise above the external argument



With these baseline assumptions as a backdrop, we are now in a position to observe how Voice restricts extraction possibilities of different elements in Tagalog. In (7), we see that in the agent voice, external arguments, obliques, adjuncts, but not direct objects are permitted to wh-move.

(7) Tagalog: Agent Voice only permits external arguments, adjuncts, obliques to wh-move, not direct objects

a. Sino ang [nagsu∼sulat ng tula]?
who.NOM NOM AV.IPFV write GEN poem
'Who is writing a poem?' (Hsieh, 2020, ex. 5a, p. 3) *Wh = external argument*

b. *Ano ang [nagsu∼sulat ang estudyante]?
what.NOM NOM AV.IPFV write NOM student
intended: 'What is the student writing?' (Hsieh, 2020, ex. 5b, p. 4) *Wh = direct object*

c. Saan nag-lagay ang kusinero ng kaldero?
where AV.PFV-put NOM cook GEN pot
'Where did the cook put a pot?' (Hsieh, 2020, ex. 5, p. 230) *Wh = oblique argument*

d. [Sa ilog /Saan] nali∼ligo ang kalabaw.
OBL river where AV.IMPF∼bathe NOM water.buffalo
'It's in the river that the water buffalo is bathing.'
'Where is the water buffalo bathing?' (Hsieh, 2020, ex. 19b, p. 88) *Wh = adjunct*

In order to wh-move a direct object in Tagalog, an appropriate object voice must be used. Importantly, object voices do not prevent external arguments, adjuncts or obliques from wh-moving. We can thus characterize wh-direct objects as being sensitive to Voice, while external arguments, adjuncts and obliques can wh-move in any Voice context.

(8) Tagalog object Voices: anything can wh-move

a. Ano ang [s<in>u∼sulat ng estudyante]?
what.NOM NOM IPFV∼write.PV GEN student
'What is the student writing?' (Hsieh 2020, ex. 10b, p. 6) *Wh = direct object*

b. ?Sino ang [pinaki∼kingg-an ang mga podcast ng NPR]?
who NOM *pa*.IPFV∼listen-LV NOM PL podcast GEN NPR
'Who listens to NPR podcasts?' (Hsieh, 2020, ex. 55a, p. 178) *Wh = external argument*

c. Saan i-ni-lagay ng kusinero ang kaldero?
where CV-PFV-put GEN cook NOM pot
'Where did the cook put the pot?' (Hsieh, 2020, ex. 5, p. 230) *Wh = oblique argument*

The lack of Voice sensitivity among obliques is especially interesting given that Tagalog has an oblique Voice alternation, shown in (9). Direct objects and obliques therefore have in common that they are internal arguments that can undergo a Voice alternation. However, they diverge in their wh-movement requirements: direct objects need to be promoted to wh-move while obliques do not.

(9) Tagalog oblique Voice alternation (Hsieh, 2020, ex. 3, p. 33)

a. Mag-u∼usap ang mga mag-aarál tungkol sa nobela.
AV-FUT∼talk NOM PL AN.study about OBL novel
'The students will talk about the novel.'

b. Pag-u∼usap-an ng mga mag-aarál ang nobela.
pag-FUT∼talk-LV GEN PL AN.study NOM novel
'The students will talk about the novel.'

In sum, Tagalog direct objects need to be the pivot in order to wh-move. All other elements, namely external arguments, obliques and adjuncts, are not subject to this restriction. We will now observe the same facts in Malay, which is a language with a different Voice system but the same profile for wh-movement/Voice interactions.

Malay, like Tagalog, is an Austronesian language with interactions between wh-movement and Voice. Malay has a slightly less rich Voice system, however. Here we will focus on two Voices, which I will call the *meN-* Voice and the ∅- Voice respectively, following discussion in Soh (1998). Unlike the Tagalog Voice system, which reliably tracks the pivot/subject of the clause, the choice between *meN-* and ∅- seems to track something more subtle. External arguments can surface as the apparent subject of the clause in both Voices, where ∅ optionally allows the object to front.

(10) Malay *meN-* voice:

a. Ali telah mem-baca buku itu.
Ali PFV MEN-read book the
'Ali has read the book.' (Soh, 1998, ex. 6, p. 2)

b. *Ali I men-cubit.
Ali I meN-pinch
intended: 'I pinched Ali/Ali was pinched by me.' (Cole & Hermon, 1998, ex. 28b, p. 232)

(11) Malay ∅- voice:

a. Ali telah baca buku itu.
Ali PFV read book the
'Ali has read the book.' (Soh, 1998, ex. 1, p. 2)

b. Buku itu Ali baca.
book the Ali read
'Ali read the book/the book was read by Ali.' (Soh, 1998, fn. 3)

The surface position/properties of the fronted object in (11b) are somewhat debated. While Chung (1976) argues, based on control and raising profiles, that the fronted object is a surface subject, binding and crossover facts suggest it's actually in an Ā-position. Cole et al. (2008) discuss several varieties of Malay and Indonesian that have a stricter relationship between the choice of Voice morphology and the surface position of the object. In standard Indonesian, they show that the ∅- Voice only surfaces in examples like (11b), where the object has fronted. However, they also show that the fronted object can reconstruct for binding purposes, as the reflexive object in (12) shows.

(12) Dirimu mesti kau serahkan ke polisi.
self-2 must you surrender-APPL to police
'Yourself must be surrendered to the police.' (Cole et al., 2008, ex. 20, p. 1507, citing Arka and Manning 1998)

Similarly, Soh (1998) shows that in Malay wh-questions, wh-objects in the ∅- Voice are subject to Weak Crossover.

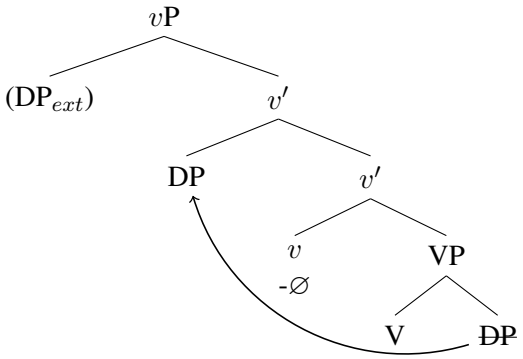
(13) Fronted objects subject to Weak Crossover (Soh, 1998, ex. 21, p. 6)

a. Emaknya$_i$ sayang Ali$_i$.
mother-his love Ali
'His mother loves Ali.'

b. *Siapa$_i$kah yang emaknya$_i$ sayang t_i?
who-Q that mother-his love
intended: 'Who does his mother love?'

Following Cole et al. (2008) and Keine & Zeijstra (to appear), I will assume that the ∅- Voice involves a step of object raising from its base position to Spec vP. Unlike those other authors, however, who assume that the object moves further to Spec TP to become the surface subject of the clause, I remain agnostic about whether the object must undergo further movement, and if so, to what position. We have seen evidence from word order that movement may not be crucial past that point, and we have also seen evidence from binding that movement past that point might necessarily have Ā-properties. To reflect these aspects of the ∅- Voice, I will not assume that the object necessarily A-moves to Spec TP. As we will see, whether or how the object moves to a higher position will not be important to explaining the distribution of wh-movement/Voice interactions in Malay.[1]

(14) ∅-Voice brings object to Spec vP; from there, the object might or might not Ā-move past the external argument to a higher position.



In sum, we have two voices that are consistent with transitive clauses, the *meN-* Voice and the ∅- Voice, which are distinguished by the possible positions of the object. I assume that the *meN-* Voice has the object in its base position, while the ∅- Voice partially promotes the object at least as high as

[1]Malay also has a passive alternation, similar to the European passive alternation, in which the external argument is represented as a post-verbal oblique, and the internal argument clearly raises to subject position.

(1) Patung itu di-beli (oleh) Minah.
doll the PASS-buy by Minah
'The doll is bought by Minah.' (Soh, 1998, ex. 34, p. 10, 11)

I will largely put aside discussion of the passive, but note it here to provide additional support for the treatment of ∅- Voice as distinct from a passive Voice.

Spec vP. These two voices may look similar in declarative contexts, but they exhibit different interactions with wh-movement. In the *meN-* Voice, every element except direct objects may wh-move, while in the ∅- Voice, everything (including direct objects) may wh-move. Though Soh does not provide examples of non-DP wh-movement in the ∅-Voice, the prose suggests that the only elements restricted under Ā-movement are restricted under *meN-*, which is consistent with the claim in (16).

(15) Malay: *meN-* Voice licenses wh-movement of external argument, adjunct, oblique but not direct object

a. Siapa$_1$-kah yang ___$_1$ telah **mem**-baca buku itu?
who-Q that PFV MEN-read book the
'Who has read the book?' (Soh, 1998, ex. 9a, p. 3) *Wh = external argument*

b. *Apa$_1$-kah yang Ali telah **mem**-baca ___$_1$?
what-Q that Ali PFV MEN-read
intended: 'What has Ali read?' (Soh, 1998, ex. 9b, p. 3) *Wh = direct object*

c. Kepada siapakah Minah **mem**-beri kucing kesayangannya?
to who-Q Minah MEN-give cat beloved-her
'To whom did Minah give her beloved cat?' (Soh, 1998, ex. 32b, p. 9) *Wh = oblique argument*

d. Bagaimanakah Ali **men**-jawab soalan itu?
how-Q Ali MEN-answer question the
'How did Ali answer the question?' (Soh, 1998, ex. 32c, p. 9) *Wh = adjunct*

(16) Malay: ∅- Voice licenses wh-movement of everything

a. Apa$_1$-kah yang Ali telah baca ___$_1$?
what-Q that Ali PFV read
'What has Ali read?' (Soh, 1998, ex. 4b, p. 2)

b. Siapa$_1$-kah yang ___$_1$ telah baca buku itu?
who-Q that PFV read book the
'Who has read the book?' (Soh, 1998, ex. 4a, p. 2)

To summarize, we have looked at two languages, Tagalog and Malay, which have very similar wh-movement/Voice interactions.[2] Despite having different Voice systems, they both exhibit the same restrictions: direct objects restrict the Voice of the clause when they wh-move, but external arguments, obliques and adjuncts do not.

2.3 Dinka-type

In this section, we discuss two languages, Dinka and Malagasy, which are from different language families but have similar Voice systems and wh-movement/Voice interactions. They have in common the property that every element equally restricts the Voice of its clause when undergoing wh-movement: external arguments, direct objects, obliques and adjuncts all need to be the pivot of their clause when wh-moving.

Starting with Malagasy, an Austronesian language primarily spoken in Madagascar, we see in (17) a similar Voice system to Tagalog, except that pivots (bolded) always surface at the end of the clause.

(17) Malagasy Voice (Pearson, 2005, ex. 8, p.389-390)

[2]It should be noted that there are several dialects of Malay Indonesian, which sometimes show differences with respect to what word orders arise for different Voices (see Cole et al. 2008 for discussion). As Soh doesn't specify which dialect (15–16) are from, it isn't entirely clear that these are from the same dialect as that discussed by Cole et al. (2008)).

a. Mamono ny akoho amin'ny antsy **ny** **mpamboly**.
AV.kill DET chicken with-DET knife DET farmer
'The farmer is killing the chickens with the knife.'

b. Vonoin' ny mpamboly amin'ny antsy **ny** **akoho**.
PV.kill DET farmer with-DET knife DET chicken
'The chickens, the farmer is killing with the knife.'

c. Amonoan' ny mpamboly ny akoho **ny** **akoho**.
CV.kill DET farmer DET chicken DET knife
'The knife, the farmer is killing the chickens with.'

As in Tagalog and Malay, we can see in (18) that pivots are always accessible to wh-movement. However, unlike Tagalog and Malay, (19) shows that restrictions on wh-movement extend to *all* non-pivots, not just direct objects. These examples are taken from Pearson (2005), who does not provide examples of wh-movement in every case, but who shows the restrictions in other Ā-movement phenomena such as focus fronting and relative clauses. Given that Malagasy uses a pseudocleft strategy for wh-questions, the same restrictions found in these other cases of Ā-movement are expected to hold in wh-questions as well.

(18) Malagasy pivots can wh-move (Pearson, 2005, ex. 43, p. 415)

a. **Iza** no mamono ny akoho amin'ny antsy?
who FOC **AV**.kill DET chicken with-DET knife
'Who is killing the chickens with the knife?'

b. **Inona** no vonoin' ny mpamboly amin'ny antsy?
what FOC **PV**.kill DET farmer with-DET knife
'What is the farmer killing with the knife?

c. **Inona** no amonoan' ny mpamboly ny akoho?
what FOC **CV**.kill DET farmer DET chicken
'What is the farmer killing the chickens with?'

(19) Malagasy non-pivots cannot Ā-move

a. *Inona no mamono amin'ny antsy **ny** **mpamboly**?
what FOC **AV**.kill with-DET knife DET farmer
intended: 'What is the farmer killing with the knife?' (Pearson, 2005, ex. 44, p. 416)

b. *Ny mpamboly no vonoina amin'ny antsy **ny** **akoho**.
DET farmer FOC **PV**.kill with-DET knife DET chicken
intended: 'It's the farmer who is killing the chickens with the knife.' (Pearson, 2005, ex. 40b, p. 415)

c. *Ny antsy mamono ny akoho (amin') **ny** **mpamboly**.
DET knife **AV**.kill DET chicken with DET farmer
intended: 'the knife that the farmer is killing the chickens with' (Pearson, 2005, ex. 38a, p. 413)

Dinka has a very similar Voice system to Malagasy with some slightly different surface properties. In Dinka, pivots look like they move to a V2 position, as in several Germanic languages. Note that I follow van Urk (2015) in calling these voices "subject voice (sv)" and "object voice (ov) instead of the "agent voice (av)"/"patient voice" convention used for the other languages.

(20) Dinka Voices

a. **Àyén** à-càm cuı̈in nɛ̈ păal.
Ayen 3S-eat.**SV** food P knife
'Ayen is eating food with a knife.' (van Urk, 2015, ex. 30a, p. 74)

b. **Cuı̈in** à-cɛ́ɛm Áyèn nɛ̈ păal.
food 3S-eat.**OV** Ayen.GEN P knife
'Food, Ayen is eating with a knife.' (van Urk, 2015, ex. 25b, p. 71)

c. **Păal** à-cɛ́ɛm-ɛ̈ Áyèn cuı̈in.
knife 3S-eat.**OBLV** Ayen.GEN food
'With a knife, Ayen is eating food.' (van Urk, 2015, ex. 30b, p.74)

Dinka exhibits the same restrictions on Ā-movement as Malagasy, as shown in the relative clauses in (21). From the verbal morphology, we can see that non-pivots are not allowed to undergo relativization. Again, since Dinka uses a cleft strategy for wh-questions, the same restrictions on relative clauses apply to wh-questions.

