ON LABELING: IMPLICATIONS FOR MOVEMENT

A DISSERTATION PRESENTED

by

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Abstract

This thesis explores a new labeling mechanism within the Minimalist Framework, investigating both its theoretical and empirical consequences. More precisely, this thesis addresses two controversial questions within labeling theory: (i) how XP-YP configurations are labeled and (ii) how the (in)visibility of lower copies of a phrase is derived with respect to labeling. We demonstrate that the proposed labeling mechanism offers a principled account of a wide range of movement phenomena such as stranding/pied-piping.

In Chapter 1, after providing an overview of the history of the discussions concerning labels in Chomsky (1995a, b and his subsequent works), we present some problems of his latest study on labeling, particularly Chomsky (2013, 2015), by contrasting it with Mizuguchi's (2019) alternative labeling system. Then, we demonstrate

certain issues to be clarified under their labeling systems by considering the distribution of the *wh*-associated *exactly*, which sets the stage for proposing a new labeling mechanism. We propose that labeling applies upon transfer to the phasal complement in a bottom-up fashion. In our proposal, ambiguous labeling of an XP-YP configuration is possible, but if one of its constituents is a lower copy of a phrase, then the other is designated as the label of the set. Moreover, we propose that copy invisibility to labeling can be attributed to the timing of the label determination of copies: the determination of the label of copies is put off and the copies receive the same label across the board when bottom-up labeling detects the topmost copy in the transfer domain. We argue that this across-the-board labeling to copies follows from economy considerations: it minimizes the number of applications of search and labeling.

The subsequent chapters of this thesis explore the consequences of our proposed labeling mechanism, focusing on movement phenomena.

Chapter 2 mainly concerns stranding phenomena. Under our proposal, a set forming an XP-YP configuration is labeled ambiguously while when one of the two constituents forming the set undergoes Internal Merge (IM), the other is unambiguously selected as the label of the set. The outcomes of labeling are subsequently evaluated and interpreted at the interfaces. Given our proposal, it is predicted that if the XP label of {XP, YP} is required at the conceptual-intentional (CI) interface and XP undergoes IM out of the set, the labeled outcome is ruled out because of a violation of the interface condition. On the other hand, when the entire set stays in situ or undergo IM as a single unit, the labeled outcome is ruled in because XP can become the label of the set so that the interface condition is met. Chapter 2 demonstrates that this prediction is correct through the analysis of three phenomena: (i) the *wh*-associated *exactly*-stranding, (ii) quantifier float and (iii) VP-adverb-stranding VP-preposing. We also show that our approach to *exactly*-

stranding is more adequate theoretically and empirically than a previous study, Zyman (2022). In addition, we demonstrate that our labeling-based analysis of quantifier float provides a theoretical explanation for Bošković's (2004: 685) generalization that quantifiers cannot be floated in θ-positions. Moreover, we also discuss VP-adverb-stranding VP-ellipsis in comparison to the cases of VP-preposing in terms of labeling.

Chapter 3 is primarily dedicated to pied-piping phenomena in which the entire XP-YP configuration undergoes IM. This thesis proposes that copies of an SO are assigned the same label within a single transfer domain in an across-the-board manner. This suggests that if the copies are separated by a transfer domain, they can be labeled differently; otherwise, they cannot. Chapter 3 first analyzes massive pied-piping as a phenomenon in which the copies of {XP, YP} satisfy more than one criterion by receiving different labels. Though this approach would face the issue of criterial freezing (Rizzi (2006)) in the sense that we assume that the massively pied-piped phrase undergoes IM to criterial positions twice, adopting Maeda's (2019) feature-relativized criterial freezing, we argue that this in fact does not pose any problem for our proposal. Subsequently, we account for such constructions as degree fronting, exclamatory constructions and discontinuous spellout. In these cases, the copies of {XP, YP} are analyzed as labeled differently so that the verb's selectional requirement is met in the original position and the criterial requirement is satisfied in the final landing site.

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Chapter 1

Introduction

1.1. The Goal of This Thesis

This thesis explores a new labeling mechanism within the Minimalist Framework, investigating both its theoretical and empirical consequences. More precisely, this thesis addresses two controversial questions within labeling theory: (i) how XP-YP configurations are labeled and (ii) how the (in)visibility of lower copies of a phrase is derived with respect to labeling. We demonstrate that the proposed labeling mechanism offers a principled account of a wide range of movement phenomena such as stranding/pied-piping.

