Large-scale Pied-piping in the Labeling Theory and Conditions on Weak Heads

Hiromune Oda

The University of Tokyo

hiromuneoda@g.ecc.u-tokyo.ac.jp

Abstract: This paper discusses the concept of weak head in Chomsky's (2015) sense from a typological perspective. This paper first establishes a novel generalization that large-scale pied-piping is available in a language only if the language has indeterminate pronouns in Kuroda's (1965) sense and the clause to be pied-piped is head-final. To deduce this generalization, this paper first offers a labeling theoretic account of large-scale pied-piping. It then proposes that weak heads are (i) heads that have unvalued features and (ii) morpho-phonologically weak. It is shown that the generalization is deduced from this conception of weak heads, given Inaba's (2011) generalization that head-final complementizers are generally affixal. This paper further argues that the proposed conception of weak heads also allows us to deduce Agree from Minimal Search, which is a third factor principle (Chomsky 2013), hence minimizes UG.

Keywords: large-scale pied-piping, labeling, weak heads, syntax-PF interface, Agree

1 Introduction

In recent minimalism, labeling of syntactic objects has been one of the most important issues. In particular, Chomsky (2013, 2015) proposes that labeling a syntactic object is not an inherent property of the syntactic object or part of Merge, unlike in earlier syntactic theories, but it is determined by the operation *Minimal Search*, which searches the syntactic structure from the highest node. For instance, when a head X and a phrase YP are merged, X projects and provides the label for the configuration {X, YP}, because it is the first head that Minimal Search finds.

Chomsky (2015) further proposes that T in English is a "weak" head, in the sense that it cannot provide a label on its own. For T to provide a label of the configuration {T, vP}, for instance, it needs to undergo feature sharing of ϕ-features with a DP in its specifier position, whereby it is "strengthened" and projects TP. Chomsky proposes that T in English and R(oot) are weak heads, but remarkably, he does not offer a clear criterion for weak heads. A question that naturally arises is, then, what counts as a weak head more generally. How is the weakness of heads determined in the grammar, and to what extent can it be generalized beyond English T and R?

It should also be pointed out here that for Chomsky, weak heads are weak only in a syntactic sense, i.e., they cannot provide a label on their own. However, it is logically possible that syntactic properties can be reflected in the interfaces. In fact, Chomsky suggests that labels are required for syntactic objects to be interpreted at the C-I and A-P interfaces. There thus arises a question as to whether the weakness of heads, which is relevant for labeling, is also relevant for the interfaces.

In this paper, I address these issues from a typological perspective. Specifically, I discuss the typology of so-called large-scale pied-piping found in languages such as Basque and Imbabura Quechua. I point out that there is a factor unnoticed in the literature that is relevant to the availability of large-scale pied-piping; in particular, I establish the novel generalization that large-scale pied-piping is allowed in a language only if the language has a certain type of indefinite pronominal system and the projection to be pied-piped is head-final. To deduce this new generalization, I propose a criterion for determining weak heads, which generalizes the notion of weak heads to all heads that have unvalued features at the point of External Merge. I also propose a morpho-syntactic condition on weak heads, in which weak heads cannot be realized as free morphemes; in other words, weak heads are weak not only syntactically but also morpho-phonologically. I then show that this conception of weak heads captures the availability of large-scale pied-piping, tied with a cross-linguistic morphological difference between head-initial and head-final complementizers observed by Inaba (2011); what is crucial is not the head-directionality *per se*, but the morpho-phonological strength/weakness of head-initial/final complementizers.

In addition, I demonstrate that this new conception of weak heads allows, and in fact requires, us to deduce Agree from Minimal Search, which is a third factor principle external to UG according to Chomsky (2013). In other words, we can eliminate Agree from the computational system of language and hence minimize UG. I also show that this deduction can capture the variation in the superiority effects that is found with multiple wh-questions in combination with Epstein et al.'s (2020) proposal regarding multiple specifier configurations under Minimal Search.

This paper is organized as follows. Section 2 establishes a novel cross-linguistic generalization regarding large-scale pied-piping. Section 3 offers a deduction of the generalization by proposing a morpho-syntactic condition and a criterion regarding weak heads, as well as integrating Inaba's (2011) observation that head-final complementizers are generally affixal. Section 4 argues for a deduction of Agree from Minimal Search based on the proposed criterion for weak heads, and account for variation in the superiority effects with wh-questions based on Epstein et al.'s (2020) analysis of multiple specifiers under Minimal Search. Section 5 concludes the paper.

2 Large-scale pied-piping: A novel generalization

In some languages, an entire clause containing an interrogative pronoun can undergo movement to the licensing position of interrogative pronouns, as illustrated in Basque (1) and Imbabura Quechua (2). This phenomenon is called *large-scale pied-piping*.

(1) *[**Nor** joango d-ela]$_i$ esan du Jon-ek t_i?*
who go AUX-C say AUX John-ERG
'Who has John said will go?'
(Basque: Ortiz de Urbina 1989:248)

(2) *[**Ima**-ta wawa miku-chun-taj]$_i$ Maria t_i muna-n?*
what-ACC child eat-FIN-Q Maria want-TNS.AGR
'What does Mary want (that) the child eat?'
(Imbabura Quechua: Hermon 1984:152)

Large-scale pied-piping can also move an entire island that contains an interrogative pronoun to

a licensing position of an interrogative pronoun without inducing island effects. In (3) and (4), the relative clause, which constitutes a complex NP island, is pied-piped by the interrogative pronoun, without the island effect being obtained.

(3) *[[**Nork** idatzi zuen] liburua] irakurri du Peruk?*
who.ERG write AUX book read AUX Peter.ERG
'Who did Peter read the book that (he) wrote?'
(Basque: Ortiz de Urbina 1989:249)

(4) *[[**Ima**-ta randi-shka] runa]-ta-taj riku-rka-ngui?*
what-ACC buy-C man-ACC-Q see-PAST-2
'What did you see the man who bought (it)?'
(Imbabura Quechua: Cole 1982:24)

Interestingly, Watanabe (2004) points out that Basque and Imbabura Quechua have productive indeterminate pronouns in Kuroda's (1965) sense, which function as interrogative pronouns in the context involving interrogative force or as indefinite pronouns when a specific quantificational particle/affix is added to them.[1] A partial paradigm of indeterminate pronouns in Basque is given in (5) (see Haspelmath 1997 for the full paradigm; see Cole 1982 for Imbabura Quechua). Watanabe thus suggests the generalization in (6).

(5)

	interrogative	existential	negative polarity	free choice
person	nor	nor-bait	i-nor	edo-nor
thing	zer	zer-bait	i-zer	edo-zer
place	non	non-bait	i-non	edo-non
time	noiz	noiz-bait	i-noiz	edo-noiz

(6) Languages that allow large-scale pied-piping have productive indeterminate pronouns.

As Watanabe suggests, Old Japanese is a language of this type. He points out that Old Japanese had indeterminate pronouns, as exemplified by (7).

1. Oda (2022) calls the relevant pronouns *compositional indeterminate pronouns*, distinguishing them from Chinese-type *bare indeterminate pronouns*. See Oda (2022) for a discussion of the differences between these two types and the relevance of this distinction for the (un)availability of large-scale pied-piping. Here I use the term indeterminate pronoun for ease of presentation.

(7) . . . ***itsu-mo*** ***itsu-mo*** *hito-no* *yurusa-mu* *koto-wo-shi* *mata-mu.*
when-also when-also person-NOM accept-will word-ACC-PRT wait.for-will
'I will always wait for the woman to accept me.'
(Man'youshuu #2770, Watanabe 2004:76)

Aldridge (2009) shows that an indeterminate pronoun in Old Japanese can be embedded in an island, which is fronted to a licensing position of indeterminate pronouns in interrogatives, as seen in (8). This can be analyzed as a case of large-scale pied-piping on a par with (3) and (4).

(8) *Kono toki-fa* *[$_{adjunct\ island}$* ***ika-ni*** *si-tutu]-**ka*** *na-ga* *yo-fa* *wataru?*
this time-TOP how-DAT do-while-KA you-NOM world-TOP pass
'At this time, you pass through this world doing what?'
(Man'youshuu #892, Aldridge 2009:560)

The generalization (6) is also confirmed by Latin, which had indeterminate pronouns (see Haspelmath 1997 for the paradigm). Danckaert (2012) shows that Latin allowed large-scale pied-piping of adjunct clauses by indeterminate pronouns, as seen in (9).

(9) *[$_{adjunct\ island}$* ***Qu-am*** *utilitat-em* *aut* ***qu-em*** *fructu-m* *petent-es]*
which-ACC use-ACC or which-ACC benefit-ACC searching-NOM
sci-re *cup-imus* *illa,* *quae* *occult-a* *nobis* *sunt?*
know-PR.INF desire-PR.1PL those.ACC which.NOM hidden-NOM us.DAT be.PR.3PL
'With which goal or benefit do we desire to know those things which are hidden for us?'
(Cicero. Fin. 3.37, Danckaert 2012:173)

Bengali, which has indeterminate pronouns (see Thompson 2012), also supports the generalization. Bengali is regularly an SOV language, but an object can be moved rightward. This rightward movement is generally a marked option, but if a complement clause follows the matrix verb, it is not marked (Bayer 1996). The two possible positions of a complement clause are shown in (10).

(10) *chele-Ta {baba aS-be} jan-e na {baba aS-be}.*

boy-CF father come-FUT.3 know-3 not

'The boy doesn't know that (his) father will come.'

(Bayer 1996:254)

Interestingly, when an embedded clause contains an indeterminate pronoun that is to take scope in the matrix clause, the entire embedded clause needs to be located in the preverbal position, as shown in (11).

(11) *tumi {**ke** baRi kor-be} bhab-cho {***ke** baRi kor-be}?*

you who house make-FUT.3 think-2

'Who do you think will build a house?'

(Bayer 1996:273)

In addition, an indeterminate pronoun can be contained in an adjunct clause and be interpreted in the matrix clause without inducing the adjunct island effect, as shown in (12).

(12) *[$_{\text{adjunct island}}$ tumi **kothaY** ge-le] tomar ma khuSi hO-be?*

you where go-CPT your mother happy become-FUT.2

'Your mother will be happy if you go where?'

(Bayer 1996:283)

Simpson & Bhattacharya (2003) suggest that these data can be captured if Bengali allows large-scale pied-piping, just like Basque and Imbabura Quechua (Bayer 1996 also points out that Bengali is similar to Japanese in the relevant respects, see below for Japanese). If this is on the right track, Bengali falls under the generalization (6).

The generalization under discussion is further supported by Japanese, which has productive indeterminate pronouns and has been argued to have covert large-scale pied-piping by Nishigauchi (1990), Richards (2000), and Morita (2009). As shown in (13), wh-questions in Japanese are not subject to the complex NP island effect, similar to Basque (3) and Imbabura Quechua (4).[2]

2. Nishigauchi (1990) observes that the reason indeterminate pronoun *naze* 'why' in Japanese cannot pied-pipe an island, unlike other indeterminate pronouns, as shown in (i). See footnote 16 for an analysis.