(21) Same restrictions in Dinka (van Urk, 2015, ex. 11, p. 66)

a. móny [$_{CP}$ càm/*cɛ́ɛm/*cɛ́ɛmɛ̈ cuı̈in nɛ̈ păal]
man.CS eat.**SV**/eat.OV/eat.OBLV food P knife
'the man who is eating food with a knife'

b. cuı̈in [$_{CP}$ cɛ́ɛm/*càm/*cɛ́ɛmɛ̈ mŏc nɛ̈ păal]
food eat.**OV**/eat.SV/eat.OBLV man.GEN P knife
'the food that the man is eating with the knife'

c. păal [$_{CP}$ cɛ́ɛmɛ̈/*càm/*cɛ́ɛm mŏc cuı̈in]
knife eat.**OBLV**/eat.SV/eat.OV man.GEN food
'the knife that the man is eating food with'

In Dinka, the oblique Voice is very productive and can be used to promote not just oblique arguments, but adjuncts of various kinds as well. Thus, the ban on the extraction of non-pivots does not rule out adjunct extraction, as the oblique Voice can be used to promote adjuncts to pivot.

(22) Temporal adjunct vs. oblique Voice (van Urk 2015, ex. 34, p. 75)

a. **Bòl** à-cɛ̤́ Àyén tı̈ıŋ nɛ̈ á̤kɔ̤́l-ìc.
Bol 3S-PFV.**SV** Ayen see.NF P afternoon-inside
'Bol has seen Ayen at noon.'

b. **Á̤kɔ̤́l-ìc** à-cɛ̤́-nɛ̈ Bôl Àyén tı̈ıŋ.
afternoon-inside 3S-PFV.**OBLV** Bol.GEN Ayen see.NF
'At noon, Bol has seen Ayen.'

In Dinka, the Voice-related restrictions on wh-movement are crucially restrictions on *movement*. Wh-phrases can be left in situ, in which case they need not be the pivots of their clauses. In (23), we see grammatical wh-questions of non-pivots, where the wh-phrases are in their base positions. In (24), we see that this strategy for question-formation is a non-movement strategy, as the in situ wh-elements are insensitive to islands.

(23) In situ wh-subjects in different Voice contexts (van Urk, 2015, ex. 6, p. 63)

a. Yíi ŋà ɛ̤́-kè-càm cuı̈in nɛ̈ pɛ̆ɛɛl?
ASSOC who PST-PL-eat.SV food P knives
'Who all was eating food with knives?'

b. Cuɪ̈in ɛ́-cɛ́ɛm yíi ŋà nɛ̀ pɛ̌ɛɛl?
food PST-food.OV ASSOC who P knives
'The food, who all was eating it with knives?

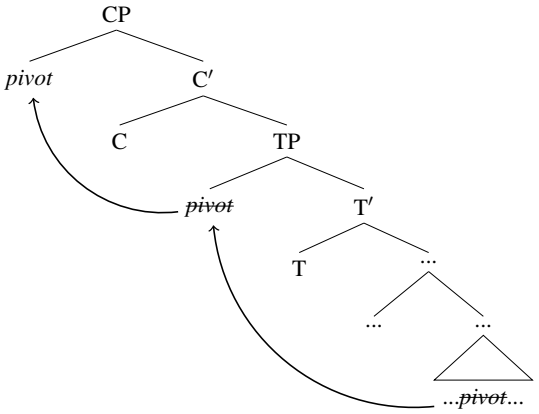
c. Pɛ̌ɛɛl ɛ́-kè-cɛ́ɛmɛ̀ yíi ŋà ké cuɪ̈in?
knives PST-PL-eat.OBLV ASSOC who 3PL food
'Knives, who all was eating food with them?'

(24) Cɛ́ Ádìt jàäl [wuɪ́n cɪ́i Máyèn ŋɔ́ kuêem]?
PFV.SV Adit.GEN leave when PFV.OV Mayen.GEN what break.NF
'What did Adit leave when Mayen broke?' (van Urk, 2015, ex. 12, p. 99)

Pearson (2005) and van Urk (2015) argue for Malagasy and Dinka respectively that pivot-hood is connected with movement to a higher position in the clause compared to Tagalog and Malay. Pearson argues that pivots have topical properties in Malagasy, like V2 elements in Germanic languages, despite their clause-final position. He suggests that they are base-generated high, but coindexed with an operator that moves through a case position before Ā-moving to a lower CP projection. This analysis accounts for the fact that pivots affect Voice as well as information structure. van Urk similarly argues for a V2 analysis, suggesting that simultaneous A and Ā-properties on C can jointly attract the pivot.

I will argue for a version of these approaches in which pivots stop first at a specifier position of a lower head (following Keine & Zeijstra to appear), which I'll call Spec TP (though the exact head is not important) followed by subsequent V2-like movement to Spec CP.

(25) Pivots in Dinka and Malagasy



In sum, we have looked at three distinct patterns of wh-movement/Voice interactions across languages. We saw languages where there was no interaction between wh-movement and Voice, languages where the interactions arose only for wh-direct objects, and languages where the interactions arose for every wh-element. In the coming sections, I will offer a proposal for why wh-movement and Voice should interact in this fine-grained way across different languages. According to my approach, properties of wh-phrases and their selecting heads predict a typology of ways in which wh-elements can affect their local contexts. One of the proposed ways in which a wh-phrase can affect its local context is it can create a pied-piping context: it traps itself in a larger wh-bearing constituent, making that larger constituent available for wh-movement, but blocking movement of the wh-word itself. In such cases, wh-movement of that element is prohibited, but A-movement is not; A-movement to some higher position therefore becomes a core strategy for licensing (non-pied-piping) wh-movement.

Before moving on, I want to address a conspicuous gap in the present discussion of wh-movement/Voice interactions, which is often called the "Ergative extraction restriction." This restriction refers to the fact that in some ergative languages, wh-extraction of an ergative element appears to be banned; in order to extract an agent in these languages, a different Voice (often the antipassive) must be used, which realizes the wh-moving element as absolutive.

(26) West Greenlandic subject relatives (Bittner (1994), ex. 17,19, p. 58)

a. angut [t_{abs} aallaam-mik tigu-si-sima-su-q]
man.ABS gun-INST take-AP-PFV-REL.ITV-SG
'the man who took the gun' *antipassive*

b. *angut [t_{erg} aallaat tigu-sima-sa-a]
man gun.ABS take-PFV-TV.PTCP-3SG
intended: 'the man who took the gun' *transitive*

As these are languages in which some elements restrict the Voice of the clause when they wh-move, we might think they belong somewhere in the present typology (potentially as either Tagalog-like or Dinka-like pending investigation of the behavior of obliques and adjuncts). However, I have cautiously not included them for several reasons, which may be overcome upon future investigation.

First, as discussed by Polinsky (2016) and Deal (2016b), the ergative extraction restriction is not robustly observed for every kind of $\bar{A}$-extraction in some of these languages. For example, West Greenlandic shows the restriction in (26) in relative clauses but not in wh-questions more generally. Stiebels (2006) discusses similar sensitivity to extraction strategy in the Mayan languages.

(27) Kia uqaatig-aa?
who.ERG talk.about-3SG.3SG.Q
'Who talked about it?' (Fortescue 1984:23)

Second, in some ergative languages with Voice-related extraction restrictions, such as several Mayan and Salish languages, the morphology that we observe in ergative extraction isn't obviously Voice morphology. In Q'anjob'al, for example, the "Voice" that licenses $\bar{A}$-extraction is a morphological reflex that uniquely appears in certain extraction contexts and embedded clauses, and therefore may not actually represent a Voice alternation. As a result, it is not clear whether wh-movement interacts with "Voice" in these languages the way we observe for Tagalog and Dinka.

Similarly, in some Salish languages, one of the the repairs for ergative extraction is the *passive*, namely a demotion rather than a promotion strategy. For these reasons, Newman (2021) argues that the kinds of wh-movement/Voice interactions found in these languages are not indicative of constraints on wh-movement, and instead reflect how agreement targets different elements in different contexts. As such, further investigation is needed to determine whether the ergative extraction restriction should be included in the typology of extraction restrictions discussed here.

3 Updating our theory of projection

3.1 The limits of phase theory and intervention effects

So far, we have looked at three different ways in which wh-movement can interact with Voice in languages: 1) not at all, 2) when direct objects wh-move but not external arguments, obliques or adjuncts, or 3) when anything wh-moves. The existence of the middle option provides some insight into what factors contribute to such interactions in the first place. I argue that Tagalog and Malay, which instantiate this middle option, show us that the deciding factor determining whether wh-movement will interact with Voice is the structural height of an element's base position. What makes languages different is what point in the clause they care about.

Looking at Tagalog and Malay, we might wonder what makes direct objects so special that they restrict the Voice of their clause, while external arguments, obliques and adjuncts do not. I suggest that what distinguishes direct objects from these other elements is their structural position, which is within VP. In contrast, external arguments are generated above VP, in Spec vP or VoiceP depending

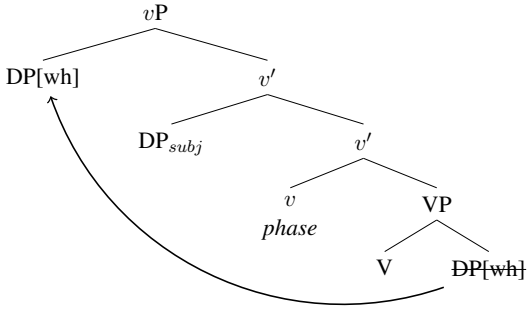
on the theory. Similarly, obliques could be introduced by applicative heads, which can have variable positions within and across languages, including above VP. Lastly, adjuncts are also often represented in various positions above VP. The rule in Tagalog and Malay therefore seems to be: things that can merge above VP can wh-move without a Voice alternation, while things that must merge within VP must undergo some promotion before they can wh-move.

If this is right, how do we state the rules for wh-movement/Voice (non)interactions in English and Dinka? In English, nothing has to undergo promotion in order to wh-move, meaning that everything is base generated above the threshold needed to permit wh-movement. We can therefore state the rule as follows: anything merged with V or higher can wh-move without promotion. In Dinka, everything must undergo promotion in order to wh-move, meaning that everything is base generated below the threshold needed to permit wh-movement. We can therefore state the rule for Dinka as follows: anything merged below some point X, where X is above the base position of all arguments/adjuncts, must promote before wh-moving.

So far, this notion of "threshold" doesn't really mean anything – it just provides a heuristic way of dividing the data. That said, the way I have been talking about these points is very similar to the notion of a phase: if there is a point in the clause that an element must move past in order to wh-move, the first place we might look to formalize such a notion is phase theory, which defines points in the clause that elements must move past in order to wh-move.

However, it is not obvious how phase theory could predict interactions with Voice. It is usually thought that there are phase boundaries between direct objects and C in English, for example, given that one can diagnose successive cyclic movement though intermediate positions in the clause, but that these boundaries don't contribute to interactions with Voice. This is because phase boundaries typically come with their own machinery for licensing movement to their edge, which allows elements to escape with no Voice alternation.

(28) If v is a phase head, a direct object should be able to wh-move to its edge, licensing further wh-movement → Voice is irrelevant.



The crucial question for a phase theoretic account is therefore: why is *A-movement* required to obviate restrictions on wh-movement, given that successive-cyclic Ā-movement is possible? Many authors who have looked at these interactions therefore appeal to something else in order to explain the interactions with Voice, namely a notion of *intervention*.

The intervention account, which can be seen in various forms in Campana (1992), Ordóñez (1995), Bittner & Hale (1996), Aldridge (2004, 2008), Coon et al. (2014), Tollan & Clemens (2022), Branan & Erlewine (2022), and Keine & Zeijstra (to appear), argues that wh-movement can be sensitive to configurations like (29), in which an argument c-commands the base position of the moving wh-phrase. One way to understand the ungrammaticality of Tagalog object questions in the agent Voice, on this view, is to say that wh-movement of the direct object past the c-commanding external argument is ruled out. In order to wh-move the direct object, it must first be promoted to a position from which it c-commands the external argument, so that its wh-movement step does not violate (29).

(29) The intervention account:
$[_{CP}$ XP[wh] ... DP ... ~~XP[wh]~~]?
X

This kind of proposal is attractive for languages like Dinka and Malagasy, where every ungrammatical example indeed looks like a case of (29) at work. In Dinka and Malagasy, moved wh-elements need to be the pivots of their clauses, showing that wh-movement past a different pivot is not possible. However, it becomes difficult to see how this account extends to the grammatical cases of non-pivots wh-moving in Tagalog and Malay. Presumably, when a non-pivot external argument wh-moves, or non-pivot obliques/adjuncts wh-move, they are wh-moving across an intervening DP. If such movement were banned in these languages, accounting for restrictions on object questions, why is the ban obviated for external arguments and obliques/adjuncts?

Keine & Zeijstra (to appear) offer an analysis that partially addresses this difference between Dinka/Malagasy and Tagalog/Malay. They propose that different probes may be used to attract wh-DPs vs. wh-non-DPs, where the different kinds of probes show different locality effects. If Tagalog and Malay have access to these different probe types, wh-DPs would be sensitive to intervening DPs, but wh-PPs would not be – instead, wh-PPs would only be sensitive to intervening PPs. The different probe types taken up in Keine & Zeijstra (to appear) are shown in (30).

(30) Conjunctive probes with different locality profiles
   a. $[u\delta + uD]$: wh-attracts the closest DP (PPs are not interveners)
   b. $[u\delta + uP]$: wh-attracts the closest PP (DPs are not interveners)
   c. $[u\delta + uAdv]$: wh-attracts the closest AdvP (arguments are not interveners)

It is important for their analysis that external arguments be attracted by a probe like (30a), since external arguments are DPs. They therefore propose, contra my description in §2, that external arguments are subject to Voice-related restrictions on wh-movement in Malay. Thus, they dispute the claim that only direct objects are subject to these restrictions and propose instead that all DPs are subject to intervention effects in these languages. The crucial example motivating this approach is shown in (31). Here we see an ungrammatical subject question, in which the ∅-Voice is used. What makes this example different from the grammatical case of subject extraction in the ∅-Voice shown previously is the position of the object: the object has fronted in (31), instead of remaining in situ. They argue that this provides evidence for the DP-intervention approach: in situ objects do not count as intervening DPs for the probe in (30a), but fronted objects do.