1.2. The History of Labeling in Generative Grammar

Under the Minimalist Program, the structure-building operation, called *Merge*, is assumed to be the simplest operation, which applies to two syntactic objects (SOs) α and β to form a new SO, a set of {α, β}, where α and β may be lexical items (LIs) or the outputs of Merge.[1] In order for the resulting SO to be properly interpreted at the interfaces, it must somehow identify the type that it belongs to in interface-significant senses; for this purpose, SOs are assumed to be given *labels*.

In this section, after providing an overview of the history of the discussions concerning labels in Chomsky (1995a, b and his subsequent works), we present some problems of his latest study on labeling, particularly Chomsky (2013, 2015), by

contrasting it with Mizuguchi's (2019) alternative labeling system. Chomsky (2013, 2015) and Mizuguchi (2019) are notably crucial for the current discussion because, in a sense, our labeling mechanism to be proposed is largely based on their labeling systems.

1.2.1. From Chomsky (1995a, b) to Chomsky (2007, 2008)

With the advent of the Minimalist Program, it was assumed, for example, in Chomsky (1995a, b), that the labeling procedure is integrated into the operation of Merge. In other words, it takes place derivationally and concomitantly with the formation of sets in syntax. The set K, created by Merge (α, β), is thus formulated as follows:

(1) K={γ, {α, β}}, where α, β are objects and γ is the label of K

(Chomsky (1995a: 223))

In (1), the set K is assigned the label γ. Chomsky (1995a: 209) argued that syntactic derivations must adhere to the condition in (2) so that LF representations are produced without "induc[ing] too much computational complexity," which means that the determination of γ must also be carried out in accordance with the condition.

(2) *Inclusiveness Condition*

[A]ny structure formed by the computation […] is constituted of elements already present in the lexical items selected for N[umeration]; no new objects are added in the course of computation apart from rearrangements of lexical properties. (Chomsky (1995a: 209))

Thus, the determination of γ only makes use of elements available within K, namely, α and β. Let us assume for the time being that α and β in (1) are lexical items. Under the assumption that lexical items are bundles of features (see Chomsky (1995a: 224)), three potential options are available for the label γ, as shown in (3).

(3) a. the intersection of α and β
b. the union of α and β
c. one or the other of α, β (Chomsky (1995a: 224))

However, (3a) is excluded due to the possibility that the intersection of α and β will often be null. (3b) is also excluded because α and β may have different feature values such as +F and -F, leading to a contradiction. Therefore, only (3c) qualifies as the label of γ. Thus, the set K is derived either as in (4a) or as in (4b).

(4) a. K={α, {α, β}}
b. K={β, {α, β}}

K is interpreted at the interfaces as a phrase of the type α in (4a) and the type β in (4b). When α and β of K are constituents already formed in the course of the derivation, the label of one of the constituents, for example, α, serves as a label of K: at the interfaces, K is then interpreted as a phrase of the type α. In this way, the determination of labels is incorporated into the operation of Merge.

In Chomsky's subsequent works, such as Chomsky (2000, 2001, 2004, 2005, 2007, 2008), the label of a set created by Merge was argued to be predictable and identified as one of the members functioning as a selector or a probe, i.e. the one driving syntactic

operations including Agree and Merge.[2] This, however, still indicates that the role of labeling is indispensable in syntactic computation. In this respect, it is noted that Chomsky (2008: 141) explicitly mentioned that the label of an SO contains all the relevant information for further computations of the SO. He then formulated the following very simple algorithm of labeling, the labeling algorithm (LA), under minimal search, i.e. the condition that search is minimal:[3]

(5) a. In {H, α}, H an LI, H is the label.
b. If α is internally merged to β, forming {α, β} then the label of β is the label of {α, β}. (Chomsky (2008: 145))

(5a) indicates that the label of {H, α} is determined purely by minimal search, uniquely detecting the head H within {H, α}. On the other hand, (5b) refers to the locus of a syntactic operation, i.e. the syntactic object that triggers Internal Merge (IM): even if both α and β are not heads but phrases, the label of β is uniquely designated as the label of {α, β} because it is the probe and triggers IM of α. Therefore, this version of LA clearly reflects there being a tight association between labeling and the locus of syntactic operations. However, Chomsky (2013, 2015) discards the hypothesis that labels play a significant role in syntax. In the next subsection, we will review Chomsky (2013, 2015), who has significantly contributed to the recent developments of Merge and labeling theory.