(13) *Mary-wa [[**dare**-ga kaita] hon]-o yonda no?*

Mary-TOP who-NOM wrote book-ACC read Q

'Who did Mary read the book that (he) wrote?'

Although large-scale pied-piping voids most of the island effects, it does not void the wh-island effect. Thus, Basque does not allow pied-piping of a wh-island, as shown in (14). Crucially, as Richards (2000) points out, Japanese also disallows pied-piping of a wh-island, as seen in (15).

(14)* *[$_{wh\text{-}island}$ Nor etorriko d-en] galdetu duzu?*

who come AUX-Q asked AUX

'Who have you asked whether t has come?'

(Ortiz de Urbina 1993:197)

(15)* *John-wa [$_{wh\text{-}island}$ Mary-ga nani-o katta kadooka] shiritagatteru no?*

John-TOP Mary-NOM what-ACC bought whether want.to.know Q

'What does John want to know whether Mary bought t?'

(Richards 2000:195)

Morita (2009) provides a number of arguments for the existence of covert large-scale pied-piping in Japanese. A striking data among them is the possibility of binding a local anaphor in an embedded clause by a matrix subject. As shown in (16a), a local anaphor *kanojo-jishin* "herself" in the embedded clause cannot be bound by the matrix subject. Crucially, when the local anaphor is contained in an indeterminate phrase that takes scope in the matrix clause, it can be bound by the matrix subject, as shown in (16b).[3]

(16) a.* *Mary$_i$-wa [John-ga kanojo-jishin$_i$-no ronbun-o yonda to] shitta.*

Mary-TOP John-NOM her-self-GEN paper-ACC read C found.out

Lit: 'Mary found out that John had read herself's paper.'

(i)* *Mary-wa [[John-ga **naze** kaita] hon]-o yonda no?*
Mary-TOP John-NOM why wrote book-ACC read Q
Lit. 'Mary read the book that John wrote why?'

3. Morita (2009) uses *jibun-jishin* 'oneself' for the relevant test, but the judgment is less clear because this element can easily have a logophoric interpretation, by which a local anaphor can refer to a non-clausemate nominal. Here I use *kanojo-jishin* 'herself' to make the contrast sharper.

b. *Mary$_i$-wa [John-ga* ***dono****-kanojo-jishin$_i$-no ronbun-o yonda to] shitta no?*
Mary-TOP John-NOM which-her-self-GEN paper-ACC read C found.out Q
Lit. 'Which herself's paper did Mary found out that John had read?'

This contrast cannot be explained if the object indeterminate phrase containing the anaphor in (16b) stays in-situ. The acceptability of (16b) indicates that the indeterminate phrase undergoes covert movement to a position from which it is accessible to the matrix subject, just as the indeterminate phrases in Basque and Quechua undergo overt movement to the edge of the embedded clause.

It should be added here that Heck (2008) proposes the Edge Generalization as stated in (17).

(17) *The Edge Generalization*

If α pied-pipes β, then α must be at the edge of β.

This generalization was originally meant to apply to overt edges. As seen in Basque (1) and Imbabura Quechua (2), the indeterminate phrase that pied-pipes the embedded clause is located at the edge of the embedded clause. We can even extend this to covert edges under the copy theory of movement; namely, a copy of α needs to be at the edge of β in narrow syntax, whether this copy or the one at the bottom of the chain is realized at PF. In Basque, Imbabura Quechua, and Latin, the copy at the edge of β is pronounced, whereas in Bengali and Japanese the lowest copy is pronounced. Thus, the Edge Generalization can be generalized further under the copy theory of movement, by which covert pied-piping falls under this generalization.

At this point, I would like to note that (6) is a one-way correlation; that is, not all languages that have indeterminate pronouns allow large-scale pied-piping (e.g., Slavic languages, which have indeterminate pronouns, do not allow large-scale pied-piping). A question that arises is, then, what property is relevant for the presence/absence of large-scale pied-piping among languages with indeterminate pronouns. Notice that the Edge Generalization (17), even if it is about overt edges, does not contribute to this issue, since indeterminate pronouns in Slavic can be located at the edge of a potential pied-pipee. In fact, Slavic languages are multiple wh-fronting languages just like Basque, in which all indeterminate pronouns overtly move to the edge of the C-domain that could potentially be pied-piped. Likewise, the difference between

overt vs. covert wh-movement does not give us a right cut, since Basque and Latin are multiple-fronting languages, while Japanese is a wh-in-situ language. What can, then, be a factor that differentiates languages that allow large-scale pied-piping and those that do not?

I suggest that it is the canonical word order that matters here. Crucially, the languages that have large-scale pied-piping (i.e., Basque, Imbabura Quechua, Latin, Bengali, Old and Present Japanese) are canonically SOV languages. In contrast, those that do not have it (e.g., Slavic) are all SVO languages. Thus, I revise Watanabe's generalization (6) as (18).[4]

(18) Languages that allow large-scale pied-piping have productive indeterminate pronouns and the SOV canonical word order.

The SOV order is captured by head-finality in theoretical syntax. Crucially, the clauses that are pied-piped in the relevant languages are also head-final. Thus, the generalization (18) can be further refined in the following way:

(19) Large-scale pied-piping is possible in a language only if the language has productive indeterminate pronouns and the projection to be pied-piped is head-final.

The next question is how this new generalization can be deduced. In particular, why does the head-finality matter for the availability of large-scale pied-piping? I address this issue below. It turns out that what actually matters is not the head-finality *per se*, but the morpho-phonological weakness of head-final complementizers. I argue that the generalization in question is deduced from the nature of weak heads in general and the morpho-phonological status of head-final complementizers.

3 Deduction of the new generalization

In this section, I offer a deduction of the generalization (18). I first propose to revive a feature-percolation analysis of large-scale pied-piping under Chomsky's (2015) labeling framework, which was the standard analysis in the GB theory but has been claimed to have no theoretical status in minimalism. I then introduce Inaba's (2011) typological work, which shows that the head-directionality correlates with the morpho-phonological status of complementizers. Based

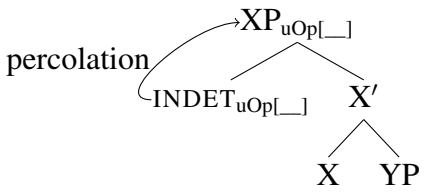
4. Note that this is also a one-way correlation; that is, there can be languages that have indeterminate pronouns and SOV word order but do not allow large-scale pied-piping. What is important here is that no language that canonically has the SVO order allows large-scale pied-piping even if it has indeterminate pronouns.

on this, I propose that there is a correlation between the syntactic and morpho-phonological status of heads, which I argue is responsible for large-scale pied-piping being available only in head-final clauses.

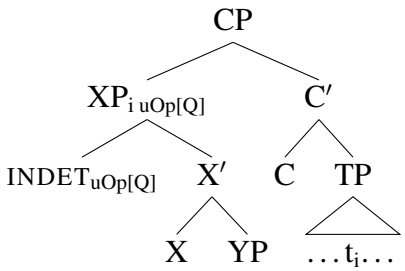
3.1 Revival of feature percolation under the labeling theory

The more or less standard line of analysis of large-scale pied-piping in the literature is a feature-percolation analysis. Under this analysis, an operator feature of an indeterminate pronoun at the specifier of XP to be pied-piped is *percolated* into XP, as a result of which XP moves to the licensing position of indeterminate pronouns (e.g., Nishigauchi 1990, Ortiz de Urbina 1989; see Heck 2008 for more references). This is schematized in (20); the operator feature of the indeterminate pronoun in Spec,XP percolates to the XP (20a) and the entire XP moves to Spec,CP instead of the indeterminate pronoun (20b), where the operator feature is valued as [Q].

(20) a.



b.



The feature percolation illustrated in (20) has been argued to have no theoretical status in the current minimalism, and in fact it is difficult to implement it under the current framework; see Heck (2008) for extensive discussion of this issue. Cable (2010) also argues that pied-piping by means of feature percolation as in (20) should be eliminated from the syntactic theory. In this subsection, however, I show that feature percolation, hence pied-piping, can actually be implemented under Chomsky's (2015) labeling framework.

Before proceeding, I would like to clarify certain properties of large-scale pied-piping. Following Saito (2017), I assume that indeterminate pronouns have an unvalued operator feature. In large-scale pied-piping cases like (1), repeated here as (21), the indeterminate pronoun *nor*, which has an unvalued operator feature, moves to the edge of the embedded CP.

(21) $[_{CP}$ ***Nor*** *joango d-ela]$_i$ esan du Jon-ek t_i?*

who go AUX-C say AUX John-ERG

'Who has John said will go?'

(Basque: Ortiz de Urbina 1989:248)

In (22), I list three important aspects of large-scale pied-piping that need to be captured.

(22) a. The indeterminate pronoun *nor* lands in the embedded Spec,CP; it does not directly move to the matrix Spec,CP. Instead, the entire embedded CP moves to the matrix Spec,CP. This means that this embedded CP has the relevant unvalued operator feature.

b. The operator feature of the indeterminate pronoun should not be valued at the embedded Spec,CP, because receiving a value in the embedded clause means that the indeterminate pronoun would take scope in the embedded CP (just as in indirect questions).

c. The operator feature of the indeterminate pronoun should be valued once the embedded CP moves to the matrix Spec,CP and has its operator feature valued. Otherwise, the operator feature of the indeterminate pronoun would remain unvalued at the end of the derivation, resulting in ill-formedness.

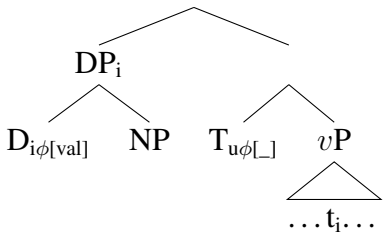
In order to address (22a) and (22b), I propose that a head that has an unvalued operator feature, which I will simply call F for ease of exposition, merges with the head of the projection to be pied-piped, e.g., the embedded CP in (21).[5] I suggest that this merger is a head-to-head adjunction as base-generation, which is implemented as External Pair-Merge in the current syntactic theory as discussed by Epstein et al. (2016). Then, External Pair-Merge of F with C creates a ⟨C, F⟩ amalgam as a complex head. Essentially, External Pair-Merge of F with C adds an unvalued operator feature to C, so that the entire CP is marked as having the operator feature, which captures (22a) (see below for a more precise implementation). At the same time, the operator feature of the ⟨C, F⟩ amalgam is unvalued, so the operator feature of the indeterminate pronoun in the specifier of ⟨C, F⟩ is not valued in this position. This captures (22b).