(31) *Siapa yang buku ini akan ~~siapa~~ lihat ~~buku~~ ~~ini~~?
who that book this will see
intended: 'Who will see this book?' (Cole et al., 2008, ex. 22c, p. 1508)

However, we also observed that fronted objects in the ∅-Voice have Ā-properties: they exhibit Weak Crossover effects and reconstruct for Principle A. As such, it stands to reason that the ungrammaticality of (31) reflects a case of Ā-intervention rather than DP-intervention – Ā-movement of the direct object intervenes for Ā-movement of the external argument, by making the direct object the highest Ā-element in the clause. I propose that (31) therefore does not provide evidence of DP-intervention in Malay wh-questions, but rather supports the claim that object fronting in the ∅-Voice is derived by Ā-movement. In sum, while Keine & Zeijstra's (to appear) approach may be a possible description of (31), (31) does not provide sufficient support for the existence of DP-intervention in Malay.

Furthermore, while having multiple kinds of Ā-probes in a single language may offer analytical flexibility, it also presents an overgeneration problem. Importantly, Dinka must not have access to

some of these probes, or else we would expect the interactions between wh-movement and Voice to show the same sensitivity to category in Dinka as in Malay, contrary to fact.

In this paper, I attempt a more ambitious solution that avoids the overgeneration problem. I will show that the same set of probes in both languages, distributed in different ways, can provide a more restrictive solution with the same empirical coverage. The hope is that this explanation helps us understand why such interactions between wh-movement and Voice are a natural part of language in the first place.

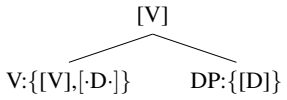
In what follows, I offer an alternative view that treats interactions between wh-movement and Voice as a reflection of how the grammar deals with properties like *argument-hood* and *wh-hood* respectively. In other words, instead of seeking an explanation rooted in the properties of probes or movement, this paper explores the possibility that it is properties of phrases themselves, and their selecting heads, that help us predict interactions between wh-movement and Voice.

The proposal makes use of a slightly modified theory of selection and projection, which closely resembles Zeijlstra (2020), that explicitly takes into account the cooccurence of properties *argument-hood* and *wh-hood* on phrases. This modified theory builds on many existing views of selection and projection, but argues that unselected features play a more substantial role in restricting the construction of clauses than previously thought, accounting for interactions between wh-movement and Voice in a new way.

3.2 "Unselected" features and projection

In this section, we re-examine our principles of projection. Traditionally, a projection rule is used to define the distribution of category features, so that we can maintain the locality of selection. For example, take the tree in (32), in which a verbal head with category [V] subcategorizes for a DP sister (illustrated by its selectional feature, [·D·], using Müller's 2010 notation). We need a rule to ensure that the root gets assigned the category [V] instead of [D], (which also ensures that DP bears [D]). Only if it gets assigned [V] can that phrase be selected by higher heads that select for [V]. If category labels never projected from their heads, selection would either only merge heads with other heads, or we would have to permit selection to ignore (some) intervening nodes.

(32) Projecting category features from heads to phrasal nodes

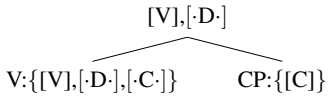


Most projection rules produce the outcome in (32) by appealing to the head/phrase distinction. On this view, heads project but phrases do not, which leads to projection of [V] but not [D] in (32). However, there is a second dimension to this rule. Observe that the head in (32) had two features: its category feature [V] and its selectional feature [·D·]. A followup question now naturally arises: why does *only* the category feature project in (32), if heads project, and the head has more than one feature?

An obvious answer is that the selectional feature is consumed by a checking mechanism. Because selectional features represent a requirement to merge with some element, once that requirement is met, the feature becomes *checked* and irrelevant to the rest of the derivation in some way. From this perspective, we can think of feature-checking as a kind of projection suppression rule: features on the head that might have projected don't if they have been checked.

This way of viewing feature-checking has much precedent in the literature. On this view, we could imagine that if the selectional feature had not been checked by its sister, then it might have projected with [V], licensing a specifier. A mechanism of this sort is described explicitly in Adger (2003), and also forms the basis of cyclic Agree, as described in Béjar & Rezac (2009), for example.

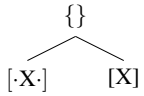
(33) Projecting category features and selectional features from heads to phrasal nodes



If selection can be regarded as a feature suppression mechanism, however, this raises a new possibility for our formulation of the projection rule, as proposed by Zeijlstra (2020). Instead of appealing to a head vs. phrase distinction, what if we instead made the suppressive quality of feature-checking symmetric? On this view, feature-checking doesn't merely suppress [·D·] on the selecting head, but also suppresses the category [D] feature of the element that satisfies it.

Returning to (32), we can use this reasoning to ensure that [V] but not [D] projects: [·D·] and [D] are both involved in feature-checking, which suppresses them both, leaving [V] as the only remaining feature in the equation capable of projecting. Formalizing this idea more explicitly, take the rules in (34,35), which are based off of Zeijlstra (2020).

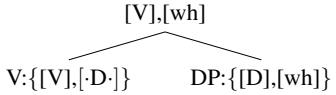
(34) The checking rule
When a feature [·X·] is sister to a corresponding feature [X], neither is projected on the mother node.



(35) The projection rule
Every feature that the checking rule fails to apply to projects to the mother node.

Coming to the point, this new formulation of the projection rule makes the same predictions in basic cases like (32) as projection rules that rely on the head/phrase distinction. However, it makes crucially different predictions when we consider phrases with multiple features. Imagine now that instead of the DP in (32), V merged with a wh-DP, as in (36). Based on the new projection rule, we now expect [wh] to project with [V], since it does not feed the checking rule.[3]

(36) When phrases have multiple features: unselected features project



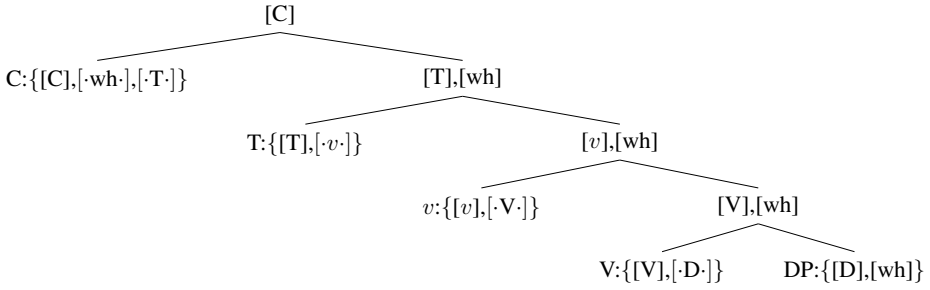
At first glance, this result might seem undesirable – we don't usually think that phrases containing wh-elements have to become wh-elements themselves. However, I argue that, upon closer inspection, this approach to projection has desirable implications for our theories of movement, and has much precedence in the pied-piping literature.

One striking implication is that movement can only occur in the presence of at least *two* of the relevant Merge-inducing features. To see why, consider the structure in (37). In (37), there is a wh-phrase present in the VP, and one Merge-inducing [·wh·] feature on C, which is responsible for attracting a wh-element. What we find, when we apply the checking and projection rules, is that wh-movement is prohibited in this context – the [wh] feature on the wh-element doesn't feed the checking rule until it reaches the TP node, meaning it gets to project all the way up to C's sister. From that point, [·wh·] and [wh] feed the checking rule and suppress each other, preventing any other instances

[3]Though the projection rule described here is essentially the same as that found in Zeijlstra (2020), the implications are explored quite differently. Zeijlstra does not consider (36) to be a prediction of his approach, on the view that properties like [wh] are *values* of category features, rather than independent features themselves. He therefore proposes that the only kinds of features that project are categories of selecting heads and unchecked uninterpretable features, on heads or phrases. Here, however, I include all other features in the algorithm, which has very different consequences.

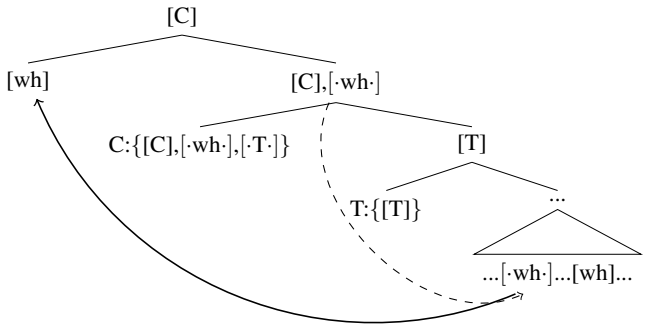
of wh-checking. This prevents wh-movement in two ways: 1) there is no wh-probe on the root to attract a wh-element (C's [·wh·] was satisfied by its sister), and 2) even if there were, every node between C and the wh-phrase bears [wh], making every node a more local target for movement than the wh-phrase, blocking movement of the wh-phrase.

(37) If the first/only instance of [·wh·] were on C:



As a result, in order for *anything* to wh-move to Spec CP, there must be a [·wh·] lower in the clause, which prevents [wh] from reaching C's sister. Only if C's sister does not bear [wh] will [·wh·] project and license a wh-specifier. In short, a clause-medial instance of [·wh·] is a precondition for wh-movement.

(38) For C to attract a [wh]-specifier, its sister must not bear [wh]:



This is an exciting result because it provides a possible explanation for why wh-movement is so often successive cyclic through clause-medial positions. Since Chomsky (1986), it has been standard to assume that wh-movement proceeds successive-cyclically through the middle of the clause, not just through the clause edge. The standard explanation for this behavior is to treat some head in the middle of the clause (usually v) as a phase head. However, this treatment does not explain *why* languages would assign v the properties of a phase head. A deeper explanation for why successive-cyclic movement has to target these points has therefore remained elusive.

On the present view of selection and projection, by contrast, an implicational relationship between movement and successive-cyclicity emerges. In order for movement to take place at all, at least two heads in the clause need to have the machinery necessary for hosting a wh-specifier. Whenever those features are not checked by their sisters, they license movement to their edges, giving us successive-cyclic movement to intermediate positions.

To make the machinery underlying successive-cyclic movement more concrete, I take up the following proposals.

(39) Uniformity:
(In languages/contexts with wh-movement,) if one instance of a category has [·wh·], every instance of that category has [·wh·].

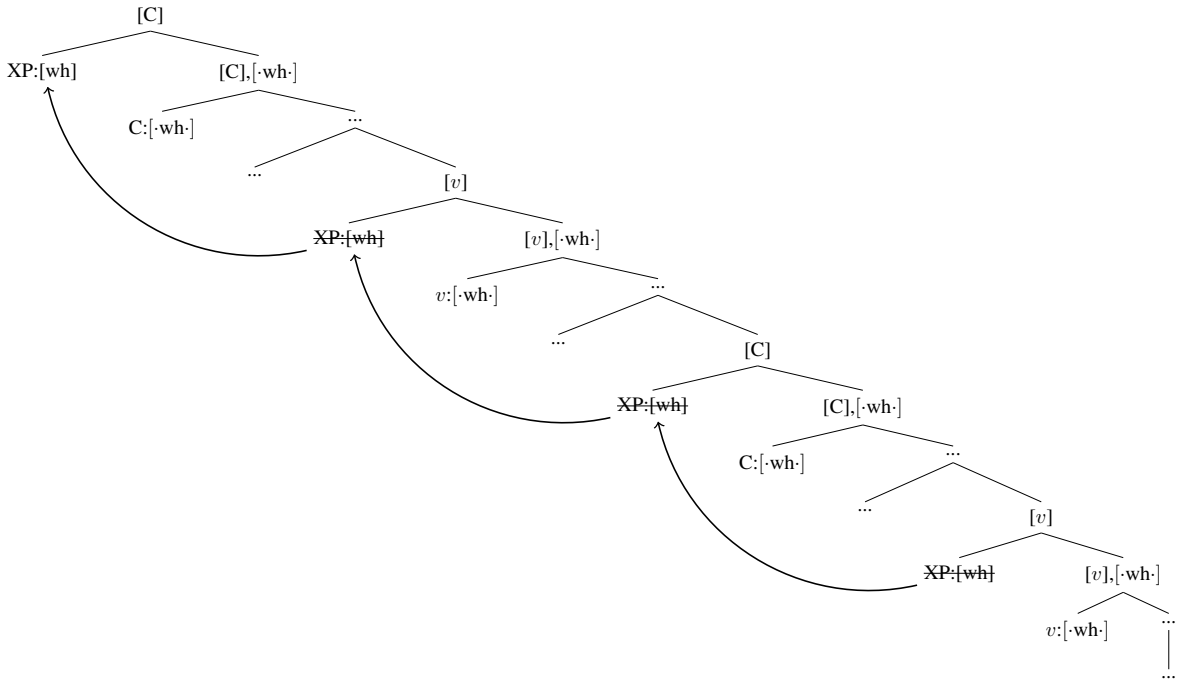
(40) Copies don't project:
Moved phrases do not feed the projection rule.

These two proposals jointly predict that wh-elements from embedded clauses always proceed through (at least) two positions in the matrix clause. Breaking this down, we have already seen that for wh-movement within a single clause to take place, at least two heads need to have [·wh·]. Let's say for this example that those heads are C and v. That means that if we add an embedded clause, which contains the wh-element instead, every instance of C or v in either the matrix or embedded clause will have [·wh·] (by Uniformity).

(41) [C:[·wh·] ... [v:[·wh·] ... [C: [·wh·] ... [v:[·wh·] ...]]]]

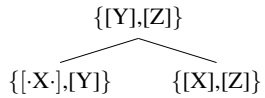
The wh-element in the embedded clause will check the lowest instance of [·wh·] via external Merge, which suppresses its [wh] feature. The [·wh·] on embedded C can then attract that wh-element via movement because the wh-element is the closest bearer of [wh] to it. From there, so long as moved phrases aren't allowed to feed the projection rule, that wh-element will be the closest accessible [wh]-bearer for the next highest [·wh·] on matrix v, and so forth, until it moves to matrix Spec CP.

(42) Successive-cyclic movement from an embedded clause

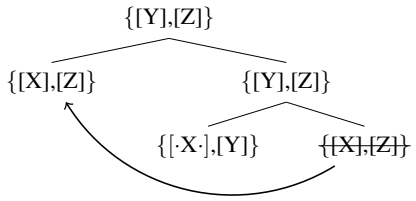


For completeness, the modified projection rule, which takes moved phrases into account, is shown in (43). Importantly, only the projection rule cares about copies – the checking rule still applies to any phrase, allowing a single element to satisfy multiple Merge-features.

(43) The projection rule
Every feature that the checking rule fails to apply to projects to the mother node.



Exception: when a phrase c-commands a copy of itself, no features project from that phrase



So far, we have explored how this modified view of projection creates a basis for successive-cyclic movement, by requiring multiple instances of Merge-inducing features for movement to take place. However, this paper isn't really about successive-cyclic movement, but rather about the typological predictions of this approach to projection.