1.2.2. Chomsky (2013, 2015)

Chomsky (2013, 2015) proposes that SOs must be assigned a label by LA, which

involves minimal search, as before, but solely for the object to be interpreted at the sensorimotor (SM) and conceptual-intentional (CI) interfaces. That is, in this new version of LA, the crucial role once played by labels as selectors or probes in syntax is unformulable. Furthermore, under the assumption of simplest Merge, whereby the result of Merge (α, β) is simply a set of {α, β} with no label, labeling is assumed to be applied at the phase level when transfer takes place, i.e., labels are now unnecessary at all for syntactic computation. According to Chomsky (2013, 2015), LA then operates as follows:

(6) a. $\{_{\alpha}$ H, XP$\}$ α=H

b. $\{_{\alpha}$ XP, YP$\}$ α=??

(6a) shows that when a set of {H, XP} is formed, H, an LI, is selected as the label of the SO by LA as before under the condition that search for labeling is minimal. On the other hand, in the case of (6b), where an SO is a set of {XP, YP}, LA cannot determine the label of the SO because minimal search locates two heads X and Y. It thus results in labeling failure, the transferred unlabeled SO being uninterpretable at the interfaces. Thus, it would wrongly be the case, for example, that the set created by merging an external argument DP with *v*P, being unlabeled, cannot be interpreted at all at the interfaces. Facing this problem, Chomsky (2013, 2015) proposes that there are two strategies through which the set of {XP, YP} can be labeled, as shown in (7).

(7) a. XP … $\{_{\alpha}$ XP, YP$\}$ α=YP

b. $\{_{\alpha}$ $XP_{[F]}$, $YP_{[F]}\}$ α=<F, F>

One strategy in (7a) means that if one of the two phrases, here XP, raises and leaves its

copy, the copy (the shaded one) is invisible to LA because 'it is part of discontinuous element'(Chomsky (2013: 44)). Then, the SO can uniquely be assigned the label of YP.[4] The other strategy is feature-sharing, as shown in (7b). The prominent feature F shared by XP and YP becomes the label of the SO, which is notated as <F, F>.

As an illustration, let us consider the contrast in (8). As argued by Chomsky (2013, 2015), the labeling failure in (6b) is involved in the derivation of the ungrammatical example in (8b):

(8) a. **Which book**$_i$ do you think that the student read t_i?

b. * Do you think **which book**$_i$ that the student read t_i?

(Mizuguchi (2019: 567))

In (8a), the *wh*-phrase moves to the final landing site in the matrix clause, originating from the complement of the verb *read* in the embedded declarative clause. On the other hand, in (8b), it stays at the intermediate landing site, the specifier position of the embedded declarative clause. The contrast in grammaticality between (8a) and (8b) can be deduced from Chomsky's (2013, 2015) LA: in both cases, the highest copy of the *wh*-phrase and CP form the set of {*wh*P, CP}. The resulting SO is properly labeled, i.e. as <Q, Q>, in (8a) because they share the Q(uestion)-feature. Thus, the *wh* criterial effect in the sense of Rizzi (2006) is captured by feature-sharing (see also note 10). On the other hand, labeling failure occurs in (8b) because the *wh*-phrase stays at the intermediate landing site, the edge of the embedded CP, but does not carry any relevant feature that is shared with the declarative CP. Thus, the *wh*-phrase still must move to the position where it can share the Q-feature with its sister. In this way, not only can the contrast be reduced to the labeling failure, but also successive cyclicity is also accounted for. Note that the same

type of labeling failure as occurs in (8b) is circumvented in (8a): the copy left by successive cyclic movement in the intermediate landing site becomes invisible to labeling through the strategy of (7a).

However, Chomsky's (2013, 2015) LA faces a problem. Mizuguchi (2019) argues that an XP-YP configuration exists where neither movement nor feature-sharing enables LA to determine its label uniquely. In German, in contrast to English, the so-called partial *wh*-movement is possible (van Riemsdijk (1982), McDaniel (1989)). Let us consider (9a, b). Note that the examples receive the same semantic interpretation.