Turning to (22c), I suggest that this F is a weak head in Chomsky's (2015) sense, which

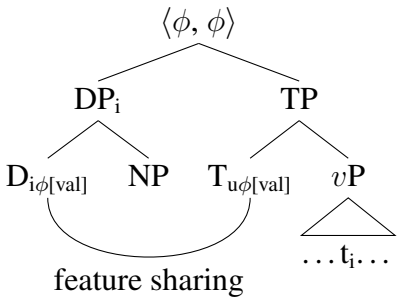
5. It is worth mentioning that Watanabe (1992) proposes that an operator that functions as WH is merged at the edge of a pied-piped clause, which is similar to what I propose here (see also Tsai 1999). See, however, footnote 18 for a discussion of an advantage of the current proposal over the Watanabe-Tsai analyses.

requires feature sharing with the head of a phrase in its specifier. In Chomsky's labeling framework, labeling of a syntactic object is not an inherent property of the syntactic object or part of Merge, unlike in earlier syntactic theories (see also Collins 2002 and Seely 2006), but it is determined by the operation *Minimal Search*, which searches the syntactic structure from the highest node. For instance, when a head X and a phrase YP are merged, X projects and provides the label for the configuration, because it is the first head that Minimal Search finds. However, Chomsky (2015) proposes that T in English is a "weak" head, in the sense that it cannot provide a label on its own. In order for the configuration {T, vP} to be labeled, a DP first moves to the specifier of T. Then, Minimal Search finds two heads, namely, D and T. In this configuration, Minimal Search finds the same feature(s) on the two heads (in this case ϕ-features), and D and T undergo *feature-sharing*, by which the unvalued ϕ-features of T are valued. As a result, the prominent shared features, in this case ϕ-features, project and provide the label for the topmost node as $\langle\phi, \phi\rangle$, and {T, vP} is labeled as TP because T is "strengthened" by feature-sharing. This is schematized in (23).[6]

(23) a.



b.

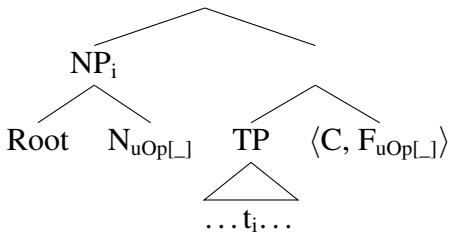


I propose that External Pair-Merge of a weak head H to a non-weak head H' makes the resulting amalgam a complex weak head (see also Section 3.2 for more discussion on this). Then, the $\langle$C, F$\rangle$ amalgam, which contains the weak head F, is a complex weak head that requires a syntactic object with an operator feature in its specifier position. The relevant derivation is given in (24). In (24a), F Externally Pair-Merges with C, which yields the $\langle$C, F$\rangle$ amalgam. This amalgam is then Externally Set-Merged with TP. Then, the indeterminate pronoun, which is NP, undergoes movement to the specifier position of the $\langle$C, F$\rangle$ amalgam. As shown in (24b), the indeterminate

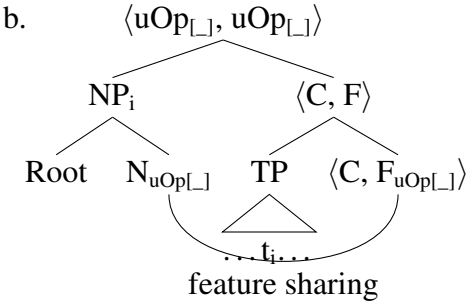
6. Chomsky argues that this deduces the EPP effect of English finite clauses; namely, T requires a specifier for the labeling reason. See also footnote 12 for more discussion.

NP and the ⟨C, F⟩ amalgam undergo feature sharing for the unvalued operator features, because Minimal Search finds N and the ⟨C, F⟩ amalgam as the first heads (note that ⟨C, F⟩ amalgam is a complex head which counts as a single unit). The shared features project and provide the label for the highest node as ⟨$uOp_{[\_]}$, $uOp_{[\_]}$⟩, and ⟨C, F⟩ projects above TP and the ⟨C, F⟩ amalgam, because it is strengthened by feature sharing, on a par with T in (23). Notice now that the entire clause is marked as having the unvalued operator features. Thus, the current proposal captures the property of large-scale pied-piping in (22a).

(24) a.



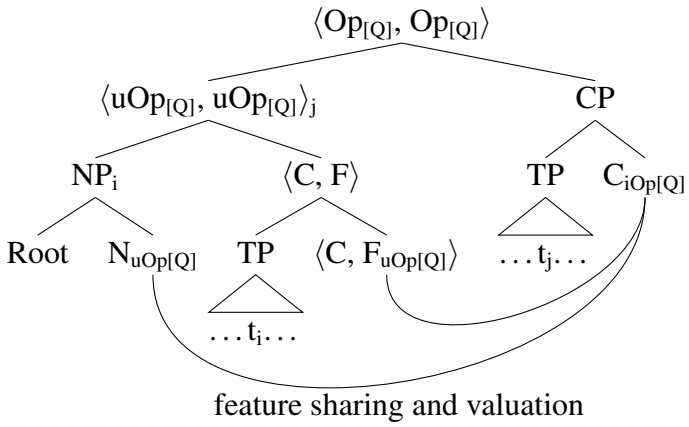
b.



Notice also that the shared features are still unvalued at this point. Thus, the entire embedded clause as a syntactic object needs to move to the matrix Spec,CP in order for its operator features to be valued, as expected in (22b).

When this embedded clause, which is now labeled as ⟨$uOp_{[\_]}$, $uOp_{[\_]}$⟩, moves to the specifier of interrogative C, Minimal Search finds N, ⟨C, F⟩, and C. Here I assume that interrogative C has a valued operator feature $iOp_{[Q]}$. Thus, N and ⟨C, F⟩ share the operator feature with C and the unvalued features of N and ⟨C, F⟩ are valued as [Q] at the same time, as illustrated in (25). Notice now that this captures (22c); namely, the operator feature of the indeterminate pronoun is valued when the operator feature of the embedded CP (i.e., the ⟨C, F⟩ amalgam) is valued.

(25)



Thus, the current proposal captures the three properties of large-scale pied-piping stated in (22). At the same time, this analysis also captures the Edge Generalization in (17); an indeterminate pronoun is necessarily located in the specifier of the (complex) head of the pied-pipee in order to undergo feature sharing of an operator feature with ⟨C, F⟩ and C.[7]

Note that this proposal captures both overt large-scale pied-piping found in, e.g., Basque and covert large-scale pied-piping found in, e.g., Japanese. The relevant operations for pied-piping illustrated in (24) take place in narrow syntax, and there is cross-linguistic variation as to which copies of the indeterminate pronoun and the pied-piped clauses are pronounced. Here I propose, building on Watanabe (2002), that the indeterminate pronoun and the pied-pipee whose highest copies are realized at PF have a focus feature (see also footnote 12 for the discussion of relevance of focus for the realization of a copy in a chain). We can thus hypothesize that in languages in which a pied-pipee moves to the matrix Spec,CP, F has both an operator feature and a focus feature. This can be supported by Old Japanese, where *ka* is used in wh-questions that involve wh-fronting as well as with focused phrases, as shown in (26), and Imbabura Quechua, where the particle *taj* found in large-scale pied-piping is also used in focused phrases (that express exclusivity), as shown in (27).

(26) a. *Kono toki-fa [ika-ni si-tutu]-**ka** na-ga yo-fa wataru?*
this time-TOP how-DAT do-while-KA you-NOM world-TOP pass
'At this time, you pass through this world doing what?'
(Man'youshuu #892, Aldridge 2009)

7. For similar ideas of determining the nature of a projection by feature sharing in other configurations, see Citko (2011) and references therein.

b. . . . *[Hatsuse-no kawa-ha ura na-mi]-**ka** fune-no yori-ko-nu?*

Hatsuse-GEN river-TOP shore absent-ness-KA boat-NOM approach-come-NEG

'Is it because Hatsuse River has no shore that no boat comes near?'

(Man'youshuu #3225, Watanabe 2002:183)

(27) a. *[Ima-ta Juan randi-shka]-ta-**taj**$_i$ ya-ngui t_i?*

what-ACC Juan bought-C-ACC-TAJ think-2

'What do you think that Juan bought?'

(Cole 1982:21)

b. *Chay-ta-**taj** muna-ni*

that-ACC-TAJ want-1

'I want that very one.'

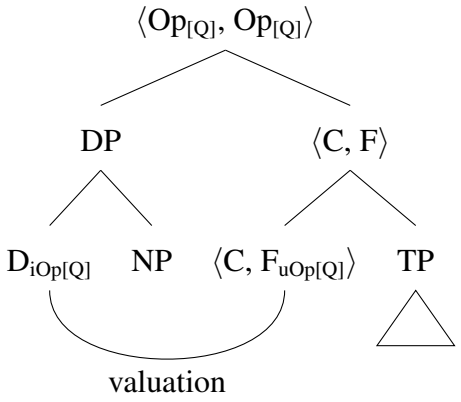
(Cole 1982:167)

In such languages, both the operator feature and the focus feature project after feature sharing, and both features are valued in the matrix Spec,CP.

I add here that the proposed system of large-scale pied-piping correctly predicts that large-scale pied-piping is only possible in languages with productive indeterminate pronouns, given Oda's (2022) work on the typology of indeterminate pronouns. Based on a large-scale typological survey, Oda (2022) establishes the generalization that languages that have productive indeterminate pronouns either lack definite articles (e.g., Japanese) or have affixal definite articles (e.g., Basque); in other words, languages with non-affixal definite articles (e.g., English) do not have productive indeterminate pronouns. Building on Talić's (2015, 2017) proposal that DP necessarily projects above NP in non-affixal article languages while it may be absent in affixal article languages and article-less languages, Oda proposes that a DP layer that has a valued operator feature iOp$_{[Q]}$ projects above an indeterminate NP in non-affixal article languages, whereby the relevant pronouns necessarily function as interrogative pronouns. Thus, in languages that lack indeterminate pronouns of the Basque/Japanese type and only have interrogative pronouns, even if F Externally Pair-Merges with C, its unvalued operator feature would be valued by the valued operator feature of the D in question via feature sharing. The entire clause would then be labeled as $\langle \text{Op}_{[Q]}, \text{Op}_{[Q]} \rangle$, which means that the clause would be

interpreted as an indirect question, as schematized in (28).

(28)



Thus, the present analysis of large-scale pied-piping tied with Oda's proposal captures the generalization that large-scale pied-piping is allowed only in languages that have indeterminate pronouns.

3.2 Weak heads as bound morphemes and head-final complementizers

A remaining question is how to explain the second part of the generalization (19), namely, the relevance of head-finality for large-scale pied-piping. Here I propose that the weakness of heads interacts with the morpho-syntactic nature of complementizers in a given language, which correlates with head-finality. The gist of the proposal is that weak heads in Chomsky's (2015) sense are morpho-phonologically weak as well, and that only head-final complementizers can be weak heads because they are morpho-phonologically weak, in contrast to head-initial complementizers.

Under the traditional Head Parameter, the choice of parameter value (i.e., head-initial or head-final) is arbitrary, and has nothing to do with the morpho-phonology of heads. However, Inaba (2011) observes an interesting correlation between headedness and morpho-phonology of heads in certain domains. Specifically, Inaba (2011) notes that head-initial complementizers are generally independent words, i.e., free morphemes, whereas head-final complementizers are generally particles or suffixes, i.e., bound morphemes.[8] A prototypical example of the former is English *that*, as shown in (29). The same observation can also be made for Twi, a Kwa language, as shown in (30). Head-final suffixal complementizers are exemplified by

8. It should be noted that this is a statistical universal, i.e., (strong) tendency. See, e.g., Richards (1999) for the head-initial complementizer *-ng* in Tagalog, which is suffixed/cliticized onto its preceding word.