Observe that the precondition for wh-movement is fairly non-specific: it demands at least two heads with [·wh·], but does specify which heads. In what follows, I will show how varying the distribution of [·wh·], in the ways that still permit movement, gives us a range of possible wh-movement patterns. Importantly, the different choices for where to put [·wh·] give us different interactions with Voice, accounting for English-like, Tagalog-like, and Dinka-like wh-movement/Voice interactions.

Before moving on, I want to clarify some aspects of the framework of Merge that I adopt. First, I've been using Müller's (2010) notation for Merge-inducing features because on his conception of Merge, the same features can in principle license either internal or external Merge. This makes it possible for [·wh·] to serve two functions in a clause: 1) to suppress an instance of [wh] when a wh-XP externally merges, or 2) to attract a wh-XP, when checking does not take place via external Merge.

(44) [·α·] = an instruction to Merge with an element bearing α. (Müller, 2010)

Importantly, Merge-inducing features represent something fundamentally different from the features that check them. Merge-inducing features represent a requirement to merge with something bearing a particular feature. Those features that check Merge-inducing features simply state a property of an element.

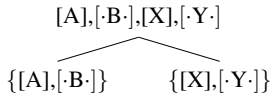
(45) What these features mean:
   a. [X] = has the property of X
   b. [·X·] = wants to merge with [X]

On this view, these features represent sets: [X] identifies an element as being a member of the set of [X]-bearing things, while [·X·] identifies an element as being a member of the set of things wanting to merge with an [X]-bearer. From this perspective, additional instances of [X] or [·X·] on a node are redundant – it is meaningless to multiply have the property of belonging to some set. The set notion of features is not important right now, but will become useful when discussing multiple questions in §4.1.

(46) Set notion of features:
   a. {[X],[X]} is equivalent to {[X]}
   b. {[·X·],[·X·]} is equivalent to {[·X·]}

Lastly, I am treating Merge as a process that may involve feature-checking, which is a hallmark of frameworks with feature-driven Merge. This raises the question of whether Merge may occur without feature-checking, in which case all features from both daughters would be expected to project (if nothing feeds the checking rule).

(47) If nothing feeds the checking rule, everything projects.



If we wanted to ban all instances of Merge that do not feed the checking rule, we could do so by invoking a principle like (48). However, it isn't entirely clear at this point whether we should do this because adjunction has often been argued not to involve any kind of selection. Throughout this paper, I will only consider cases of Merge that feed the checking rule, which makes this proposal consistent with (48), but I note that the present proposal is also consistent with an approach to adjunction that does not require feature-checking.

(48) Last Resort:
An instance of Merge is only licensed if it feeds the checking rule.

3.3 Deriving crosslinguistic variation

The key prediction of the modified projection rule is that at least two instances of [·wh·] must be present within a clause for wh-movement to be licensed within that clause – one on the head that hosts the moved phrase, and one lower down to prevent [wh] from projecting too high. However, no stipulations were placed on the location of the lower instance of [·wh·], meaning the grammar could in principle place it anywhere. Here I show that varying the position of the lower instance of [·wh·] produces different results, which mirrors the range of wh-movement/Voice interactions we observe. Thus, the modified projection rule not only provides a basis for successive-cyclic movement, but also creates a space of parametric variation that mirrors the typology of wh-questions that we find.

I propose that there are three meaningfully different places that a language can choose to represent the lower instance of [·wh·]: 1) on the head that introduces the lowest argument in the clause, 2) on the head that introduces the highest argument in the clause, and 3) on a head that is higher than all of the argument-introducing heads. For simplicity, I will refer to the lowest argument-introducing head as V, the highest argument-introducing head as v, and the head above all arguments as T, though these labels do not meaningfully impact the predictions. We will see that each of these choices corresponds to English-like, Tagalog-like, and Dinka-like patterns respectively.

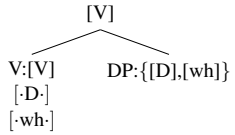
3.3.1 If V has [·wh·]

If a language distributes [·wh·] on V and C, the proposal predicts that such a language should exhibit no interactions between wh-movement and Voice. To see why, we will examine the predictions for object questions, subject questions and adjunct/oblique questions respectively, and we will find that wh-movement proceeds straightforwardly in each case.

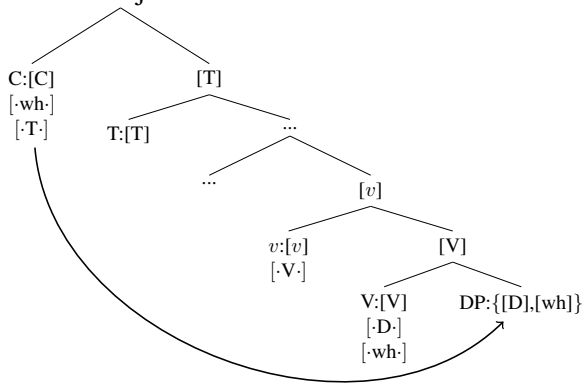
Assuming that objects are introduced by V, V must have two features: [·D·] (or something comparable) to introduce the object and [·wh·] because we are considering a hypothetical language with [·wh·] on V. When a wh-DP merges with V, both its [D] and [wh] features feed the checking rule. As a result, both features are prevented from projecting to V′ and beyond, as shown in (49). When the rest of the clause is built, and the second instance of [·wh·] is introduced with C, the closest instance of [wh] that can satisfy it is the wh-object. Thus, there is no intervention problem, and the object wh-moves to Spec CP.

(49) Object questions

a. Objects check their [wh] features against [·wh·] on V

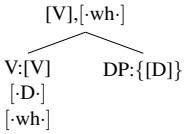


b. [·wh·] on C remains unchecked upon merging with TP, so it searches the tree for [wh] and finds the object

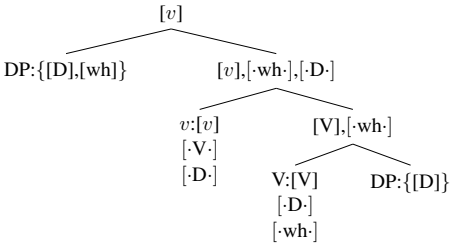


The same [·wh·] on V that licenses object wh-movement can also license subject wh-movement. Let us now consider an example in which there is a wh-subject, but no wh-object. In this case, when V merges with the object, [·wh·] on V does not feed the checking rule, and so it must project. It projects at every step of the derivation until it reaches v', where it is checked by the wh-subject. At this point, [·wh·] on v' and [wh] on the subject are prevented from projecting any further. Once C is merged, the closest element that can satisfy its [·wh·] is the subject, since [wh] did not project any higher than the subject. Again, we find that wh-movement proceeds as expected.

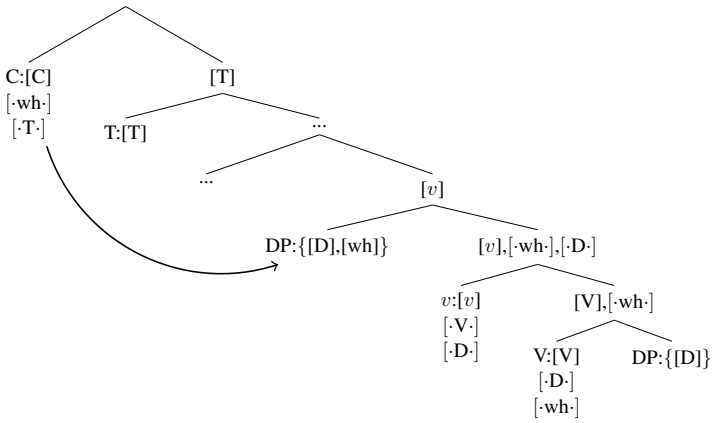
(50) When the object is not a wh-phrase: projection of [·wh·]



(51) When the wh-subject merges, it checks the [·wh·] from V



(52) C attracts the wh-subject because it is the highest [wh]-bearer



The generalization is that any wh-element that merges with V or higher will be able to check an unchecked [·wh·], which suppresses its [wh] and prevents the wh-bubble problem: if [wh] never makes it higher than the wh-element, the wh-element is the closest accessible goal for wh-movement and gets to wh-move. Assuming that adjuncts/obliques merge at least as high as Comp V, we expect adjuncts/obliques to wh-move in the same way that subjects and objects do. The theory of projection, combined with this distribution of features, thus predicts wh-movement to occur independently of the processes related to Voice, as we find in English-type languages. The proposal is that these languages have [·wh·] on (at least) V and C.

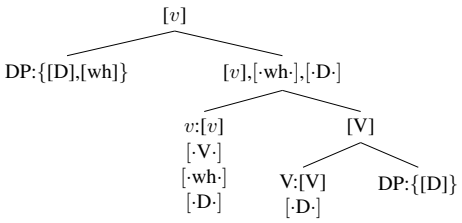
While the proposal straightforwardly predicts the range of regular wh-questions that we find, it makes a surprising prediction about multiple questions, which we will discuss in §4.1, after we have fully explored the typology of interactions with Voice. To foreshadow, this proposal correctly predicts that multiple wh-phrases can sometimes cause problems if there aren't enough [·wh·] features in the clause. It can also capture the tucking in requirement on multiple movement. To see why, we must first see the system at work when [·wh·] occurs on different heads.

3.3.2 If v has [·wh·]

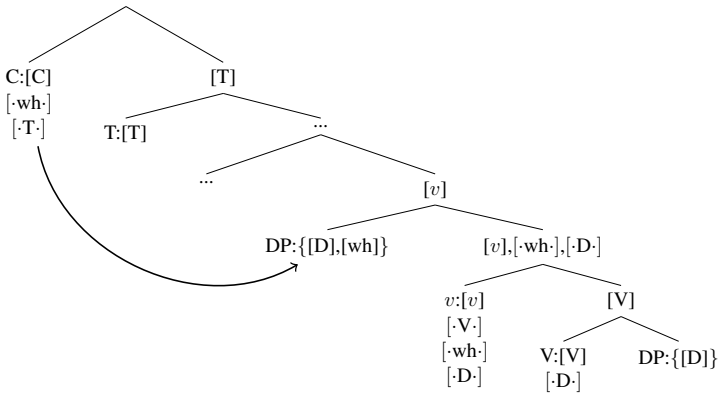
Interactions between wh-movement and Voice begin to arise when we consider the possibility that languages might not put [·wh·] on V, but rather on a higher head. Here we will look at the predictions for such a language with [·wh·] on v, and see that the result is a Tagalog-type profile for interactions between wh-movement and Voice.

If [·wh·] is on v instead of V, external arguments that are wh-phrases are expected to wh-move the same way they did in English-type languages. There is a [·wh·] on v that checks itself against [wh] on the external argument, suppressing them both. Regardless of the Voice of the clause, once C is merged, its [·wh·] will identify the external argument as the closest wh-element and attract it.

(53) Wh-subjects have their [wh] suppressed by [·wh·] on v.

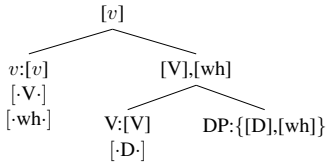


(54) As the highest bearers of [wh], wh-subjects wh-move normally.

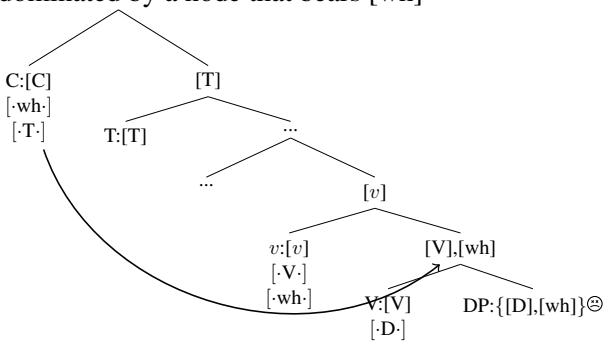


While external arguments can wh-move without deference to Voice, the same cannot be said for direct objects. Without a [·wh·] on V to suppress the [wh] on an object, [wh] on an object projects to the sister of v. In this case, wh-objects are *not* the highest bearers of [wh] – they are dominated by a node that bears [wh]. As a result, C cannot directly attract the direct object without violating locality conditions on movement.

(55) An object wh-phrase projects its [wh] until v is merged: object is not the highest bearer of [wh]

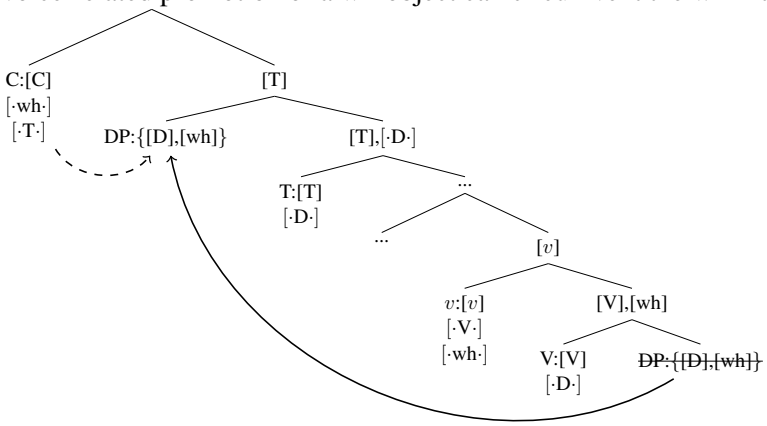


(56) Result: objects can't wh-move, because they're not the most local bearer of [wh]: they are dominated by a node that bears [wh]



In order to wh-move, the wh-object must find some way to escape the scope of its own [wh] feature. Importantly, any process that moves the object to some higher position *must not be wh-movement* or else it will suffer from the same locality problem: the wh-object is dominated by another [wh]-goal. A Voice alternation, however, can fix the problem. A higher [·D·] or EPP property could attract the wh-object to a position outside the scope of the wh-VP. From there, the wh-object can wh-move to Spec CP without violating any locality conditions on movement. This is scematized in (57), where I've put a [·D·] on T. The account does not require objects to promote to Spec TP specifically, however; we could have put the relevant A-probe on any lower head that still c-commands VP, such as v. Since it was argued that Tagalog Voice alternations are controlled by a lower position (v or Agr), the object likely fronts to one of these lower positions instead in Tagalog, which still allows it to escape the domain of projected [wh].