(9) a. **Wen**$_i$ meinst du [t'_i daß [Peter Hans t_i
who.ACC think you.NOM that Peter.NOM Hans.DAT
vorgestellt hat]]?
introduced has
'Who do you think Peter has introduced to Hans?'
(Sabel (2000: 411))

b. *Was* meinst du [**wen**$_i$ [Peter Hans t_i
WH think you.NOM who.ACC Peter.NOM Hans.DAT
vorgestellt hat]]?
introduced has (Sabel (2000: 410))

In (9a), the *wh*-phrase *wen* moves to the final landing site in the matrix clause, originating from the complement of the verb *vorstellen* 'introduce' in the embedded declarative clause. On the other hand, in (9b), it stays at the intermediate landing site, the specifier position of the embedded declarative clause. Instead of the *wh*-phrase, the *wh*-expletive *was* occupies the sentence-initial position. In other words, the derivation of (9b) is

comparable to the illicit derivation of (8b) in English except for the presence of the *wh*-expletive. The *wh*-phrase and the declarative CP in (9b) form a set of {*wh*P, CP}, where the two phrases are both visible to LA and do not have any shared feature. Nonetheless, it is allowed in German. Therefore, Chomsky's (2013, 2015) LA incorrectly predicts that (9b) is ungrammatical due to labeling failure (see Mizuguchi (2019) and sections 1.2.3 and 1.2.4 of this thesis for other cases of an XP-YP configuration).

This subsection has provided an overview of Chomsky's (2013, 2015) labeling system. However, it has been noted that there is an abundance of counterexamples where labeling seems to be properly applied to an XP-YP configuration. In the next subsection, an alternative labeling system proposed by Mizuguchi (2019) will be introduced to address the shortcomings of Chomsky's (2013, 2015) system.

1.2.3. Mizuguchi (2019)

In order to account for the partial *wh*-movement in (9b), Mizuguchi (2019) adopts Chomsky's (2013, 2015) assumption that labeling applies upon transfer, and proposes that minimal search can detect the two heads X and Y in the set of {XP, YP} and label the set as either of the two, as follows:

(10) $\{_{\alpha}$ XP, YP$\}$ α=XP/YP

Mizuguchi (2019) argues that this ambiguous labeling should be freely available; provided that no part of ambiguous labeling violates any third-factor principles, it can only be eliminated by a stipulation. Therefore, the set of {XP, YP} in (10) does not end with labeling failure even if XP or YP does not raise, or XP and YP do not share any

appropriate feature. Labeling ambiguity in the sense of Chomsky (2013, 2015) is tolerated in Mizuguchi's (2019) system.

In this connection, Mizuguchi (2019) argues that his system dispenses with the role played by movement in determining the label of an {XP, YP} configuration, unlike Chomsky's (2013, 2015) system. Given simplest Merge, under which no copy operation exists that was once formulated under the copy theory of movement (Chomsky (1995)), no significant difference is expected to be made with respect to syntactic computation between repetitions created by External Merge (EM) and two (or more) copies created by IM. It does only matter to the interfaces whether an SO is a copy or not. Thus, copies do not have to and thus should not be distinguished from repetitions in syntax and remain visible to minimal search, which is a natural consequence of Mizuguchi's (2019) labeling system.

Furthermore, Mizuguchi (2019) proposes that the well-formedness of the labeled set depends on whether it satisfies the properties of the CI system, one of which is selection. Then, the outcomes of labeling must satisfy selectional restrictions at the CI system.

To illustrate how labeling interacts with selection at the CI interface, let us reconsider the example of the partial *wh*-movement in (9b), which is repeated below as (11).

(11) *Was* meinst du [**wen**$_i$ [Peter Hans t_i
WH think you.NOM who.ACC Peter.NOM Hans.DAT
vorgestellt hat]]?
introduced has (Sabel (2000: 410))

Recall that (11) is incorrectly ruled out under Chomsky's (2013, 2015) LA, due to the labeling failure of {$_{\alpha}$ *wh*P, CP} in the embedded clause. On the other hand, Mizuguchi (2019) predicts that (11) is grammatical because α can be assigned a label of either *wh*P or CP, so that labeling failure does not occur. If *wh*P is the label of α, α is interpreted as a nominal element like a free/headless relative clause at the CI interface, violating the selectional requirement of the verb *meinen* 'think', which should select a clausal complement. Then, only when α is labeled as CP, it satisfies the verb's selectional requirement and is ruled in at the CI interface.[5, 6]

Mizuguchi's (2019) proposal is also supported by many other examples. For example, Mizuguchi (2019) analyzes the complement structure of the examples in (12) by positing the configuration of labeling ambiguity for their underlying structure. Note that the underlined complements consisting of the same set of lexical items are interpreted either as an interrogative clause, as in (12a), or as a free relative, as in (12b) (see also Donati and Cecchetto (2011) and Cecchetto and Donati (2015)).