Uzbek (31) and Japanese (32).[9]

(29) I think [that John is sleeping].

(30) *na ama nim [sɛ̀ kofi yɛɛ adwuma no].*
PAST Ama know C Kofi did work the
'Ama knows that Kofi had done the work.'
(Twi, Lord 1993)

(31) *Men [bu ɔdam-miŋ ǰoǰa-ni oğirla-gan-i-ni] bilaman.*
I this man-GEN chicken-OBJ steal-NOMN-3SG.POSS-OBJ know.1SG
'I know that this man stole the chicken.'
(Uzbek, Noonan 2007:96)

(32) *Boku-wa [kare-ga kuru-to] omou.*
I-TOP he-NOM come-C think
'I think that he will come.' (Japanese)

Inaba also points out that a similar pattern has actually been observed in other domains in the literature. For instance, Andrews (2007) claims that clause-final relativizers typically appear as part of the verbal morphology of the relative clause (or they have no overt form at all). Inaba takes this as indicating that clause-final functional elements are generally affixal.[10]

Turning to weak heads, in Chomsky (2015), they are weak only in a syntactic sense, that is, they cannot provide a label on their own. However, it is logically possible that syntactic properties can be reflected in the PF realization. It is also worth noting here that Chomsky suggests that labels are required for syntactic objects to be interpreted at the C-I and A-P interfaces. We

9. A reviewer points out that the Japanese complementizer *to* can be stranded as shown in (i), which could be taken as indicating that it would be a free morpheme.

(i) *Ken-wa kuru no? – __ **To** boku-wa omou yo.*
Ken-TOP come Q C I-TOP think PART
'Will Ken come? – lit. 'That (he will come), I think.'

It should, however, be noted that in such stranding cases, the complementizer (or stranding particles in general) must be focused, i.e., phonologically strengthened (Shibata 2014), which is a language-specific additional factor. Thus, the general idea that head-final complementizers are affixal is intact. (Note also that Inaba's generalization is a statistical universal; thus, there can be a head-final complementizer that is a free morpheme.)

10. Inaba's generalization regarding the morphological nature of complementizers is a statistical universal (i.e., strong tendency; cf. footnote 8). See footnote 15 on a note regarding the generalization in (19) in this respect.

can, then, hypothesize that weak heads are weak not just in the syntactic sense, but also in some interface sense. Now, let us look at weak heads proposed in the literature. Chomsky (2015) proposes that R(oot) and English T are weak heads, as seen above. Saito (2018) proposes that case suffixes in Japanese, which he analyzes as K(ase), are also weak heads. Interestingly, these elements are not free morphemes; roots and affixes.[11] The F head I have proposed above can also be considered to be a phonologically null affix that is adjoined to the head of a projection to be pied-piped. Thus, I propose the following morpho-syntactic condition:[12]

(33) Weak heads cannot be realized as free morphemes, i.e., they are morpho-phonologically weak.

The intuition here is clear; syntactically weak elements are morpho-phonologically weak as well. This is also compatible with the Distributed Morphology framework (e.g., Halle & Marantz 1993), under which relations among syntactic objects established in narrow syntax are reflected in morpho-phonology.

The next question is what counts as a weak head (i.e., a head that cannot provide a label on its own). Note that the above mentioned weak heads, T in English, K in Japanese, and F, contain an unvalued feature. T has unvalued ϕ-features, K has an unvalued Case-feature, and F

11. These elements are not prosodic words (i.e., free) on their own; e.g., *cant-a-re* 'sing' in Italian, where none of the root *cant*, the thematic vowel *a*, and the infinitive suffix *re* are prosodic words on their own. As for English, verbs such as *sing*, which are often assumed to be roots and free morphemes, are analyzed as consisting of a Root and a verbalizer *v* in the Distributed Morphology framework. Accordingly, *sing* is a realization of Root + *v*, not Root itself, and hence Root itself is not a prosodic word on its own (cf. *song*, which is a realization of the relevant Root and *n*).

12. Note that (33) is a one-way correlation; namely, not all non-prosodic morphemes are weak heads. Chomsky (2015) in fact suggests that Italian T, which is a bound morpheme, is a strong head (i.e., a head that can provide a label on its own) in contrast with English T.

However, it may actually not be impossible to strengthen (33), and hypothesize that weak heads are realized as non-prosodic morphemes and non-prosodic morphemes are weak heads in the relevant sense. As mentioned in footnote 6, Chomsky attributes the EPP effect in English to the weakness of T, i.e., T in English requires an overt specifier for a labeling reason. In contrast, Italian T does not require an overt specifier, and hence Chomsky suggests that Italian T can provide a label on its own, i.e., T in Italian is strong. There are actually two cases in which T in Italian does not have an overt specifier: a null subject and a post-verbal subject. A null subject in Italian has been standardly analyzed as *pro*, which is considered to be a phonologically null nominal phrase (see, e.g., Barbosa 2019 and references therein). Thus, we can assume that *pro* is actually present in narrow syntax and located in Spec,TP in Italian, *pace* Chomsky, who suggests that *pro* is simply the absence of a nominal element in narrow syntax. As for post-verbal subjects, it is observed that they are focalized (see, e.g., Belletti 2001, 2004). Stjepanović (1999, 2003) actually proposes that the interaction of the Nuclear Stress Rule and focus requires the lower copy of the subject to be pronounced at PF in Italian as well as in Serbo-Croatian. Italian T can, then, be analyzed as a weak head, which requires a valuer of its unvalued ϕ-features in its specifier position, just like English T. Thus, it is not implausible to strengthen (33) as a two-way correlation. A full investigation of this issue is left for future research.

has an unvalued operator feature. As for R, Roberts (2019) and Song (2019) propose that it has an unvalued categorial feature $\text{Cat}_{[\ ]}$, which is valued by a categorizer such as v, n.[13] Based on this, I propose the criterion for weak heads in (34).[14]

(34) Weak heads are heads that bear an unvalued feature when they enter into the syntactic derivation (i.e., at the point of External Merge).

Note that under the above formulation, an amalgam of heads that is created by External Pair-Merge also counts as a weak head. Thus, the ⟨C, F⟩ amalgam in (24) is a weak head under this formulation of weak heads, since F has an unvalued operator feature and the amalgam also has this feature at the point of External (Pair-)Merge.

Notice now that this theory of weak heads enables us to capture the relevance of head-finality for large-scale pied-piping, in combination with Inaba's (2011) observation. According to Inaba, head-initial complementizers are generally independent words, i.e., free morphemes. However, if F Externally Pair-Merges with a head-initial C, which is in principle possible in narrow syntax, (33) requires the ⟨C, F⟩ amalgam to be realized as a bound morpheme at PF. Under the Distributed Morphology framework, in which morpho-phonological forms of lexical items are determined based on syntactic information (i.e., Vocabulary Insertion takes place after the syntactic computation), there is generally no vocabulary item for head-initial complementizers that can be realized as a bound morpheme. This can actually be restated under the lexicalist view, where the form of syntactic objects is already specified in the numeration. For instance, suppose that English *that*, which itself is a free morpheme, enters into narrow syntactic computation, where it is Externally Pair-Merged with F and marked as a weak head as per (34) (note that this merger itself is in principle possible). At PF, however, the condition (33) is not met since *that* is a free morpheme. Thus, both the lexicalist and non-lexicalist views are compatible with the deduction discussed here. In contrast, head-final complementizers are usually bound morphemes, so that the ⟨C, F⟩ amalgam in head-final clauses can satisfy the PF requirement (33), and the derivation for large-scale pied-piping as in (24) is possible in such

13. See also Oda (2021), who proposes that the head of the coordinate structure, Conj, has an unvalued categorial feature which is valued by its conjuncts.

14. Given (34), Italian T, which Chomsky (2015) suggests is a strong head, should actually be a weak head, since it has unvalued ϕ-features. See footnote 12 for discussion.

cases. Thus, the relevance of head-finality for large-scale pied-piping in the generalization (19) can be captured by the interaction of the morpho-syntactic requirement on weak heads and morphological forms of complementizers that depend on whether they are head-initial or head-final.[15]

The analysis can be straightforwardly extended to large-scale pied-piping of islands. Let us look at Old Japanese (35), repeated from (8).

(35) *Kono toki-fa* [$_{adjunct\ island}$ *ika-ni si-tutu]-ka na-ga yo-fa wataru?*
this time-TOP how-DAT do-while-KA you-NOM world-TOP pass
'At this time, you pass through this world doing what?'
(Man'youshuu #892, Aldridge 2009:560)

Notice that *tutu* 'while', which heads the adjunct island, is a bound morpheme affixed to the verb *si* 'do'. Thus, if F (*ka* here) Externally Pair-Merges with *tutu* (which I assume to be C for ease of exposition), the ⟨C, F⟩ amalgam satisfies the condition (33). This amalgam undergoes feature sharing with the indeterminate pronoun *ika(-ni)* and the adjunct clause is pied-piped, in the same way as complement clauses are pied-piped.

Relative clauses involve a more complex derivation. Let us consider Imbabura Quechua (36), repeated from (4).

(36) *[[Ima-ta randi-shka] runa]-ta-taj riku-rka-ngui?*
what-ACC buy-C man-ACC-Q see-PAST-2
'What did you see the man who bought (it)?'
(Imbabura Quechua: Cole 1982:24)

15. There is actually room for exceptions to the generalization (19). Inaba's generalization regarding the correlation of head-directionality and the morpho-phonological status is a statistical universal, which means that there can be a language that has an affixal head-initial complementizer (though such cases are rare; see footnote 8 on Tagalog). Under the deduction of (19) offered here, if a complementizer Externally Pair-Merges with F, which bears the unvalued operator feature, the amalgam counts as a weak head as per (34), which in turn requires that the amalgam be a bound morpheme, as stated in (33). To put it differently, if the complementizer is a bound morpheme, it can Externally Pair-Merge with F and satisfy the condition (33), whether it is head-initial or head-final. It is, then, predicted that large-scale pied-piping should be in principle possible in languages that have a head-initial affixal complementizer and productive indeterminate pronouns, since such a head-initial complementizer meets the condition (33) if F Externally Pair-Merges with it. I leave investigation of this prediction for future research (note that large-scale pied-piping is a rather rare phenomenon, and only a small set of languages have been tested in this respect in the literature.)

The current proposal also leaves room for the availability of pied-piping on a smaller scale in some domains in head-initial languages; see Oda (2022) for discussion.