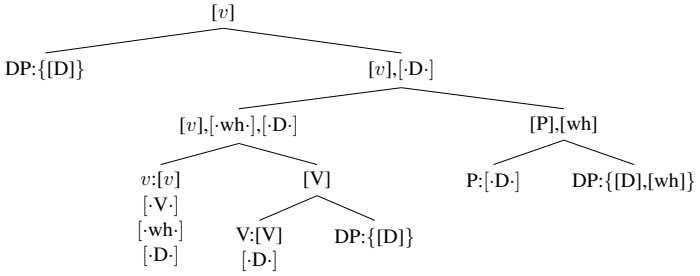
(57) Voice-related promotion of a wh-object can circumvent the wh-intervention problem.



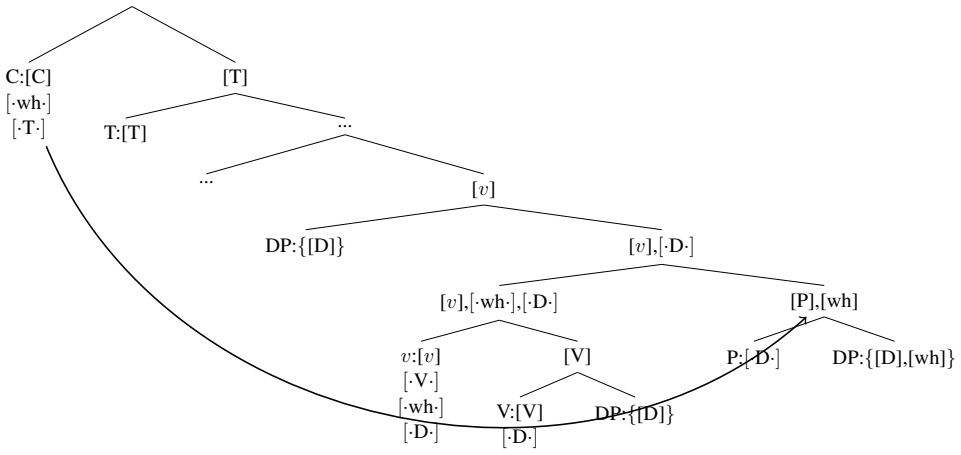
This setup therefore predicts a subject/object asymmetry. Arguments that merge with v never have their [wh] features projected, and so never face the kinds of wh-related intervention effects that objects face. They can therefore wh-move whether or not they have been promoted to the privileged subject position. Objects, by contrast, always project their [wh] features to a node that dominates them, meaning they have to get promoted to some higher position in order to avoid the intervention effects created by their own [wh] features. The result is a language in which some instances of wh-movement interact with Voice while some do not.

Tagalog-type languages fit this profile: wh-objects need to be the pivots of their clause, while wh-external arguments do not. Provided that adjuncts and obliques have the option to merge at the v level or higher, they are expected to pattern like external arguments. The trees in (58,59) illustrate a possible derivation for a wh-question built from a wh-locative PP. Here, the locative PP adjoins to v' as a rightward specifier, checking itself against the $[\cdot\text{wh}\cdot]$ introduced by v.

(58) Wh-obliques have their [wh] suppressed by $[\cdot\text{wh}\cdot]$ on v.

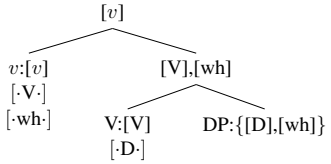


(59) As the highest bearers of [wh], wh-obliques wh-move normally.

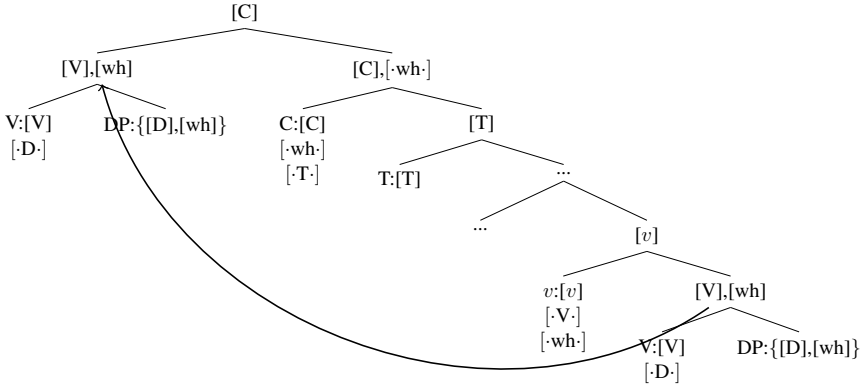


So far, the proposal predicts that a wh-direct object that wh-moves (in a Tagalog-type language) must do so from a position that is higher than the VP it originated in. However, the proposal also predicts another option for deriving an object question, one that does not involve wh-movement of the object. In principle, we might expect the wh-object to be able to pied-pipe its VP instead, requiring no Voice alternation.

(60) An object wh-phrase projects its [wh] until v is merged: VP bears [wh]



(61) When C is merged, it attracts VP as the closest bearer of [wh]



Tagalog appears to have confounding factors, which block this possibility: Richards (2021) demonstrates that wh-predicates in Tagalog cannot undergo wh-movement and are subject to special prosodic requirements. That said, if we were to find a language with $[\cdot \text{wh} \cdot]$ on v that in principle allows V/VP wh-movement, we should expect wh-direct objects (but not external arugment, adjuncts, obliques) to pied-pipe VP.

In fact, the Brazilian language Gavião appears to have exactly this profile. Direct objects pied-pipe VP when they wh-move, but other elements, such as external arguments, adjuncts and obliques do not pied-pipe any verbal material when they wh-move.[4]

[4]Moore (1984) uses the following glossing conventions for Gavião: NASR = nonassertative; TH-LK = 'like that', common

(62) *Gavião*: Object questions pied-pipe VP (Moore, 1984, ex. 7.17, 7.20, p. 107)

a. [A mé kalà] té ę-zé-e-na-á?
what want NASR 2S-NASR-TH-LK-S.M
'What do you want?'

b. [T ą̀ va] té zâ ále ní?
which eat NASR 1S+NASR FUT ?
'Which will I eat?'

(63) Subject and adjunct questions do not pied-pipe VP

a. [T ą́ tígi] té pa-zé-e-na sa-ga váneè-p ké-e-na?
which place NASR 1PL-NASR-TH-LK 3S-kill (3S)-exit-NZ IN-TH-LK
'Where do we kill him when he comes out?' (answer:'On the head.') (Moore, 1984, ex. 7.22, p. 108)

b. [A á-nám-dígi] té ę-záno sá a-ka tírí-á?
which-number-time NASR 2S-brother NASR 3C-field burn-S.M
'When does your brother burn his field?' (Moore, 1984, ex. 7.24, p. 108)

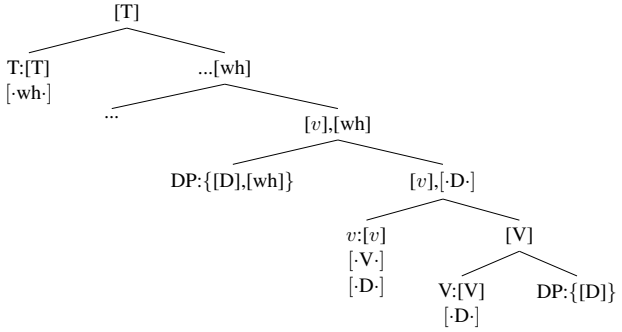
c. [A á-na mát] té saká-ka a-vít ígí ę-gá pí-á?
which-LK SB.NZ NASR 3S+NASR-go 3C-food take+out 2S-field from-S.M
'Who gets food from your field?' (Moore, 1984, ex. 7.54, p. 126)

In sum, we have two strategies available for wh-moving direct objects in languages with [·wh·] on v: 1) use a Voice alternation to help the direct object escape its projected [wh] (Tagalog), or 2) pied-pipe the entire wh-VP (Gavião). Other elements that are generated outside of the VP need not undergo A-movement to wh-move, nor can they pied-pipe VP when they wh-move, since they would c-command the wh-VP and thus have to move (to obey Superiority).

3.3.3 If T has [·wh·]

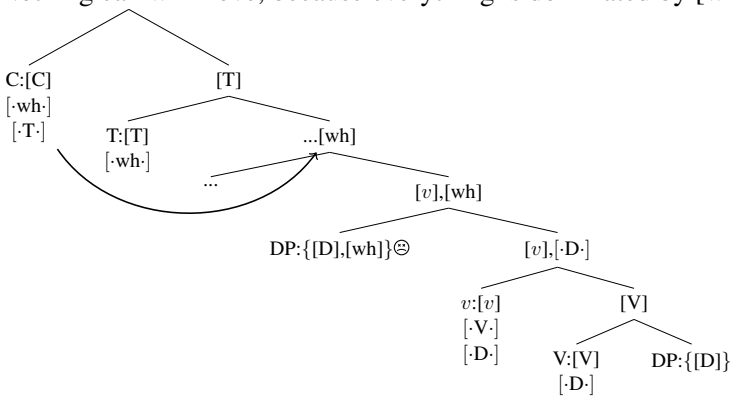
If a language distributes [·wh·] on C and a another head above all argument introducing heads, such as T, it is predicted to show a Dinka-like profile with respect to wh-questions. If the first instance of [·wh·] is above the base position of any argument, every wh-phrase merged below that point will project its [wh], creating a wh-island. Thus, for any element to wh-move, it must first escape the domain of its own [wh] feature by raising to Spec TP.

(64) Wh-subjects project [wh] up until T is merged



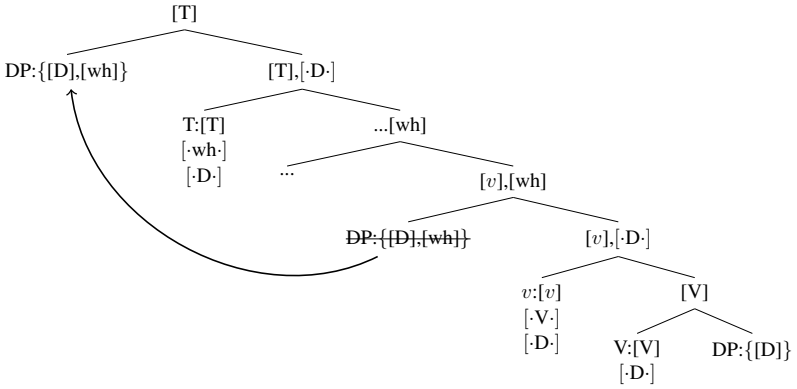
suffix and verb; LK = 'like', manner suffix; NZ = nominalizing suffix; SB = substantive; S.M = end marker (right-hand syntactic boundary); 3C = third-person coreferential/cross-referencing.

(65) Nothing can wh-move, because everything is dominated by [wh]

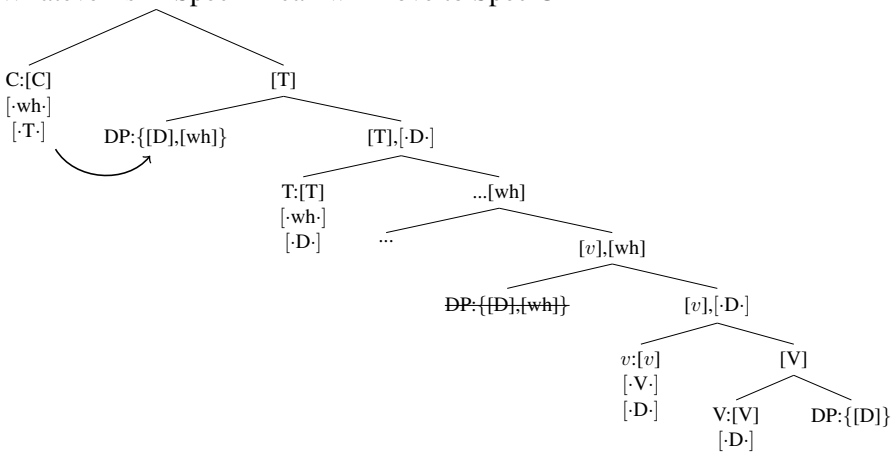


As with the promotion strategies available to Tagalog-type languages, the only requirement for movement is for the wh-element to promote to Spec TP via some non-wh process. I have again represented this as a [·D·] on T in (66), but it could be any A-feature that isn't on T's sister. Since A-movement usually has consequences for agreement and Voice morphology, the prediction is as follows: any element that wants to wh-move must first undergo some Voice-related promotion to Spec TP before it can wh-move.

(66) EPP movement to Spec TP: makes the moved element the highest bearer of [wh]



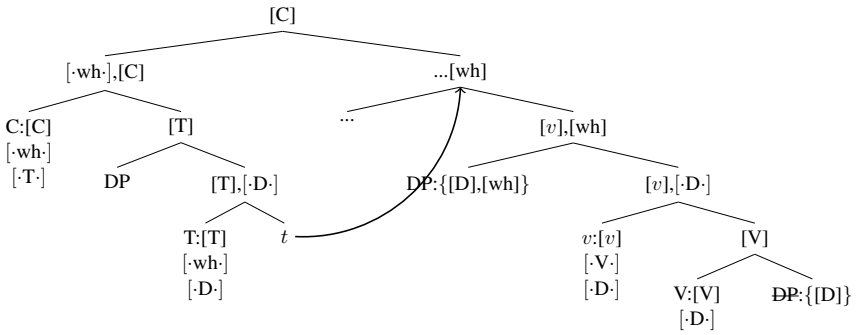
(67) Whatever is in Spec TP can wh-move to Spec CP



This is the profile that we find in Dinka-type languages: subjects, objects, obliques and adjuncts are all subject to the pivot-only requirement when they wh-move. If they are not the pivot, they do not wh-move.

Like in Tagalog-type languages, however, the proposal provides a second option for deriving these wh-questions in Dinka-type languages. The first option was to promote the wh-element and then wh-move that element. Another option, however, would be to promote something else to Spec TP and wh-move T's sister instead (the pied-piping strategy), which is the highest bearer of [wh]. van Urk & Richards (2015) have argued that clausal movement in Dinka is possible, but that clausal specifiers get linearized to the right. If the pied-piping strategy is available in Dinka, it should look like string-vaccuous movement as in (68).[5]

(68) If T's sister wh-moves instead



Recall that wh-movement is not obligatory in Dinka. There is also an in situ strategy available, where in situ wh-phrases are not subject to the pivot-only requirement. If the pied-piping strategy is available in Dinka, it should derive exactly these words orders and (lack of) Voice effects.