(12) a. I'll ask <u>what he's selling</u>.
b. I'll buy <u>what he's selling</u>. (McCawley (1988: 431))

Mizuguchi (2019) analyzes the complements in (12) as a set consisting of *wh*P and CP, which is labeled as either CP or *wh*P, as follows:

(13) {$_{\alpha}$ *wh*P, CP} α=CP (12a)
α=*wh*P (12b)

In (12a), the complement labeled as CP is ruled in at the CI interface because it satisfies

the selectional requirement by the verb *ask*, which selects an interrogative clausal complement (see note 9). On the other hand, the complement labeled as *wh*P is ruled in when it forms a selectional relation with the verbs that take an NP complement such as the verb *buy* as in (12b).[7]

1.2.4. Problems of Chomsky's (2013, 2015) and Mizuguchi's (2019) Systems

Sections 1.2.2 and 1.2.3 have provided an overview of the labeling systems proposed by Chomsky (2013, 2015) and Mizuguchi (2019). Before presenting our proposal that builds on them in the next section, we demonstrate certain issues to be clarified under their labeling systems by considering the distribution of the *wh*-associated *exactly*. This thus sets the stage for proposing a new labeling mechanism.

First, let us look at the following examples of echo questions, where the *wh*-phrases remain in their original position.

(14) a. Muriel put what *exactly* on the table with great care?!
b. Harvey gave what *exactly* to the president to annoy you?!
(Zyman (2022: 90))

In (14), *exactly* is associated with the *wh*-phrases. We refer to such a *wh*-phrase as *wh*-associate and *exactly* as (the *wh*-associated) *exactly*. As shown in (15), the *wh*-associated *exactly* can also be fronted with its *wh*-associate.

(15) Who(m)/what *exactly* did she blame? (Zyman (2022: 86))

The data in (14) and (15) suggest that the *wh*-associate and the *wh*-associated *exactly* form a set, as follows:

(16) $\{\{_{whP}\text{ wh}\}, \{_{AdvP}\text{ exactly}\}\}$

Assuming that the constituents in the set in (16) are both phrases, it follows that the set consisting of the *wh*-associate and the *wh*-associated *exactly* is also an example of XP-YP configurations.

Recall here that Chomsky (2013, 2015) and Mizuguchi (2019) have conflicting views on the possibility of labeling such a set: Chomsky's (2013, 2015) system cannot label {XP, YP} and thus makes it uninterpretable at the interfaces, but Mizuguchi's (2019) system can label {XP, YP} as either XP or YP by way of their heads (and the outcome of labeling is evaluated at the CI interface). Since the examples involving the phrase consisting of the *wh*-associate with *exactly* are acceptable in (14) and (15) and, as discussed so far, Mizuguchi (2019) provides numerous examples of XP-YP configurations, Mizuguchi's (2019) claim concerning the labelability of XP-YP configurations is well-supported. On the other hand, it raises a problem for Chomsky's (2013, 2015) system. Thus, we adopt Mizuguchi's (2019) claim on this point.

Furthermore, Chomsky (2013, 2015) and Mizuguchi (2019) also take different positions on whether a lower copy of an SO is visible or invisible to LA.[8] For Chomsky (2013, 2015), it is invisible to LA as it is part of a discontinuous element created by IM, and hence, in an XP-YP configuration, YP becomes the label of the set of {XP, YP} (where the shaded XP indicates that it is a lower copy of XP). In contrast, Mizuguchi (2019) argues that copy invisibility is just a stipulation, and that copies created by IM are not distinguished from repetitions of the same SO introduced by EM in syntactic

computation and are taken to be visible to LA. Thus, XP in {XP, YP} is still visible to labeling and can, in principle, be designated as the label of the set. This means that a lower copy of an SO (e.g. XP in {XP, YP}) can still serve to satisfy selectional requirements, just like XP as a single SO or the highest copy (or head) of a chain. However, this is refuted by the following examples:

(17) a. * What did Muriel put *exactly* on the table with great care?
b. * What did Harvey give *exactly* to the president to annoy you?