In (36), the relative complementizer *shka* is affixed to the verb *randi* 'buy'. Thus, if F Externally Pair-Merges with *shka*, the resulting amalgam ⟨C, F⟩ satisfies the condition (33). Note here that what is pied-piped is the entire nominal phrase, not just the relative clause. Under the current proposal, this means that the head of the nominal phrase, which I assume to be the K(ase) head *-ta*, also has an operator feature, and this operator feature is shared with the relative clause as well as the indeterminate pronoun embedded in the relative clause. The presence of the operator feature on K is implemented by External Pair-Merge of F with K, which observes the condition (33), since the K head *ta* is a bound morpheme (here F is realized as *taj*). As for the position of the relative clause, I assume, following Cinque (2013), that relative clauses are hosted in the specifier of a functional projection αP that is located between N and K. The relative clause then moves to the specifier of the ⟨K, F⟩ amalgam, and they undergo feature sharing of the operator features. The relevant structures are given in (37), where some irrelevant details are omitted.[16,17]

16. A question that arises regarding αP is how its label is exactly determined under the labeling framework adopted here. Specifically, the αP level in (37) would actually be an {XP, YP} structure (i.e., {NP, αP}), so this level should be labeled by feature sharing. The question is, then, what feature would be shared here. One possibility that I would like to suggest here is that α has the categorial feature [+N], given that it is part of the extended projections in the nominal domain (cf. Grimshaw 2000, Bošković 2014). This in turn means that F also bears the [+N] feature in the case under discussion. F and α would then undergo feature sharing of this [+N] feature, and the αP node in (37) would actually be ⟨+N, +N⟩ (cf. Citko 2011).

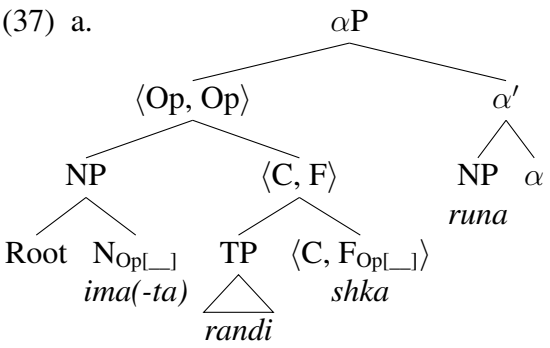
One advantage of this suggestion is that it can be extended to capture the observation noted in footnote 2 that the reason indeterminate pronoun *naze* 'why' in Japanese cannot pied-pipe an island, including relative clauses. Oda (2022) suggests that reason indeterminate pronouns are PPs rather than NPs (cf. Huang 1982, Nishigauchi 1990). Under the feature-based classification of traditional lexical categories (Chomsky 1970), P is [-N, -V]. Given that F is [+N] as suggested above, the reason indeterminate pronouns cannot undergo feature sharing of the categorial feature, hence they cannot pied-pipe an island unlike other indeterminate pronouns, which are analyzed as NPs.

17. A reviewer asks whether there is any independent evidence for the merger of F to the relevant heads. The reviewer suggests that the possible positions of the merger could be tested by presence of an overt quantificational particle such as *mo* 'also/∀' in Japanese. However, *mo* cannot be attached to the relative clause, as shown in (i).

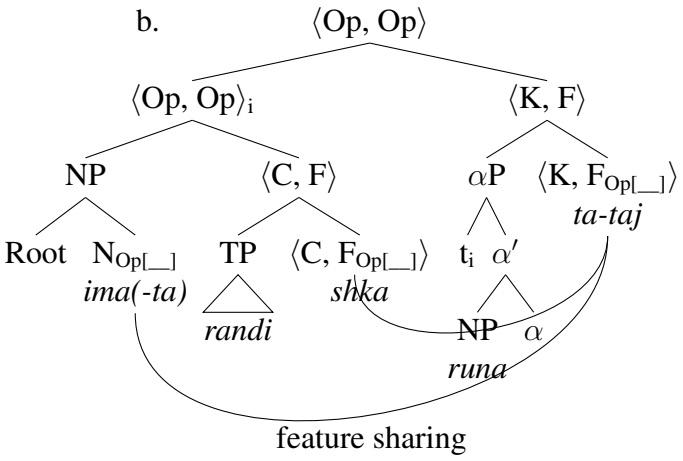
(i) *[Dare-ga kaita]{*-mo} hon]{-mo} omoshiroi.*
who-NOM wrote-∀ book-∀ interesting
'For all x, the book that x wrote is interesting.'

The unavailability of an overt quantificational particle in (i) can, though, be due to some semantic incompatibility (e.g., Yatsushiro 2009), or because the overt element closes the agreement/quantificational domain there, prohibiting further movement. The reviewer also wonders whether the Q-particle *də* in Sinhala discussed by Kishimoto (2005) signals the merger site of F, but Yang (2021) shows that the position of this particle is actually irrelevant to the syntax of wh-questions. Thus, the presence of overt particles discussed in the literature cannot necessarily be used as evidence for or against the current proposal. It remains to be seen whether F can be observed in some way, but it should also be mentioned that what F essentially does is to add to a head an unvalued operator feature, which need not necessarily be lexically realized as long as the amalgam satisfies the proposed PF requirement.

(37) a.



b.



Notice now that the entire nominal phrase is pied-piped by the indeterminate pronoun in a "roll-up" manner; the indeterminate pronoun pied-pipes the relative clause, and the relative clause pied-pipes the nominal phrase. Actually, Heck (2008) argues that this is a general property of pied-piping, as stated in (38), where a canonical position amounts to the edge of a pied-pipee.

(38) *Generalization on recursive pied-piping*

If α can pied-pipe β, and β is in a canonical position to pied-pipe γ, then α can also pied-pipe γ.

This generalization follows from the current proposal. When α pied-pipes β, α is at the edge of β and they undergo feature sharing of operator features. This β then undergoes feature sharing of operator features with γ and pied-pipes γ when β is at the edge of γ. This is the configuration of pied-piping of γ by α via β. Thus, the current proposal captures the general property of recursive pied-piping.[18]

18. The current proposal can also explain the impossibility of indeterminate pronouns being interpreted in the matrix clause in (i), where the indeterminate pronouns are embedded in a wh-island that is embedded in a relative clause.

(i) *Taro-wa [[[Hanako-ga doko-de nani-o katta ka] shitteiru] hito]-ni atta no?*
Taro-TOP Hanako-NOM where-LOC what-ACC bought Q know person-DAT saw Q
'Did Taro see a person who knows where Hanako bought what?'
NOT 'For which x, x a thing, did Taro saw a person who knows where Hanako bought x?
NOT 'For which x, x a place, did Taro saw a person who knows what Hanako bought in x?'

Under the current proposal, the operator feature of the indeterminate pronouns is given the value [Q] by *ka* and interpreted in the most embedded clause. Thus, neither *doko* 'where' nor *nani* 'what' can undergo movement to the edge of αP in order to pied-pipe the relative clause. It is worth noting here that the observation in (i) cannot be accounted for by Watanabe's (1992) proposal, in which an operator that functions as WH can be merged at the edge of a pied-pipee regardless of the position of the indeterminate pronoun. Tsai (1999) offers a proposal similar to Watanabe's, where an operator, which is responsible for the interpretation of wh-questions, can be merged at the edge of DP, i.e., the relative clause in the case of (i). Their proposals incorrectly predict that the indeterminate

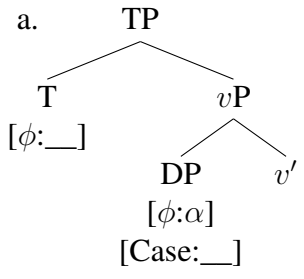
To summarize this section, I have proposed that large-scale pied-piping can be captured by a feature-percolation analysis implemented under Chomsky's (2015) labeling theory, in which a head F that has an unvalued operator feature Externally Pair-Merges with the head of the projection to be pied-piped, and F undergoes feature sharing with the head of an indeterminate pronoun that also bears an unvalued operator feature. I have then proposed the criterion of weak heads, by which weak heads are heads that bear an unvalued feature, and a morphological condition of weak heads, in which weak heads cannot be realized as free morphemes. I have argued that the generalization (19) is deduced from these two properties of weak heads in combination with the feature specification of indeterminate pronouns and Inaba's (2011) generalization that head-initial complementizers are free morphemes but head-final ones are bound morphemes.

4 Deduction of Agree from Minimal Search

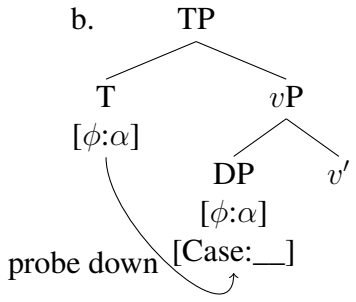
In this section, I argue that the formulation of weak heads in (34) allows us to deduce Agree from Minimal Search, which Chomsky (2013, 2015) suggests is a third factor principle external to UG.

The operation Agree, which was originally proposed by Chomsky (2000), requires an unvalued feature (i.e., probe) to c-command its valued counterpart (i.e., goal) for valuation. Refining Chomsky's Agree, Bošković (2007) proposes that movement is always driven by an unvalued feature of the moving element. To illustrate, when a DP is base-generated in Spec,vP and has an unvalued Case feature as in (39a), T first probes down the DP and has its ϕ-features valued, as shown in (39b). The DP then moves to Spec,TP, from where it can probe down T, as a result of which the Case feature of D is valued as [NOM], as seen in (39c).

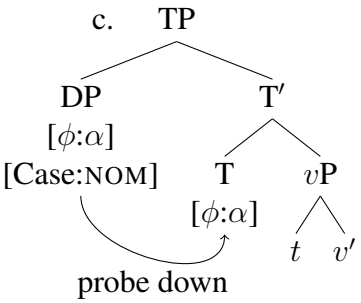
(39) a.



b.



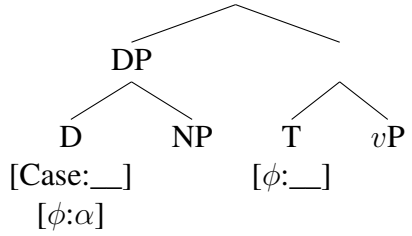
c.



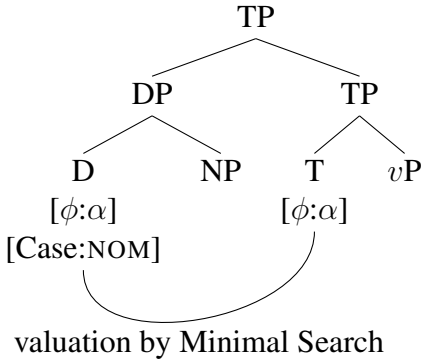
pronouns in (i) could be interpreted in the matrix clause, because the relevant operator can merge at the edge of the relative clause and pied-pipe it in (i). Thus, the current proposal is favored over those by Watanabe and Tsai. I am grateful to Mamoru Saito for pointing this out.

In the spirit of Bošković, Saito (2018) suggests, following Hisa Kitahara, that Case is valued via Minimal Search when DP is in Spec,TP. When a DP moves to Spec,TP, Minimal Search finds D and T, which have an unvalued Case feature and unvalued ϕ-features, respectively, and those features are valued against their valuer, as illustrated in (40).

(40) a.



b.