(23) In situ wh-subjects in different Voice contexts (van Urk, 2015, ex. 6, p. 63)

a. Yíi ŋà e̱-kè-càm cuı̱̂in nè̱ pɛ̆ɛɛl?
ASSOC who PST-PL-eat.SV food P knives
'Who all was eating food with knives?'

b. Cuı̱̂in é̱-cɛ́ɛm yíi ŋà nè̱ pɛ̆ɛɛl?
food PST-food.OV ASSOC who P knives
'The food, who all was eating it with knives?

c. Pɛ̆ɛɛl e̱-kè-cɛ́ɛmè̱ yíi ŋà ké cuı̱̂in?
knives PST-PL-eat.OBLV ASSOC who 3PL food
'Knives, who all was eating food with them?'

It is not entirely clear whether this is the right approach to wh-in situ in Dinka, however, given the lack of island sensitivity in (24). An alternative approach would be to posit an optional [·wh·] on C, which, when present, attracts movement but not otherwise.

(24) Cé̱ Ádìt jàä̱l [wuı́n cı̱̈i Máyèn ŋó̱ kuêem]?
PFV.SV Adit.GEN leave when PFV.OV Mayen.GEN what break.NF
'What did Adit leave when Mayen broke?' (van Urk, 2015, ex. 12, p. 99)

[5] van Urk & Richards (2015) propose that this type of clausal movement is available for finite clauses but not for non-finite clauses. It is unclear what that means for the subparts of finite clauses considered here. The present approach predicts that the sister of T should be the target of wh-movement – if we treat T's sister as a non-finite clause, because it lacks tense morphology, then van Urk & Richards' approach would potentially rule out this movement on the grounds that non-finite clauses are not eligible for this kind of V2 movement. If we instead treat T's sister as a finite clause, because it is part of a finite clause, then their approach might permit this movement. Further research on Dinka clause-typing is therefore needed to fully understand the possibilities for pied-piping in Dinka.

4 Other sources of granularity

In §3.3, we drew some coarse distinctions between different positions in the clause, and examined the general predictions associated with assigning [·wh·] to those positions. The different choices for hosting [·wh·] were V, v, and T, as examples of heads that merge 1) as low as the lowest argument, 2) as high as the highest argument, and 3) higher than all arguments. Given that the functional hierarchy tends to be richer than these options suggest, however, it is entirely possible that when examining a "Tagalog-type" or "Dinka-type" language, there may actually be even finer grained choices about the distribution of [·wh·]. For example, instead of putting [·wh·] on T, we could have imagined putting it on an aspect head instead, with very similar implications for the profile of interactions between wh-movement and Voice, but with slightly different implications for the distribution of successive cyclic movement and the position of "subjects". Similarly, if someone were to argue that "subject position" is as high as C in a Dinka-type language, one could imagine simply assigning both an EPP property and [·wh·] to C, with no lower instance of [·wh·] anywhere in the clause.

Thus, the present theory captures the kinds of distinctions that languages draw in a coarse way, but further work is needed to do a more detailed and holistic analysis of each language. Upon closer inspection, we might find that some languages have multiple clause medial positions with [·wh·], for example, or that [·wh·] needs to be shifted to some higher or lower head to get more subtle differences between different languages within one of the above categories.

In this section, I discuss some diagnostics for making these more detailed choices about where to assign [·wh·], by looking closer at some of these languages and others. First, we examine the predicted profile for multiple questions in closer detail to identify the possible impact of additional wh-phrases. Then we will discuss how these differences make different predictions about the distribution of successive cyclic movement.

4.1 Multiple questions

The above derivations discuss wh-questions that contain at most one wh-phrase. This section addresses multiple questions, or wh-questions that contain multiple wh-phrases. It turns out that the present theory predicts a space of possible behaviors for multiple questions, ranging from ungrammaticality, to superiority-obeying movement, to multiple movement that tucks in. I propose that each of these behaviors is attested, and is predictable from the other wh-behaviors discussed in this paper: 1) interactions between wh-movement and Voice, and 2) the profile of successive cyclic movement in a language.

In some languages, multiple questions are simply ungrammatical. For example, Standard Italian is often reported to have wh-movement in general, but no multiple questions, as shown in (69).

(69) Italian has wh-movement but not multiple questions

a. Che cosa hai letto?
what have.2SG read
'What have you read?' (Stoyanova ex. 61a, p. 44)

b. *Chi ha scritto che cosa?
who have.3SG written what
intended: 'Who wrote what?' (Stoyanova ex. 70b, p. 51, citing Calabrese 1984)

c. *Chi crede che Giovanni abbia baciato quale ragazza?
who thinks that Giovanni have.COND.3SG kissed which girl
intended: 'Who thinks that Giovanni has kissed which girl?' (Stoyanova, ex. 63b, p. 47)

Italian shows some dialectal variation, in which some speakers (especially younger ones) will tolerate multiple questions, as in English. The lack of multiple questions is nonetheless a robustly at-

tested phenomenon across several unrelated languages, as discussed extensively in Stoyanova (2008). She discusses Somali, Berber, and Irish, which similarly lack multiple questions.

(70) *Somali* (Stoyanova, 2008, ex. 4, p. 2, citing Svolacchia & Puglielli 1999)

a. Maxáy sameeyeen?
what-FM-SCL did
'What did they do?'

b. *Yaa goormuu yimid?
who-FM time-which-FM-SCL came
intended: 'Who came when?'

c. *Yaa yimid goorma?
who-FM came time-which
intended: 'Who came when?'

(71) *Berber* (Stoyanova, 2008, ex. 5, p. 2-3)

a. May t-sghu terbatt?
what-CM 3FSG-bought girl
'What did the girl buy?' (Calabrese 1987)

b. *W manwn i(g) yzwn?
who whom CM kissed-PART
intended: 'Who kissed whom?'

c. *Wiy yzrin may?
who-CM seen-PART what-CM
intended: 'Who saw what?' (Cole & Tenny 1987)

(72) *Irish* (Stoyanova, 2008, ex. 5, p. 3, citing McCloskey 1979:61, 71)

a. Caidé aL thug tú dó?
what COMP give you to-him
'What did you give him?'

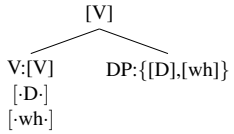
b. *Cé caidé aL rinne?
who what COMP did
intended: 'Who did what?'

c. *Cé aL rinne caidé?
who COMP did what
intended: 'Who did what?'

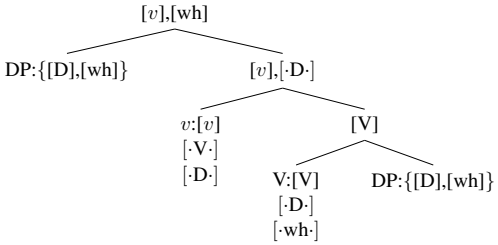
In each of these languages, we might posit a [·wh·] on V, given that they all permit wh-objects to wh-move without a Voice alternation. Let us additionally suppose that there is no other instance of [·wh·] in the clause until C. If this is the state of affairs, the theory predicts that wh-movement should not occur in the presence of multiple wh-phrases. The first one will check the lowest instance of [·wh·], preventing it from projecting. When the next wh-phrase merges, there is therefore nothing remaining to prevent its [wh] from projecting all the way to C's sister, blocking wh-movement.

(73) When both the subject and object are wh-elements

a. Object checks [·wh·]



b. When the wh-subject merges, [wh] projects, blocking any wh-movement

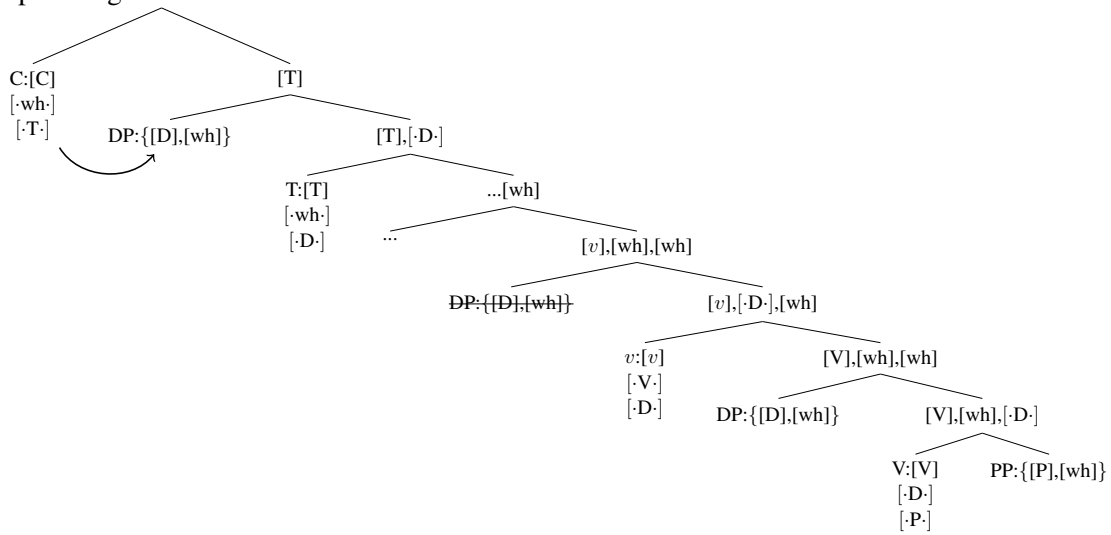


Assuming that, in these languages, the interfaces require a wh-phrase in Spec CP to produce a convergent wh-question, the lack of multiple questions is unsurprising in Italian, Somali, Berber and Irish. When there is a second wh-phrase, movement to Spec CP is blocked due to projection of [wh], which creates a wh-bubble containing all of the wh-phrases. Wh-probing into this bubble violates locality principles and CP couldn't license a wh-specifier anyway ([·wh·] was checked by its sister). Thus the requirement for C to have a wh-specifier is not satisfied and the result is ungrammaticality.

If all languages only had [·wh·] on V and C, the expectation would be that multiple questions should be ungrammatical in every language, contrary to fact. However, I have proposed that different languages have [·wh·] on different heads, in order to account for interactions between wh-movement and Voice, which also accounts for the variable existence of multiple questions.

If we were to change the location of [·wh·] to T and C (as in Dinka-type languages) instead of V and C, the predictions would be different. Observe what happens if we add multiple wh-phrases to a clause with [·wh·] on T and C: [·wh·] on T suppresses all of the [wh] features that projected to its sister, licensing movement of the pivot as usual. This is because of the set notion of features adopted in §3: one instance of [wh] or [·wh·] is equivalent to multiple.

(74) Multiple instances of [wh] coalesce and then check [·wh·] on T together – whatever moves to Spec TP gets to wh-move



Multiple questions are indeed generally possible in Dinka (Coppe van Urk, p.c.). Though there are not many published examples in the literature, Yuan (2013) shares the example in (75) from the Twic East dialect of Dinka. In this example, both wh-phrases originate in an embedded clause: one (the pivot) moves to the higher clause and the other remains in situ, as we expect.

(75) Yee käŋö ŋii Abul ke [ke ke cïï ŋa ke ɣɔɔc]?
what.PL know.NSV Abul PL COMP PL PRF.NSV who PL bought
'What does Abul know that who bought?' (Yuan, 2013, ex. 18, p. 9)

The existence of multiple questions is therefore unsurprising if we think that [·wh·] can occur on heads higher than V in addition to V. The theory therefore predicts the following relationship between the distribution of [·wh·] and the profiles of multiple questions and interactions with Voice.

(76) The lowest head that bears [·wh·] defines how wh-movement will interact with Voice: lower instances of [·wh·] remove Voice-related restrictions on wh-movement.

(77) The presence or absence of [·wh·] on a higher head, e.g. T, predicts the availability of wh-movement in multiple questions.

To capture multiple questions in English, for example, which has multiple questions and no wh-movement/Voice interactions, we would just need to conclude that English has [·wh·] in three locations: V, C, and some head in between.

Among the languages with multiple questions, however, there is another parameter of variation. In some languages, multiple questions are only derived by a single instance of wh-movement, while in other languages, they are derived by multiple instances of wh-movement. Bulgarian is a classical example of the latter language type. Importantly, when multiple wh-phrases move in Bulgarian, they preserve their underlying relative word order, indicating that successive specifiers of CP *tuck in* under previous ones, rather than create higher specifiers of CP.

(78) Multiple questions with multiple movement in Bulgarian (Richards 1997, ex. 2, p. 54, citing Rudin 1988, 472-473)

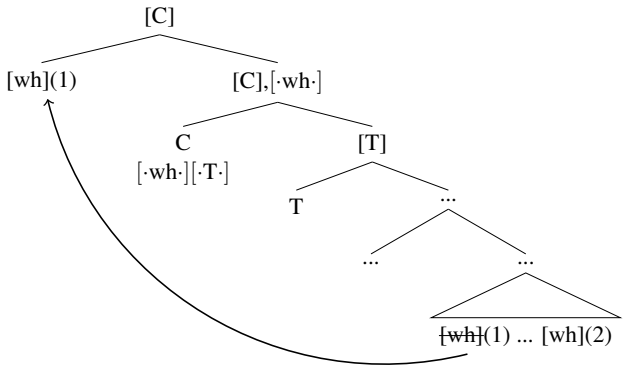
a. Koj kogo vižda?
who whom sees
'Who sees whom?'

b. *Kogo koj vižda?
whom who sees
intended: 'Who sees whom?'

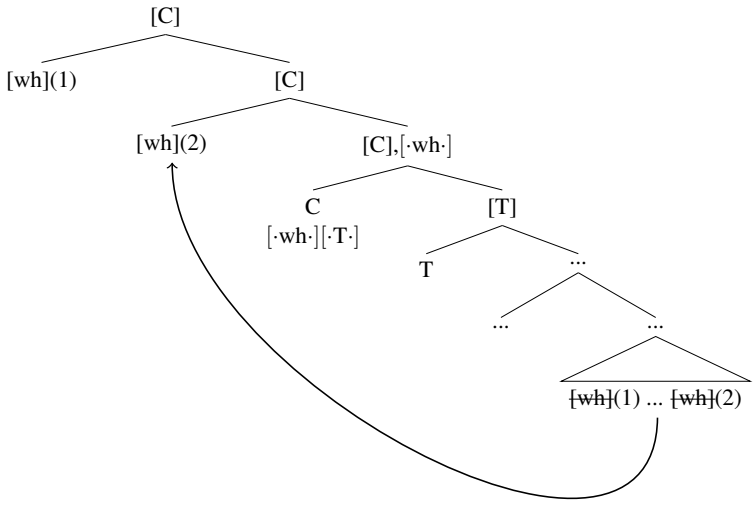
This is exactly what the theory leads us to expect, for languages that tolerate multiple specifiers in the left periphery. When [·wh·] on C′ is suppressed by feature checking, it fails to project to CP but it *does not disappear*. As a result, the C′ node is still able to feed the checking rule, as it bears [·wh·]. For it to feed the checking rule, however, internal merge must apply at the C′ level rather than the CP level, allowing additional specifiers that tuck in, but not additional specifiers that merge with the root.