(Zyman (2022: 90))

In (17), only the *wh*-associates undergo IM from the complement position of the verbs to the sentence-initial position and *exactly* stays in the original position. The resulting sentences are unacceptable. Under Mizuguchi's (2019) system, the lower copies of the *wh*-associates should be able to become the label of {*wh*P, AdvP} and satisfy the verbs' selectional requirements. However, (17) is clearly degraded compared with (14), where the *wh*-associates stay with the *wh*-associated *exactly*, i.e., they form a set of {*wh*P, AdvP}. Given this fact, it is reasonable to conclude that a lower copy of a phrase (e.g. XP in {XP, YP}) cannot participate in the labeling of the set, which means that copies are invisible. On this point, Chomsky's (2013, 2015) claim appears to be correct while Mizuguchi's (2019) claim cannot be supported.

Now, we are in a dilemma: labeling of an XP-YP configuration must be possible without the mechanism of copy invisibility in some cases but it has recourse to the mechanism in others. There are further complications. Let us consider the following example.

(18) Who(m)/what *exactly* did she blame? (Zyman (2022: 86))

In (18), both the *wh*-associate and *exactly* undergo IM from the complement position of *blame* to the sentence-initial position. (18) is a perfectly grammatical example, which means that the outputs of labeling are properly interpreted at the interfaces. However, if a lower copy is invisible with respect to labeling, how is the set of {*wh*P, AdvP}, the copy left by IM in the original position, labeled while satisfying the interface conditions in (18)? In light of this, it is safe to conclude that a lower copy of a phrase is also involved in the label determination. In short, it has the "potential" to be (in)visible with respect to labeling.

With this dilemma surrounding copies and labeling in mind, the next section proposes a new labeling system; we propose that lower copies have the potential to be (in)visible to labeling and the time lag in labeling between (lower) copies and non-copies yields an effect of invisibility. It will also be shown that this will be deduced from economy considerations.

1.3. Proposal

This section presents a new theory of labeling. Section 1.3.1 briefly offers our labeling algorithm, which is based on the insights gained from both Chomsky's (2013, 2015) and Mizuguchi's (2019) theories of labeling. The first part of section 1.3.2 addresses in terms of economy considerations the issue of how and when copies become invisible to LA. The second part of this section then provides a detailed demonstration of how the labeling procedure proceeds.

1.3.1. Labeling Algorithm

First of all, we assume that labeling applies upon transfer to the phasal complement, i.e. the transfer domain (see also McInnerney (2022)), in a bottom-up fashion. In other words, the labeling procedure starts with the SO most deeply embedded within the transfer domain and proceeds upwards until the entire phasal complement is labeled, keeping to the condition that search for labels is minimal.

Under our proposal, labels are assigned as follows:

(19) a. $\{_{\alpha}$ H, XP$\}$ α=H

b. $\{_{\alpha}$ XP, YP$\}$ α=XP/YP

The set in (19a) is formed by a head H and a phrase XP. In this case, minimal search uniquely finds H and α is labeled as H. On the other hand, in (19b), a set is created with XP and YP. As discussed in the previous subsection, this thesis assumes with Mizuguchi (2019) that ambiguous labeling in (19b) is possible.

Then, let us consider the case where XP moves out of the set of {XP, YP} in (19b). In this respect, following Chomsky (2013, 2015) and contra Mizuguchi (2019), this thesis assumes that the label of α is uniquely determined as YP, as follows:

(20) XP … $\{_{\alpha}$ XP, YP$\}$ α=YP

Indeed, as noted by Mizuguchi (2019), the distinction between copies and repetitions is not brought about by IM per se. However, we argue that they are to be distinguished at the time of labeling, by adopting FormCopy (FC) proposed by Chomsky (2021), where FC applies to the *v*P/CP phase that is completed and assigns a copy relation to identical

inscriptions (identifying them as copies of the same LI, so to speak). As for the timing of the application of FC, we assume that it applies before labeling applies, i.e., the completion of the *v*P/CP phase is followed by the application of FC to it, which is then followed by the application of bottom-up labeling. Then, it follows that XP in {XP, YP} in (20) is identified as a copy of XP before labeling applies. Further details of the mechanism of deriving the copy invisibility to labeling will be discussed in the next subsection. The point here is that we employ Chomsky's (2013, 2015) assumption that if one of the constituents in {XP, YP} is a copy, the other is used as the label of the set.