Notice that the current conception of weak heads (see (34)) allows and requires us to generalize this idea to all weak heads, namely, all unvalued features. Whenever Minimal Search finds a weak head with an unvalued feature, it seeks a head in the search domain which can value the feature via feature sharing. But when valuation is not possible, a syntactic object that immediately dominates the weak head moves to a position where Minimal Search can find a valuer of the unvalued feature of the weak head. This essentially derives the mechanism of Agree in Bošković's system, in which unvalued features always probe down and movement is driven by an unvalued feature of the moving element for probing down (note that Agree also takes place without movement when a probe finds a goal in the pre-movement structure). Crucially, however, under the current system, the valuation of all features is done by Minimal Search, which is a third factor principle outside UG according to Chomsky (2013, 2015).[19] This means that we can eliminate the operation Agree from the computational system of language, hence minimize UG.[20]

19. A reviewer suggests that Agree is not deduced from Minimal Search but from the labeling algorithm, by which the value of an unvalued feature is given via feature sharing. Note, though, that Chomsky (2013:43) suggests that what is called labeling algorithm is actually just Minimal Search (see also Epstein et al. 2020). I thus maintain that Agree is deduced from Minimal Search as discussed in the text.

20. Under the current system, it would need to be assumed that apparent "upward" valuation, i.e., valuation of a probe that is c-commanded by its goal, in general involves covert movement and pronunciation of a lower copy; e.g., ϕ-agreement between T and a post-verbal subject in Italian is analyzed as involving movement of the subject to Spec,TP and pronunciation of the lower copy. See Stjepanović (2003) and footnote 12 for relevant discussion.

This deduction of Agree also captures two conflicting ideas regarding movement driven by agreement proposed in the literature. On the one hand, as mentioned above, the current argument integrates Bošković's insight that movement is driven by a formal inadequacy of the moving element, which dates back to Move and feature-checking in early minimalism and Case Filter in the GB Theory. Essentially, under this line of movement theories, the pre-movement structure involves a problem. Resolving a problem with the base (i.e., pre-movement) structure thus motivates movement. From this perspective, as Bošković (2021) points out, Chomsky's (2013) version of labeling theory, which does not assume weak heads, can be considered to be of this type. In this version of labeling theory, movement of an external argument from Spec,vP to Spec,TP takes place in order to label the {DP, vP} structure by leaving a copy in Spec,vP that is ignored for labeling (the {DP, TP} structure is labeled by feature-sharing, but T itself does not require this movement). In other words, if the movement in question does not take place, the labeling problem in the base (i.e., pre-movement) structure would remain, which results in ill-formedness. In fact, unifying Bošković's (2007) Agree theory and Chomsky's (2013) labeling theory from the perspective discussed here, Bošković (2021) proposes that an unvalued feature on the moving element causes a labeling problem in the base structure, which then drives movement. On the other hand, movement has also occasionally been assumed to be driven by a formal requirement of the target of movement. Part of Chomsky's (2015) version of labeling theory belongs to this type, since the weak head T requires movement of DP to its (traditional) specifier position for feature-sharing. Crucially, under this version of labeling theory, in this particular case movement is solely driven by weakness of the target, not by a problem in the base-structure.[21] Attract in Chomsky (1995) and the EPP-driven movement theory in Chomsky (2000) are also of this type. The current proposal allows both types of movement, i.e., movement can be driven by a formal inadequacy of the target or the moving element, but crucially, the motivation for movement is uniform; the presence of an unvalued feature (i.e., a weak head).[22] Movement of XP can take place if the target of the movement is

21. As mentioned in footnote 12, Chomsky (2015) assumes that T in Italian is strong and hence does not require a DP in its specifier position. He actually leaves open the structure and the derivation in which an external argument does not move to Spec,TP, which would involve a {DP, vP} structure that should be unlabelable. See footnote 12 for relevant discussion.

22. The current proposal thus revives Lasnik's (1995a,b) Enlightened Self-Interest, under which movement is triggered by formal inadequacy of the moving element or its target (see Bošković 2011 for a related discussion).

a weak head, even if the XP does not have an unvalued feature. Conversely, the movement of XP can be motivated solely by an unvalued feature of the XP, even if the target has no unvalued feature. Valuation of Case in Japanese discussed by Saito (2018) falls under this. Saito assumes that T in Japanese does not have unvalued ϕ-features, unlike T in English. Under the current system, an external argument that bears an unvalued Case feature moves to Spec,TP in order for the Case feature to be valued, and T itself has no reason to attract the external argument. There is even a third possibility that the movement is driven by both the moving element and the target, if both have an unvalued feature. One such case is movement of an external argument from Spec,vP to Spec,TP in English (cf. (40)); D has an unvalued Case feature, which triggers the movement of the external argument, and T has unvalued ϕ-features that attract the external argument. In all these three cases, a weak head requires feature valuation via feature sharing under Minimal Search, for which the traditional spec-head configuration is created.

The current proposal that movement can be driven by either the target or the moving element, or both, can account for the cross-linguistic variation regarding the superiority effect in multiple wh-fronting languages. Bošković (2008) establishes the generalization that multiple wh-fronting languages without definite articles do not display superiority effects. Thus, Bulgarian, which has definite articles, shows the superiority effect as seen in (41), whereas Serbo-Croatian, which lacks definite articles, does not show the relevant effect, as shown in (42).

(41) a. ***Koj kogo*** *vižda?*
who whom sees

b.* ***Kogo koj*** *vižda?*
whom who sees
'Who sees whom?'
(Bulgarian, Rudin 1988:472-473)

(42) a. ***Ko koga*** *voli?*

who whom loves

b. ***Koga ko*** *voli?*

whom who loves

'Who loves whom?'

(Serbo-Croatian, Bošković 2002:353)

In addition, Bošković (1997a) observes that even in Bulgarian, when there are more than two indeterminate pronouns, the non-initial ones do not show the superiority effect, as shown in (43).[23]

(43) a. *Koj* ***kogo kakvo*** *e pital?*

who whom what is asked

'Who asked whom what?'

b. *Koj* ***kakvo kogo*** *e pital?*

who what whom is asked (Bulgarian: Bošković 1997a:239)

Bošković (2002) proposes that the highest indeterminate pronoun in Bulgarian undergoes movement to Spec,CP triggered by a [+wh] feature of C, which is responsible for the superiority effect, while the non-initial indeterminate pronouns in Bulgarian (see below for details) and all indeterminate pronouns in Serbo-Croatian move to a lower position. Bošković (2008) suggests that in languages with definite articles, C has a D feature, which drives the movement of an indeterminate pronoun to Spec,CP.

It should be noted first that this explanation is difficult to implement in frameworks such as Bošković's (2007), in which movement is solely driven by an unvalued feature of the moving element. Crucially, in such frameworks, the target of movement has no relevance to the move-

23. Note that *kogo* 'whom' and *kakvo* 'what' show the superiority effect in the absence of *koj* 'who', as shown in (i).

(i) a. ***Kogo kakvo*** *e pital Ivan?*
whom what is asked Ivan
'Who did Ivan ask what?'
b.* ***Kakvo kogo*** *e pital Ivan?*
what who is asked Ivan
(Bošković 1997a:239)

ment. Therefore, even if C has a D feature as Bošković (2008) assumes, it simply probes down a DP in its c-commanding domain and has its D feature valued against it (and the DP need not in principle be an indeterminate pronoun). The highest indeterminate pronoun then moves to Spec,CP due to its operator feature, independently of the D feature of the C head (note that the D feature of DP is naturally assumed to be inherently valued and hence does not trigger movement). Thus, the D feature on C cannot drive movement of the highest indeterminate pronoun to Spec,CP, *contra* Bošković's (2008) account. It is then unclear why C "attracts" the highest indeterminate pronoun in Bulgarian under the moving-element-driven systems such as Bošković's (2007).

On the other hand, the current proposal can capture the movement in question, if we assume, based on Bošković (2008), that the D feature of the C head is an unvalued feature and hence this C head is a weak head. Under this assumption, the C head requires a syntactic object that can value its D feature to be in its specifier position, just like Chomsky's (2015) weak T in English. At the same time, the highest indeterminate pronoun also has an unvalued operator feature, so that it also needs to move to a position where Minimal Search can find a head that can give a value to the operator feature. Thus, both the moving element and the target of the movement have a reason to undergo/attract movement in this case.

A remaining question is how the non-initial indeterminate pronouns in Bulgarian and all indeterminate pronouns in Serbo-Croatian undergo movement to a position where the operator feature is valued, without inducing the superiority effect. I argue that Epstein et al.'s (2020) implementation of Minimal Search in multiple-specifier configurations can be extended to account for the lack of the superiority effect in the cases in question. Epstein et al. (2020:6) propose a principle of unique identification as in (44).

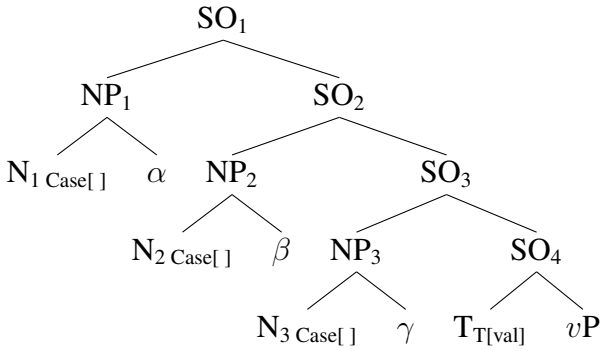
(44) "Multiple-specifier" configurations appear iff Minimal Search finds one and only one valuing head per agreement-relation; that is, for each unvalued feature *uF-valuee*, there is one and only one valued feature *vF-valuer*.

(44) essentially states that a head can have multiple specifiers iff the head does not have an unvalued feature (that would be valued by the features in the specifiers). To see how this works, let us look at a multiple nominative construction in Japanese in (45).

(45) *Bunmeikoku-ga* *dansei-ga* *heikin-jumyou-ga* *mijikai.*
civilized.country-NOM male-NOM average-life.span-NOM short.PRES
'It is in civilized countries that male's average life span is short.'

The relevant structure of (45) is schematized in (46).[24]

(46)



In the case of the Japanese multiple nominative constructions, each N has an unvalued Case feature, and there is one and only one valuer for it, namely, (the Tense feature of) T. T in Japanese, on the other hand, is assumed to lack unvalued ϕ-features, so there is no feature that needs to be valued on T. This is contrasted with English, in which multiple nominative constructions are disallowed. Note that English T has unvalued ϕ-features. Thus, although the Case features of the Ns have one and only one valuer (i.e., the Tense feature of T), Minimal Search finds three valuers for the ϕ-features of T, i.e., N_1, N_2, and N_3. Thus, an English multiple nominative construction would violate the uniqueness condition (44), resulting in ill-formedness of the construction.[25]

Let us now turn to the variation regarding the superiority effects discussed above. The gist of my proposal here is that the superiority effect arises if hosting more than one syntactic object violates the uniqueness principle in (44). Let us first consider the superiority effect in languages like Bulgarian. I assume, following Bošković (2008), that C has an unvalued D feature in languages with definite articles such as Bulgarian. The C head in those languages cannot then host more than one specifier, because C has an unvalued D feature, which requires one and only one valuer as per (44). Thus, only one indeterminate pronoun moves to Spec,CP.