(79) Multiple movement tucks in

a. First wh-specifier prevents [·wh·] from projecting to the root



b. A second wh-specifier is only licensed if it feeds the checking rule – must merge with the node bearing [·wh·] (Tucking in)



In sum, languages that lack multiple questions likely only have one instance of [·wh·] below C, on a very low head if they tolerate object wh-movement. Languages that have multiple questions, by contrast need a higher instance of [·wh·] either in addition to or instead of a lower one. For languages with multiple questions, either only the highest wh-element moves to Spec CP, or all of them move, where subsequent wh-phrases are forced to merge with C′, successively tucking in under the first wh-specifier of CP.

The locations of these [·wh·] features have been shown to contribute to various aspects of wh-movement in a language: 1) whether and how wh-movement interacts with Voice, and 2) whether a language has multiple questions. In the next section, we see that these choices should also interact with the distribution of successive cyclic movement, showing that all of these properties of wh-movement within a language are interconnected.

4.2 Successive cyclicity

If this proposal is right, the locations of [·wh·] in each language should also define the locations of successive cyclic movement in that language. In this section, I discuss some preliminary support for this view in English, Tagalog, and Dinka. If successful, the hope is that the present approach offers a framework by which to diagnose the number and position of [·wh·] in other languages as well, which can tie together these various properties of wh-movement in each language.

Since English clearly has multiple questions and no Voice-related restrictions on wh-movement, the proposal suggests that it must have [·wh·] on (at least) V, some higher head(s) (e.g. T), and C. Putting [·wh·] on these heads, however, also predicts that these heads should host successive cyclic wh-movement if [·wh·] is not checked by their sisters. As such, this proposal suggests that we should be able to find evidence of wh-movement targeting the edges of phrases like VP and TP in English (and in any language with transitive object movement and multiple questions).

In fact, there is significant precedent for treating these heads as "phases" in other literature, using standard diagnostics for successive cyclic movement in English and beyond.[6] While C and v typically

[6]I use the term "phase" with some trepidation here, as the present proposal predicts the distribution of successive-cyclicity without actually appealing to any notion of phase-hood or engaging with the timing of spell-out. I only mention the phase

come to mind most readily as possible hosts for successive cyclic movement, Davis & Elliott (2021) argue that virtually any verbal/aspectual head in an English clause can host successive cyclic wh-movement, based on evidence from the distribution of parasitic gaps. In support of this claim, see Fox & Pesetsky (2005), Wiland (2010), and Ko (2011) for evidence of VP phase-hood (or at least evidence that VP need not be distinguished from vP with respect to phase-hood diagnostics), and see additionally Deal (2016a), Wurmbrand (2017), and Davis (2021) for evidence that TP can be a phase in English (and beyond).

For Tagalog, the claim was that [·wh·] is on v and C, which suggests that wh-movement should proceed successive-cyclically through Spec vP and Spec CP. This aligns exactly with Rackowski & Richards's (2005) proposal, which assigns v both the EPP property that governs Voice as well as the edge properties of a phase. Their analysis is therefore built around the idea that wh-movement proceeds successive cyclically through Spec vP, which is what we would expect for a v that hosts [·wh·]. From their description, we wouldn't expect any other heads to host [·wh·], which should make predictions about multiple questions in Tagalog as well. Though I couldn't find discussion of multiple questions in the literature on Tagalog, Malay might fit the right profile of a language with [·wh·] only on v and C: Keely New (p.c.) informs me that Indonesian languages seem to lack multiple questions, which is what we would expect if there is no higher instance of [·wh·] to suppress the features of a second wh-phrase, but this requires further investigation.

In Dinka, we expect successive cyclic movement to target a higher position than in Tagalog. It turns out that the target positions of successive cyclic movement in Dinka are somewhat controversial. van Urk & Richards (2015) argued, based the positions of stranded clitics and gaps, that wh-movement proceeds through the edge of vP in Dinka, as in Tagalog. However, Keine & Zeijstra (to appear) dispute this claim, arguing that clitic stranding is better understood through agreement processes targeting Spec TP, and that the location of gaps is better understood by studying A-movement rather than Ā-movement chains in Dinka. The present theory would support Keine & Zeijstra's (to appear) view, because it predicts that successive cyclic *wh-movement* must target a position higher than Spec vP. The present approach restricts the profile of wh-movement, but permits A-movement to target lower positions – Keine & Zeijlstra's proposal to treat other positions targeted by movement as A-positions is therefore compatible with the predictions of the present approach.

Much further work is needed to fully evaluate the typology of successive cyclic movement in all languages affected by interactions between wh-movement and Voice. On a more promising note, however, we have seen that the present approach creates testable relationships between these different properties of wh-movement. More specifically, the kinds of Voice-related restrictions on wh-movement that we see make predictions about the locations of successive-cyclic movement, which are corroborated by others' proposals.

5 A note on pied-piping

This paper has proposed that the typology of interactions between wh-movement and Voice in several languages reflects how "unselected" features, like [wh], interact with the principles governing feature-checking and feature-projection. Though the data that inspired the approach are from interactions between wh-movement and Voice, the proposal is essentially a theory of pied-piping: sometimes chunks of structure that contain wh-words act like wh-words themselves, creating either pied-piping or wh-island configurations of different sizes.

The spirit of this approach has much precedent in the pied-piping literature. Chomsky (1973), Cowper (1987), Webelhuth (1992), Grimshaw (2000) argued that the property of [wh]-hood could indeed spread to projections beyond the word they originated on, via a rule of feature percolation,

theory literature because it provides such abundant evidence of successive cyclic movement across languages.

giving rise to pied-piping. However, this approach to pied-piping was later abandoned by Heck (2008) and Cable (2010) for the following reasons, as summarized in Cable (2012).

First, Cable and Heck refer to this approach as the "feature percolation" approach, distinguishing it from a "feature projection" approach. If this distinction is valid, they argue that theories with both "feature percolation" and "feature projection" have more machinery than theories with just "feature projection". As such, they consider theories with "feature percolation" to be more complicated and conceptually less desirable than theories with just "feature projection".

Second, they argue that theories with "feature percolation" incorrectly predict pied-piping to occur in other domains, with other features besides [wh]. Since percolation is a general principle that can apply to other features, we would expect to see evidence of it elsewhere. They argue that we do not see evidence of this, in which case we need a more specific solution to pied-piping that only applies to [wh], rather than a more general solution that would extend to all features. In sum, they suggest that pied-piping is limited to wh-environments and therefore requires a solution that is unique to wh-contexts.

Here I would like to argue that these criticisms do not apply to the present approach. Regarding the first point, I will argue that there is no meaningful distinction between "projection" and "percolation". Thus, to the extent that we need a rule of projection, it stands to reason that different formulations of that rule should be considered, and that some of those formulations might allow for the percolation configurations that predict pied-piping. In other words, assuming that every theory makes use of some projection rule, adjusting the formulation of such a rule is a natural option that doesn't necessarily add machinery to our theories.

As for the second point, following Grimshaw (2000), I will argue that syntactic structures are actually full of pied-piping configurations outside of wh-questions, in which case a general approach is preferable to a solution that uniquely applies to wh-movement.

Lastly, I will show that this approach to pied-piping has much of the same flexibility and generality that Cable's has, showing that there is no sacrifice of empirical coverage.

5.1 Projection vs. percolation

One of Cable's central objections to the projection/percolation approach to pied-piping has to do with the supposed distinction between "projection" and "percolation". Cable discusses an example of possessed nominals to illustrate the difference. For the purposes of the discussion, we can think of projection as the rule that assigns [3sg] to the phrase *my father*, as illustrated by the form of agreement in (80), even though *my father* contains both [3sg] and [1sg] subparts.

(80) [My father] is/*am at the party.

Here, we can see that the morpheme associated with subject agreement inflects for third person singular instead of first person singular, suggesting that *father* (or some head associated with it) rather than *my* controls the agreement. This can be understood if the [φ]-features of the head of the DP, rather than the [φ]-features of the possessor (specifier) *my*, determines the overall φ-specification of the DP. Seeing as the [φ]-features of *my* do not appear to project to the DP *my father*, Cable and Heck conclude that the [wh]-feature of *whose* should be similarly unable to project to the DP *whose father* in (81).

(81) [Whose father] is at the party?

To the extent that theories of pied-piping might want [wh] to project to *whose father*, they must therefore employ a separate rule, distinct from projection, to achieve this. They thus conclude that there would need to be a separate "percolation" rule, distinct from "projection" to allow *whose father* to bear a [wh]-feature. The projection rule that Cable alludes to is briefly described in (82).

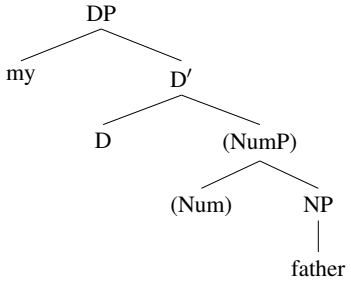
(82) Cable on projection: "Typically, the features of a head only ever extend to the projections of the head. This ubiquitous phenomenon is commonly referred to as 'feature projection'."

From this, we can imagine that the problem with (83) stems from the fact that *my* is a maximal projection, and features cannot project past the maximal projection, according to Cable's description of the projection rule.

(83) *My father am at the party.

As Danon (2011) notes, however, the matter of how *my father* comes to acquire [3sg] features is not entirely straightforward. The typical functional structure assigned to DPs includes at least two heads (and often more), with *father* embedded in the lowest projection. For the [φ]-features of *father* to end up on the DP node, (or equivalently – for the features of other nominal heads, like number, to end up on the DP node), they would either have to cross some maximal projections or we need to employ some other mechanism. If either of these options is justified for [φ]-features, it may be justified for [wh] as well.

(84) DP structure is potentially rich



In sum, Cable's assumed projection rule likely requires some amendment anyway to account for how complex phrases acquire their properties, which is why the literature on projection has explored many formulations of the rule, not all of which take the same approach to phrases like *my father*.

Of course, the fact remains that features do not seem to project from *my* to *my father*. Thus, even if we were to consider a different formulation of the rule, we could imagine Cable taking up a new argument here: if [φ] cannot project from possessors, [wh] shouldn't be able to project from *whose* to *whose father* either.

However, this paper's proposed projection rule already avoids this problem. The rule states that all features project, unless they are in a checking relation. Seeing as heads differ in what kinds of checking relations they control, a head that engages in [φ]-checking without engaging in [wh]-checking is perfectly plausible. A phrase that merges with such a head would not project its [φ]-features, but would project its [wh]-features, prohibiting [1sg] from projecting from *my* to *my father*, while allowing [wh] to project from *whose* to *whose father*.

In sum, it is at least not obvious that we need separate theories of "feature projection" and "feature percolation" to capture a theory of pied-piping. One general rule could cover both, which, for every instance of Merge, determines what information on daughters should appear on their mothers. I propose that the projection rule taken up in this paper does just this. It sometimes predicts features to stop at the "maximal projection" and sometimes allows them to project further, depending on the features of their selecting heads. Thus, a theory of this sort could extend to pied-piping without introducing extra machinery.

5.2 "Pied-piping" outside of wh-questions

A second of Cable's/Heck's objections to the projection/percolation approach to pied-piping involves its generality. They claim that we only observe "pied-piping" in wh-contexts. For that to be true, it

would have to be the case that whenever we see a dependency between X and Y trigger a syntactic operation involving X and Z instead, where Z contains Y, it has to be in the context of a wh-dependency rather than dependencies based on e.g. φ or category features. They argue that this is a problem for the feature percolation/projection approach: feature percolation/projection is a general rule that should apply to all features indiscriminately.

Thus, if percolation/projection were the right approach to pied-piping, we would expect to find other (non-wh) cases where some dependency between X and Y triggers a syntactic operation between X and Z instead, where Z contains Y. This is because the percolation rule could lead to other features, such as [φ] or category, projecting/percolating from Y to Z, leading to "pied-piping" of Z.

While it is true that the term "pied-piping" was only coined in the context of wh-movement, the phenomenon itself is quite possibly as widespread as the percolation/projection approach predicts, contra Cable/Heck's position. Examples of long distance selection and [φ]-feature sharing abound throughout the literature, which was part of Grimshaw's (2000) primary motivation to define a notion of *extended projection*. Each of these cases has the profile of "pied-piping" that we are after, in a context that is not characterized by [wh]-features.

Grimshaw has many examples of "pied-piping" in other domains, but I will focus on just two: long-distance selection and number features. In each of these cases, we have some feature controlling a dependency of some kind (either selection or agreement in these cases), where the actual phrase being selected or controlling the agreement is larger than the maximal projection containing the relevant feature. These examples parallel pied-piping in wh-movement, where the phrase undergoing the movement contains the wh-phrase that presumably triggered the dependency.

The first example is a case of long distance selection. Here, Grimshaw introduces two kinds of complementizer selection patterns. In (85) (the baseline case), we see different verbs that select for different complementizers, where in each case, the different complementizers also select for different tense environments. This is a case where we might think selection is strictly local: V cares about the C that heads its sister, and C cares about the T that heads its sister.

(85) for-inf vs. that-fin
   a. We arranged for him to leave at 6.
   b. We thought that he left at 6.

However, it is also possible to find verbs that seem to select directly for the tense environment of their complement clauses. In (86), we find two verbs that both select the same complementizer, but which each require a different tense environment as *C*'s sister. Selection tells us that there is a relationship between the matrix verb and tense, but the Merge operation does not directly apply between V and TP. Instead Merge targets V and *CP*, which contains TP. In other words, long distance selection looks like pied-piping in the case of external Merge – a larger constituent is merged than the one that is selected.

(86) Selection for fin/inf across *that*
   a. We requested that he leave/?left at 6.
   b. We thought that he left/*leave at 6.

Grimshaw's insight was to treat long distance selection as a case of pied-piping, as is evident in another of her examples, which is a more classic case of pied-piping with wh-movement. Her proposal was to treat both cases as examples of larger phrases inheriting the properties of their contents. In (86), CP inherits the relevant properties from T to satisfy V's selectional requirements. In (87), the PP inherits the relevant properties of *which* to undergo wh-movement.

(87) [Under which stone] did they find a note?

Of course, one could separately argue about whether a projection/percolation approach to long distance selection is the right move. But one cannot claim that pied-piping is absent from other domains without first discussing these cases and motivating another treatment of them.

Another of Grimshaw's examples addresses the issue of φ-features. Grimshaw observes that number features are often visible on N heads, but the phrases controlling agreement are DPs. Danon (2011) discusses a similar paradox in a more general sense, with more φ-features and functional structure in the nominal domain.