24. Epstein et al. assume that N is the highest head of each nominal phrase in Japanese. The discussion here is intact if K is the highest head of nominal phrases in Japanese as Saito (2018) assumes.
25. Here I omit some technical details that are irrelevant to the present discussion; see Epstein et al. (2020) for them.

Now, the subject indeterminate phrase 'who' asymmetrically c-commands, hence is higher than, the object indeterminate phrase 'what'.[26] Given the derivational feature-based relativized minimality proposed by Maeda (2010), by which a syntactic object cannot move across another syntactic object that shares the same type of feature (cf. Rizzi 2004), the higher syntactic object, but not the lower one, can move to Spec,CP. Thus, we obtain the superiority effect in multiple wh-fronting in languages like Bulgarian.

Turning to multiple wh-fronting in languages like Serbo-Croatian which do not show the superiority effect, a number of authors have proposed that those indeterminate pronouns that do not show the superiority effect move to a position lower than Spec,CP (see, e.g., Bošković 1997b, 2002, 2008, Lambova 2001, Stjepanović 1999, among others). In addition, it has been argued that multiple wh-fronting essentially involves focus movement (e.g., Bošković 2002, Horvath 1996, Izvorski 1995, É Kiss 1995, Lambova 2001, Rochemont 1986, Stepanov 1998, Stjepanović 1999). Based on these, I suggest that indeterminate pronouns in the cases in question move to Spec,FocP, a position lower than Spec,CP in the left periphery (cf. Rizzi 1997). I also assume that Foc has a valued Focus feature, and that this feature can value an unvalued focus feature and an unvalued operator feature (the latter as [Q], just as T values Case as [Nom]). Crucially, Foc does not have an unvalued feature, and hence is a strong head under the current system, unlike C in Bulgarian (or multiple wh-fronting languages with definite articles in general), which has an unvalued D feature and hence is a weak head. Interestingly, Bošković (2001a,b, 2002) suggests that interrogative C in Bulgarian is a PF affix, whereas that in Serbo-Croatian is not. This is motivated by the observation that Bulgarian C needs to be adjacent to a verbal element (i.e., a verbal element needs to move to C as a host of C), whereas Serbo-Croatian C (which is Foc here) does not, as shown in (47). This is straightforwardly captured by the current proposal, since Bulgarian C is a weak head that bears an unvalued D feature and hence must be realized as a bound morpheme as per (33), whereas Serbo-Croatian C (or Foc) is a strong head that does not bear the D feature and hence is not subject to the condition (33).[27]

26. See Oda (2022) for the calculation of closeness based on Epstein et al.'s (2020) path-based theory of Minimal Search. Here I use the traditional c-command-based calculation for ease of presentation.

27. English interrogative C can also be analyzed as an affix just like Bulgarian C, since it requires *do*-support in matrix questions (i.e., it requires a host for affixation; see in fact Bošković 2000). Note that English multiple wh-questions are subject to the superiority effect, and hence can be analyzed in the same way as multiple wh-fronting in Bulgarian.

(47) a.* *Kakvo* (C) *toj dade na Petko?*

what C he gave to Petko

'What did he give to Petko?' (Bulgarian)

b. *Kakvo dade toj na Petko?*

what gave+C he to Petko (Bulgarian)

c. *Šta* (C) *on dade Ivanu?*

what C he gave Ivan

'What did he give to Ivan?' (Serbo-Croatian)

(Bošković 2001a:4)

Let us now consider the derivation of multiple wh-fronting without the superiority effect. When there are two candidates for Internal Merge, the higher one moves to Spec,FocP. Then, the non-initial indeterminate pronoun undergoes Internal Merge to Spec,FocP. Interestingly, the relative height of the indeterminate pronouns in Spec,FocP does not matter, because (44) merely constrains the possibility of multiple specifiers and does not refer to their relative height.[28] Whether the non-initial indeterminate pronoun moves to the outer or inner specifier of Foc, each indeterminate pronoun has one and only one valuer for the operator feature and the focus feature (i.e., Foc) and Foc does not have an unvalued feature to be valued, just like the multiple nominative construction in Japanese in (46).[29] Thus, the superiority effect can be analyzed as a matter of labeling of the structure after Internal Merge of relevant syntactic objects.[30]

This analysis can be extended to the non-initial indeterminate phrases in Bulgarian, which

28. Note that Maeda's (2010) derivational relativized minimality also concerns the relative positions in the base structure, not in the landing site.

29. Bošković (2002) observes that multiple wh-fronting in Serbo-Croatian shows the superiority effect when the overt Q-particle *li* is present, as seen in (i).

(i) a. *Ko* ***li*** *koga voli?*
who C what loves
'Who loves what?'
b.* *Koga* ***li*** *ko voli?*
what C who loves

This can be captured if we analyze *li* as a weak head with some unvalued feature. In fact, *li* is a second position clitic, which is morphologically dependent on the first element in the sentence (see Bošković 2001b for detailed discussion of the property of *li*). The superiority effect shown in (i) can then be accounted for on a par with that in Bulgarian.

30. Based on a typological correlation between multiple wh-fronting and indeterminate pronouns, Oda (2022) suggests that multiple wh-questions in Japanese can be analyzed in a similar way to multiple wh-fronting in Serbo-Croatian, the difference being whether the movement is covert or overt. See Oda (2022) for discussion.

do not show the superiority effect on a par with indeterminate pronouns in Serbo-Croatian (cf. (43)). Interestingly, Lambova (2001) proposes that the non-initial indeterminate phrases in Bulgarian move to Spec,FocP (while the highest indeterminate phrase moves to Spec,CP).[31] We can then maintain that just as in Serbo-Croatian, each of the non-initial indeterminate phrases in Bulgarian that are located in Spec,FocP finds one and only one valuer of the operator feature, i.e., Foc. Crucially, Foc in Bulgarian can be assumed to be a strong head (i.e., it does not bear an unvalued feature) just like Foc in Serbo-Croatian, so that the superiority effect does not arise for the reason discussed above for Serbo-Croatian.[32]

To summarize this section, I have argued for a deduction of Agree from Minimal Search given the proposal that weak heads are heads that have an unvalued feature at the point of External Merge, capturing two conflicting views on agreement in a uniform manner. I have then proposed that this deduction enables us to account for the variation regarding superiority effects in multiple wh-fronting by adopting Epstein et al.'s (2020) uniqueness principle for Minimal Search.

5 Conclusion

In this paper, I have discussed how weakness of heads in Chomsky's (2015) labeling theory is determined and is related to the interfaces, from the perspective of the typology of large-scale pied-piping. In particular, I have established the novel typological generalization that large-scale pied-piping is only possible with head-final clauses in languages with indeterminate pronouns. To deduce this generalization, I have proposed a labeling-theoretic implementation of feature percolation analysis of large-scale pied-piping. In particular, I have proposed that

31. Lambova actually calls the relevant projection ΔP, but practically it is equivalent to FocP in the current proposal.

32. Movement of the non-initial indeterminate pronouns to Spec,FocP in Bulgarian violates the Cycle, since it takes place after the movement of the highest indeterminate pronoun. One possibility to circumvent this issue is to define the Cycle by phases (Chomsky 2000, 2008); e.g., movements within a single phase count as cyclic regardless of the order of the movements. Under Bošković's (2014) contextual approach to phasehood, the highest phrase in the left periphery, i.e., CP, would count as a phase in the C-domain. CP and FocP are then within one phase, so that the movements in question take place within a "single phase cycle" and hence do not violate the cycle.

It is worth adding here that there are actually proposals that violate the Cycle in the traditional sense. For instance, Richards (2001) proposes tucking-in, where non-initial indeterminate pronouns target a position lower than the highest one. Chomsky (2008) proposes that an external argument moves to Spec,TP after C enters the structure and T inherits ϕ-features from C. Extending this to the case under discussion, we can propose that non-initial indeterminate pronouns move to Spec,FocP after C enters the structure and, say, a (valued) focus feature is inherited from C to Foc.

weak heads cannot be realized as free morphemes, and that heads that have an unvalued feature when they enter into the syntactic derivation are weak heads. Combined with the proposal that a head F with an unvalued operator feature can Externally Pair-Merge with C, this conception of weak heads only allows head-final complementizers, which are generally bound morphemes according to Inaba (2011), to be involved in large-scale pied-piping. As a consequence of the current proposal regarding weak heads, I have further argued that the operation Agree can be eliminated from the computational system of language (i.e., UG is minimized), and that Epstein et al.'s (2020) treatment of multiple-specifier configurations under Minimal Search can be extended to capture variation regarding the superiority effect in multiple wh-fronting.

References

Aldridge, Edith. 2009. Short wh-movement in Old Japanese. In Shoishi Iwasaki, Hajime Hoji, Patricia M. Clancy & Sung-Ock S. Sohn (eds.), *Japanese/Korean linguistics 17*, 549–563. Stanford, CA: Center for the Study of Langauge and Information.

Andrews, Avery. 2007. Relative clauses. In Timothy Shopen (ed.), *Language typology and syntactic description*, vol. II, 206–236. Cambridge: Cambridge University Press.

Barbosa, Pilar P. 2019. *pro* as a minimal nP: Toward a unified approach to pro-drop. *Linguistic Inquiry* 50(3). 487–526.

Bayer, Josef. 1996. *Directionality and Logical Form*. Dordrecht: Kluwer.

Belletti, Adriana. 2001. 'Inversion' as focalization. In Aafke Hulk & Jean-Yves Pollock (eds.), *Inversion in Romance and the theory of universal grammar*, 60–90. Oxford: Oxford University Press.

Belletti, Adriana. 2004. Aspects of the low IP area. In Luigi Rizzi (ed.), *The structure of CP and IP*, 16–51. Oxford: Oxford University Press.

Bošković, Željko. 1997a. On certain violations of the Superiority Condition, AgrO, and economy of derivation. *Journal of Linguistics* 33(2). 227–254.

Bošković, Željko. 1997b. Superiority effects with multiple *wh*-fronting in Serbo-Croatian. *Lingua* 102(1). 1–20.

Bošković, Željko. 2000. Sometimes in [Spec, CP], sometimes in situ. In Roger Martin, David Michaels & Juan Uriagereka (eds.), *Step by step*, 53–156. Cambridge, Massachusetts: MIT

Press.

Bošković, Željko. 2001a. On the interpretation of multiple questions. *Linguistic Variation Yearbook* 1. 1–15.

Bošković, Željko. 2001b. *On the nature of the syntax-phonology interface: Cliticization and related phenomena*. Amsterdam: Elsevier Science.

Bošković, Željko. 2002. On multiple wh-fronting. *Linguistic Inquiry* 33(3). 351–383.

Bošković, Željko. 2007. On the locality and motivation of Move and Agree: An even more minimal theory. *Linguistic Inquiry* 38(4). 589–644.

Bošković, Željko. 2008. What will you have, DP or NP? In Emily Elfner & Martin Walkow (eds.), *Proceedings of North East Linguistic Society 37*, 101–114. University of Massachusetts, Amherst: GLSA.

Bošković, Željko. 2011. Last Resort with Move and Agree in derivations and representations. In Cedric Boeckx (ed.), *The Oxford handbook of linguistic minimalism*, 327–353. Oxford: Oxford University Press.

Bošković, Željko. 2014. Now I'm a phase, now I'm not a phase: On the variability of phases with extraction and ellipsis. *Linguistic Inquiry* 45(1). 27–89.

Bošković, Željko. 2021. Merge, Move, and contextuality of syntax: The role of labeling, successive-cyclicity, and EPP effects. Ms., Univesity of Connecticut, Storrs.

Cable, Seth. 2010. *The grammar of Q: Q-particles, wh-movement and pied-piping*. Oxford: Oxford University Press.

Chomsky, Noam. 1970. Remarks on nominalization. In J. Jacobs & P. Rosenbaum (eds.), *Readings in English transformational grammar*, 184–221. Waltham, Massachusetts: Ginn.

Chomsky, Noam. 1995. *The minimalist program*. Cambridge, MA: MIT Press.

Chomsky, Noam. 2000. Minimalist inquiries. In Roger Martin, David Michaels & Juan Uriagereka (eds.), *Step by step: Essays on minimalist syntax in honor of Howard Lasnik*, 89–155. Cambridge, MA: MIT Press.

Chomsky, Noam. 2008. On phases. In Robert Freidin, Carlos P. Otero & Maria Luisa Zubizarreta (eds.), *Foundational issues in linguistic theory: Essays in honor of Jean-Roger Vergnaud*, 291–321. Cambridge, MA: The MIT Press.

Chomsky, Noam. 2013. Problems of projection. *Lingua* 130. 33–49.

Chomsky, Noam. 2015. Problems of projection: Extensions. In Elisa Di Domenico, Cornelia Hamann & Simona Matteini (eds.), *Structures, strategies and beyond: Studies in honour of Adriana Belletti*, 3–16. Amsterdam: John Benjamins.

Cinque, Guglielmo. 2013. *Typological studies: Word order and relative clauses*. London/New York: Routledge.

Citko, Barbara. 2011. *Symmetry in syntax: Merge, Move, and Labels*. Cambridge: Cambridge University Press.

Cole, Peter. 1982. *Imbabura Quechua*. Amsterdam: North-Holland.

Collins, Chris. 2002. Eliminating labels. In Samuel D. Epstein & Daniel Seely (eds.), *Derivation and explanation in the minimalist program*, 43–64. Oxford: Blackwell.

Danckaert, Lieven. 2012. *Latin embedded clauses: The left periphery*. Amsterdam: John Benjamins.

É Kiss, Katalin. 1995. *Discourse configurational languages*. Oxford: Oxford University Press.

Epstein, Samuel D., Hisatsugu Kitahara & Daniel Seely. 2016. Phase cancellation by external pair-merge of heads. *The Linguistic Review* 33(1). 87–102.

Epstein, Samuel D., Hisatsugu Kitahara & Daniel Seely. 2020. Unifying labeling under minimal search in "single-" and "multiple-specifier" configurations. *Coyote Papers: Working Papers in Linguistics, Linguistic Theory at the University of Arizona* 22. 1–11.

Grimshaw, Jane. 2000. Locality and extended projections. In Hans Bennis, Martin Everaert & Eric Reuland (eds.), *Lexical specification and insertion*, 183–207. Amsterdam: John Benjamins.

Halle, Morris & Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In Kenneth Hale & Samuel Jay Keyser (eds.), *The view from Building 20: Essays in linguistics in honour of Sylvain Bromberger*, 111–176. Cambridge, MA: The MIT Press.

Haspelmath, Martin. 1997. *Indefinite pronouns*. Oxford: Oxford University Press.

Heck, Fabian. 2008. *A theory of pied-piping*. Mouton de Gruyter.

Hermon, Gabriella. 1984. *Syntactic modularity*. Dordrecht: Foris.

Horvath, Julia. 1996. *Focus in the theory of grammar and the syntax of Hungarian*. Dordrecht:

Foris.

Huang, C.-T. James. 1982. *Logical relations in Chinese and the theory of grammar*. Cambridge, MA: Massachusetts Institute of Technology dissertation.

Inaba, Jiro. 2011. The morphosyntax of constituent ordering patterns. *The Hiroshima University studies, Graduate School of Letters* 71. 43–72.

Izvorski, Roumyana. 1995. Wh-movement and focus-movement in Bulgarian. In Regine Eckardt & Veerle van Greenhoven (eds.), *Proceedings of ConSOLE II*, 54–67. The Hague: Holland Academic Graphics.

Kishimoto, Hideki. 2005. Wh-in-situ and movement in Sinhala questions. *Natural Language and Linguistic Theory* 23(1). 1–51.

Kuroda, S.-Y. 1965. *Generative grammatical studies in the Japanese language*. Cambridge, MA: Massachusetts Institute of Technology dissertation.

Lambova, Mariana. 2001. On A-bar movements in Bulgarian and their interaction. *The Linguistic Review* 18(4). 327–374.

Lasnik, Howard. 1995a. Case and expletives revisited: On greed and other human failings. *Linguistic Inquiry* 26(4). 615–634.

Lasnik, Howard. 1995b. Last Resort. In Shosuke Haraguchi & Michio Funaki (eds.), *Minimalism and linguistic theory*, 1–32. Tokyo: Hituzi Syobo.

Lord, Carol. 1993. *Historical change in serial verb constructions*. Cambridge: Cambridge University Press.

Maeda, Masako. 2010. The criterial freezing effect and split A′-movement. *English Linguistics* 27(2). 270–296.

Morita, Hisashi. 2009. Covert pied-piping in Japanese *wh*-questions. *English Linguistics* 26(2). 374–393.

Nishigauchi, Taisuke. 1990. *Quantification in the theory of grammar*. Dordrecht: Kluwer.

Noonan, Michael. 2007. Complementation. In Timothy Shopen (ed.), *Language typology and syntactic description vol. II, complex constructions*, 52–150. Cambridge: Cambridge University Press.

Oda, Hiromune. 2021. Decomposing and deducing the Coordinate Structure Constraint. *The*

Linguistic Review 38(4). 605–644.

Oda, Hiromune. 2022. *The NP/DP-language distinction as a scale and parameters in minimalism*. Storrs: University of Connecticut dissertation.

Richards, Norvin. 1999. Complementizer cliticization in Tagalog and English. In Carolyn Smallwood & Catherine Kitto (eds.), *Toronto working papers in linguistics 16, vol. 2: Proccedings of the sixth meeting of the Austronesian Formal Linguistics Association*, 297–312. Toronto: University of Toronto.

Richards, Norvin. 2000. An island effect in Japanese. *Journal of East Asian Linguistics* 9. 187–205.

Richards, Norvin. 2001. *Movement in language: interactions and architectures*. Oxford: Oxford University Press.

Rizzi, Luigi. 1997. The fine structure of the left periphery. In Liliane Haegeman (ed.), *Elements of grammar*, 281–337. Dordrecht: Kluwer Academic Publishers.

Rizzi, Luigi. 2004. On the cartography of Syntactic Structures. In Luigi Rizzi (ed.), *The structure of CP and IP*, 3–15. Oxford: Oxford University Press.

Roberts, Ian. 2019. *Parameter hierarchy and Universal Grammar*. Oxford: Oxford University Press.

Rochemont, Michael. 1986. *Focus in generative grammar*. Amsterdam, The Netherlands: John Benjamins Publishing Company.

Rudin, Catherine. 1988. On multiple questions and multiple wh-fronting. *Natural Language and Linguistic Theory* 6. 445–501.

Saito, Mamoru. 2017. Japanese wh-phrases as operators with unspecified quantificational force. *Language and Linguistics* 18(1). 1–25.

Saito, Mamoru. 2018. Kase as a weak head. In Laura Kalin, Ileana Paul & Jozina Vander Klok (eds.), *Heading in the right direction: Linguistic treats for Lisa Travis, mcgill working papers in linguistics 25.1*, 382–390. Montreal: McGill University.

Seely, Daniel. 2006. Merge, derivation, c-command, and subcategorization in a label-free syntax. In Cedric Boeckx (ed.), *Minimalist essays*, 182–217. Amsterdam: John Benjamins.

Shibata, Yoshiyuki. 2014. A phonological approach to particle stranding ellipsis in Japanese.

Poster presented at *Formal* Approaches to Japanese Linguistics 7, National Institute for Japanese Language and Linguistics and International Christian University, Tokyo, Japan, June 27-29.

Simpson, Andrew & Tanmoy Bhattacharya. 2003. Obligatory overt wh-movement in a wh-in-situ language. *Linguistic Inquiry* 34(1). 127–142.

Song, Chenchen. 2019. *On the formal flexibility of syntactic categories*. Cambridge: University of Cambridge dissertation.

Stepanov, Arthur. 1998. On Wh-fronting in Russian. In Pius N. Tamanji & Kiyomi Kusumoto (eds.), *Proceedings of the north east linguistic society*, 453–468. University of Toronto: Graduate Linguistic Student Association.

Stjepanović, Sandra. 1999. *What do second position cliticization, scrambling, and multiple* wh-*fronting have in common?* Storrs: University of Connecticut dissertation.

Stjepanović, Sandra. 2003. A word order paradox resolved by copy deletion at PF. *Linguistic Variation Yearbook* 3. 139–177.

Talić, Aida. 2015. Adverb extraction, specificity, and structural parallelism. *The Canadian Journal of Linguistics* 60(3). 417–454.

Talić, Aida. 2017. *From A to N and back: Functional and bare projections in the domain of N and A*. Storrs: University of Connecticut dissertation.

Thompson, Hanne-Ruth. 2012. *Bengali*. Amsterdam/Philadelphia: John Benjamins.

Tsai, Wei-Tien Dylan. 1999. On lexical coutresy. *Journal of East Asian Linguistics* 8(1). 39–73.

Ortiz de Urbina, Jon. 1989. *Parameters in the grammar of Basque*. Dordrecht: Foris.

Ortiz de Urbina, Jon. 1993. Feature percolation and clausal pied-piping. In José Ignacio Hualde & Jon Ortiz de Urbina (eds.), *Generative studies in Basque linguistics*, 189–219. Amsterdam: John Benjamins.

Watanabe, Akira. 1992. Wh-in-situ, subjacency, and chain formation. In *MIT occasional paper in Linguistics 2*, Department of Linguistics and Philosophy, MIT: MITPWL.

Watanabe, Akira. 2002. Loss of overt wh-movement in Old Japanese. In David Lightfoot (ed.), *Syntactic effects of morphological change*, 179–195. Oxford: Oxford University Press.

Watanabe, Akira. 2004. Parametrization of quantificational determiners and head-internal rel-

atives. *Language and Linguistics* 5. 59–97.

Yang, Muyi. 2021. A phase-based analysis of Sinhala Q-particle: New evidence from focus and verbal morphology. Ms., University of Connecticut, Storrs.

Yatsushiro, Kazuko. 2009. The distribution of quantificational suffixes in Japanese. *Natural Language Semantics* 17(2). 141–173.