(88) N has number but DP controls subject agreement

a. the dogs are/*is

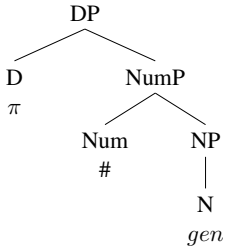
b. the dog is/*are

c. dogs are/*is

Since most modern theories of agreement treat it as a non-local phenomenon, one might object here that perhaps the agreement we observe is really with the NP/NumP rather than the DP. In that case, (88) would not be a case of pied-piping: agreement would apply directly to the NP/NumP that introduced the number feature, as expected. However, Danon has argued that the problem persists when we look carefully at the conditions under which agreement applies. Her argument rests on two premises: 1) that φ-features are not all introduced by a single head, but are rather introduced separately by different heads, and 2) that φ-probes can only be valued/satisfied by sets of features that are complete relative to the specification of the probe (Chomsky, 2000, 2001).

Danon motivates the first premise by discussing properties of construct state nominals in Hebrew, number morphology in multiple languages, and the cross-linguistic profile of concord. From these examples, and also building on the work of many others, Danon concludes that gender, number and person features all originate on separate heads, as schematized in (89).

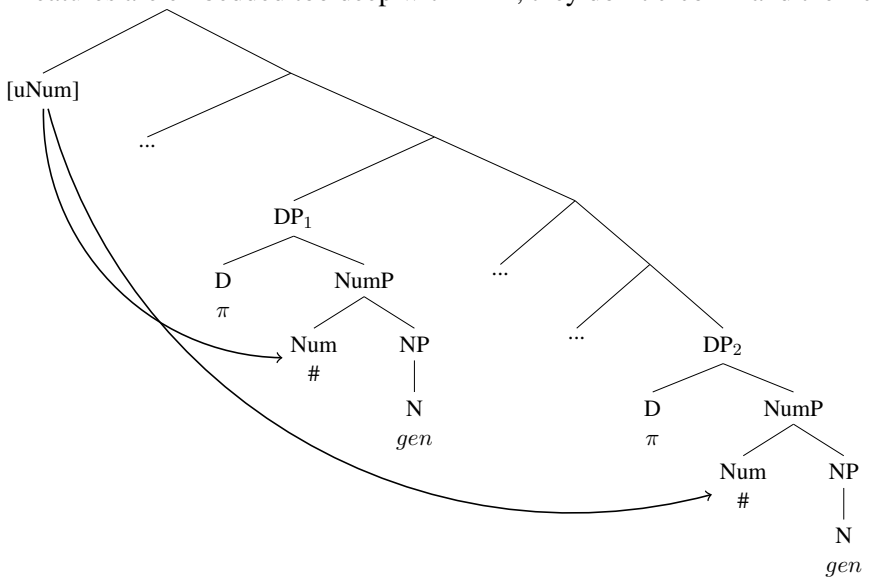
(89) Danon's proposed nominal structure: Inherent gender, functional number and person



The second premise is enforced by locality considerations. To see why, let us consider a probe, [uφ] that c-commands a DP with feature set [φ = π, #, gen]. The claim is that [uφ] can only be valued/satisfied if all of the φ-features of that DP occur on a single node. If the features were distributed across multiple nodes, as in (89), the probe would not be able to "pick up" features piecemeal along the way until fully satisfied, but would simply fail to agree.

If we were to change the specification of the probe, we would expect a different outcome. For example, if we replaced $[u\varphi]$ with a set of probes, $[u\pi]$, $[u\#]$, $[uGen]$, then we could imagine each probe searching for and valuing itself against a different node. However, the locality profile of such a probe is expected to be different than what we find for subject agreement (in English at least). If we had two DPs, as in (90), observe that the nodes associated with equivalent φ-features on each DP would not stand in a c-command relationship relative to each other. In other words, the number features of DP1 would not c-command the number features of DP2, and so forth. Subject agreement in English looks as though these probes should all have to target the features inside the first DP, but principles of locality cannot guarantee that here. Theories of locality would predict that each probe could potentially copy the features of either DP, resulting in a copied set that was an amalgam of the φ-features of both DPs.

(90) If features are embedded too deep within DP, they don't c-command their competitors.



In order to capture subject agreement in English, we need to be able to specify a probe such that it targets *all* of the φ-features of a single DP, or not at all, or else we would predict the wrong locality profile. Chomsky's φ-completeness rule, applied to a probe $[u\varphi]$ does just this.

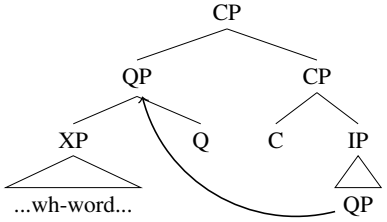
Granting that a probe $[u\varphi]$ needs to find all of the φ-features on a single node for agreement to apply, we have arrived at a paradox: for subject agreement to have the right locality profile, we need $[u\varphi]$ to find all of the features on a single node, but we have evidence from elsewhere that these features do not all originate within the same maximal projection. φ-agreement thus presents a pied-piping problem: it looks like agreement targets a single constituent, potentially the DP, but the features that are responsible for controlling this process are further embedded. Danon's solution to this problem is to invoke a rule of "feature sharing", which brings features from lower projections onto the maximal DP node. This approach is quite similar in spirit to the percolation/projection approach to pied-piping defended here.

In sum, Cable and Heck proposed to abandon projection/percolation approaches to pied-piping because they believed pied-piping to be unique to wh-questions. I have argued here that pied-piping is actually widespread, extending to other features and other operations just as it applies to [wh] and wh-movement. If it is possible to find a common treatment of all of these cases, such a solution would be preferable to having separate analyses for different features.

5.3 Comparison with Cable's Q-theory

Instead of a projection/percolation account, Cable proposes that pied-piping in wh-movement is best explained by a new functional head Q. On this approach, there is no such thing as "pied-piping" in the usual sense. What we call 'pied-piping' is just QP movement, where QP dominates the relevant wh-word and potentially other material.

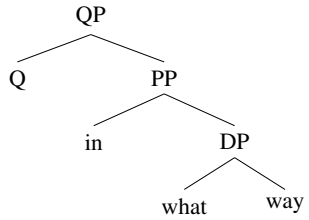
(91) The Q-based analysis of wh-movement (Cable 2010a: 38, Cable 2010b: 567)



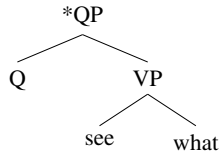
Here, I propose that the present theory of projection functionally offers the same avenues of analysis as Cable's QP theory. Both analyses must regulate the distribution of some element: Q in Cable's case and [·wh·] in the present theory, where the position of these elements affects how much structure moves with wh-phrases in different contexts. The main difference is just that the distribution of [·wh·], but not Q, is not only diagnosable by the profile of pied-piping, but also by the profile of successive cyclic movement, multiple questions, and interactions with Voice. Here I describe some issues that Cable discusses in the context of his Q theory, and show what the corresponding treatment of them in the present approach would be.

Cable proposes constraints on the distribution of Q to capture restrictions on pied-piping: since only some elements may move along with wh-phrases in certain languages, Q must be limited to certain positions in those languages. For example, English prepositional phrases can be pied-piped, but English VPs cannot be pied-piped. To capture this, Cable formulates principles that allow Q to merge with PPs but not with VPs.

(92) a. [$_{QP}$In what way] is he a natural choice?



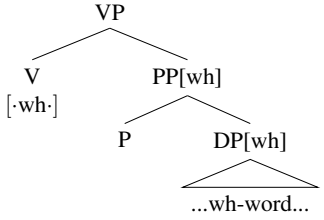
b. *[$_{QP}$See what] can you?



In the present approach, we have seen that V must bear [·wh·] in English in order to account for the existence of object questions. As it happens, the presence of [·wh·] on V also prevents pied-piping of VP: [wh] will never make it to the VP node, preventing it from being a viable target for wh-movement in English. Thus, we don't need a principle regulating the distribution of [·wh·] or Q here: other properties of English motivated a particular distribution of [·wh·], which in turn predicts that VP never pied-pipes.[7]

For prepositional phrases to be allowed to pied-pipe in English, they must either not have [·wh·], or only optionally have [·wh·] (to permit preposition stranding). If a wh-phrase merges within a PP with no [·wh·], [wh] will project to the PP node, and then get suppressed by V, licensing pied-piping of PP (the [wh]-bearer) but not of VP.

(93) PP pied-piping



[7]Importantly, pied-piping of VP is not generally ruled out across languages, as evident from its occurrence in Gavião object questions. This is what motivated our treatment of Gavião as a language with [·wh·] on v instead of V.

Cable also discusses cross-linguistic variation that motivates different parametric settings for constraints on the distribution of Q. For example, Tlingit is much more permissive than English in allowing many other types of constituents to pied-pipe, suggesting that Q has a more flexible distribution in Tlingit than in English. Cable describes the basic template for a Tlingit wh-question in (94), analyzing *sa* as the Q head that can attach to most phrase types.

(94) General Form of a Tlingit Wh-question
[$_S$ ... [[... wh-word ...] *sá*] ... Main-Predicate ...]

(95) [[[Wáa kwligeyi] x̲áat] sá] ituwáasigóo?
how it.is.big.REL fish Q do.you.want
'How big a fish do you want?'

To capture a more flexible system like Tlingit's with the projection story, we would need to allow for a more flexible distribution of [·wh·]. Supposing that heads might optionally have [·wh·], as perhaps prepositions in English do, we might imagine that more kinds of heads in Tlingit fall into this category of optionally possessing [·wh·]. This would allow for a wider range of pied-piped constituents.

Though there are many other aspects of pied-piping cross-linguistically to explain, I propose that the projection theory offers at least as much empirical coverage as the Q-story does. By regulating the distribution of [·wh·], we can capture the same phenomena that constraints on the distribution of Q can provide.

6 Conclusion

In this paper, I argued that the typological profile of restrictions on wh-movement motivated an amendment to our theory of projection. I first described three classes of Voice-related restrictions on wh-movement that followed a cline: 1) the least restricted languages exhibited no Voice-related restrictions on wh-movement (English-type), 2) the intermediate languages showed some Voice-related restrictions on wh-movement, depending on the height and category of the moving element (Tagalog-type), and 3) the most restricted languages showed Voice-related restrictions on wh-movement, which were insensitive to the height/category of moving element (Dinka-type).

The goal of the paper was to find an analysis of these restrictions on wh-movement that helps us understand why such restrictions emerge in these fine-grained ways across languages. It also had a second goal to help us diagnose the other aspects of these languages' wh-questions that are connected to these restrictions. Importantly, we discussed how the profile of Voice-related restrictions on wh-movement connected to the availability of multiple questions, as well as the positions associated with successive-cyclic movement in each case.

I proposed that the piece of architecture responsible for these restrictions on wh-movement was a particular formulation of the projection rule proposed in Zeijlstra (2020). According to his proposed projection rule, there is no head/phrase distinction: instead, features that participate in checking do not project, while other features do project. This has an immediate consequence for any features that are not "selected" by a corresponding Merge-inducing feature: those features should project until they become sister to such a feature that they can check.

On this view, the distribution of wh-probes can influence whether phrases that dominate wh-words inherit the [wh]-property from those words. If the [wh]-property is allowed to project, it creates pied-piping domains, which may wh-move themselves, but which cannot be escaped by wh-movement. In such cases, if pied-piping is prohibited, the only option is to A-move the wh-phrase out of the domain of [wh], as illustrated in (3). These cases of rescue A-movement account for the interactions between Voice and wh-movement.

(3) Domain bearing [wh] is an island for wh-movement, but not for A-movement

a. Wh-movement blocked

* $[_{CP}$ wh-phrase ... $[_{[wh]}$ ... ~~wh-phrase~~ ...]]

wh-movement

b. A-movement licensed

✓ $[_{XP}$ wh-phrase ... $[_{[wh]}$ ... ~~wh-phrase~~ ...]]

A-movement

This approach to the Voice-related restrictions on wh-movement also had consequences for other aspects of our theories of wh-movement. In a first result, it provided an explanation for why successive cyclic movement targets clause-medial positions: if intermediate heads did not have [·wh·], wh-movement would not occur at all because [wh] would project all the way to C. The positions of [·wh·] therefore determine which elements will be able to wh-move without A-movement, as well as which positions will host successive cyclic wh-movement from embedded clauses.

Though the proposal tied wh-movement to clause-medial instances of [·wh·], it did not tie wh-movement to any particular clause-medial position of [·wh·]. The framework thus offered an avenue of flexibility: putting [·wh·] on different heads produces different restrictions on wh-movement. We explored how lower choices for [·wh·] corresponded to fewer Voice-related restrictions, while higher choices corresponded to more restrictions.

This proposal is exciting because it is both similar and different to many other analyses of wh-movement. On the one hand, it makes use of very familiar machinery: feature-checking, feature-projection, and intervention-based locality constraints. On the other hand, it is a significant departure from many analyses of Voice-related restrictions on wh-movement, which tie these restrictions to a richer inventory of wh-probes. On the intervention-based accounts discussed in §3.1, different languages have different restrictions on wh-movement because the specification of their wh-probes is different. Some wh-probes might attract the closest wh-element, while others might be specified to attract only the closest DP, for example.

On the intervention-based views, it is lexical, rather than structural differences between languages that distinguish profiles of wh-movement: different languages have different lexical items, which have different requirements that may or may not be shared by lexical items in other languages. By contrast, the present approach ties these restrictions to properties of UG which are shared by all languages: the ingredients available to one language are the same as those available to others. This makes the present approach more restrictive by reducing the combinatorial possibilities of different features on heads.

There are many issues left to discuss, which I leave to future research. One issue is that this paper limited itself to identifying the coarse ways in which languages' restrictions on wh-movement differ from each other. These differences were therefore analyzed in a coarse way: [·wh·] and EPP properties were distributed based on loose diagnostics, without doing a fully detailed analysis of the functional structure of each language. However, we saw that the proposal allowed for a much finer-grained investigation, which would diagnose the more specific locations of these difference probes, with consequences for the profiles of multiple questions, successive cyclic movement, binding, etc.

In addition, one of the claimed advantages of the proposal was to unite a variety of "pied-piping" effects under a common analysis: cases of pied-piping in wh-movement were treated as analogous to cases of long-distance selection and φ-feature sharing. To live up to this claim, further investigation of these and similar phenomena are needed. Though I was not able to fit extensive discussion of these other phenomena into this paper, the hope would be to find analogous diagnostics in those other domains for the distribution of φ-probes and category-selecting features, which can feed the checking and projection rules like [wh]-features and probes do.

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