Finally, let us consider the cases of the disambiguation of ambiguous labeling by feature-sharing/agreement proposed by Chomsky (2013, 2015). We argue that there is no need to assume feature-sharing/agreement for labeling because XP-YP configurations no longer cause labeling failure.[9] This means, for example, that the set of {*wh*P$_{[Q]}$, CP$_{[Q]}$}, if it is to be interpreted as an interrogative clause, will be labeled as CP, not <Q, Q>, which, for Chomsky (2013, 2015), is interpreted as an open interrogative question with a *wh*-phrase. Thus, our proposal adopts another way of distinguishing semantic types of clauses in order for the CI interface to correctly interpret the clause not as declarative but as interrogative. In this regard, this thesis assumes that clauses are typed by the elements located at the CP edge, in accordance with the clausal typing hypothesis (see e.g. Cheng (1991)). For example, to derive an interrogative clause, *wh*P must be located at the CP edge for clausal typing purposes. Thus, CP in (21) can be properly typed as an interrogative clause (and a similar point can also be made for a topicalization construction, a focalization construction and so on) when the configuration is transferred to the interfaces:

(21) $\{_{CP}\ XP_{[+wh,\ +Top,\ +Foc\ \ldots]},\ \{_{CP}\ C,\ \{TP\}\}\}$

As shown in (21), the CP edge must be occupied by an element that has a feature determining the type of the clause, such as [+wh], [+Top] and [+Foc]. If the CP edge is null, the CP is interpreted as declarative at the CI interface. To be more precise, for example, in order for a clause to be typed as interrogative at the CI interface, an element at the CP edge must be an SO headed by $X_{[+wh]}$. This suggests that labels are involved in the evaluation at the CI interface not only in that they serve to selectional restrictions but also in that they serve to properly determine the type of the clause (in this connection, chapter 3 will also discuss so-called criterial phenomena, the explanation of which often makes use of such as Q-criterion and Topic criterion in Rizzi's (2006) term).[10, 11]

In this subsection, we have proposed a new bottom-up labeling mechanism, under which labeling applies upon transfer to the phasal complement. In our proposal, ambiguous labeling of $\{_{\alpha}$ XP, YP$\}$ is possible, but if one of the constituents of α is a copy, then the other is selected as the label of α. As a result, we have devised a labeling mechanism that integrates Mizuguchi's (2019) ambiguous labeling and Chomsky's (2013, 2015) disambiguation by IM. Furthermore, we have also argued that the outcome of labeling is evaluated at the CI interface in terms of selection and clausal typing.

1.3.2. Deducing Copy Invisibility from Economy Considerations

Let us turn to the copy invisibility to labeling in (20) repeated in (22).

(22) XP … $\{_{\alpha}$ XP, YP$\}$ α=YP

We propose that the determination of the label of copies is put off until bottom-up labeling detects the topmost copy in the transfer domain. That is, in (22), when α is labeled, the

label of the SO indicated as XP in α actually has not been determined yet. As a result, the label of the SO indicated as XP in (22) cannot be a candidate for the label of α, so that α is automatically labeled as YP. As for the label of XP, once bottom-up labeling locates and labels its highest copy in the transfer domain, all the lower XPs receive the same label across the board. We argue that this across-the-board labeling to copies follows from economy considerations: it minimizes the number of applications of search and labeling.

With these in mind, let us consider how the labels of α, β and γ are determined in (23a), where PH is a phase head.

(23) a. {PH, {α, … {$_{\gamma}$ α, β}}}

b. {PH, {α, … {$_{\gamma}$ α_{DEL}, β}}} *FC's identification of αs as copies*

c. {PH, {α, … {$_{\gamma}$ α_{DEL}, YP}}} *labeling of β as YP*

d. {PH, {α, … {$_{YP}$ α_{DEL}, YP}}} *labeling of γ as YP*

e. {PH, {XP, … {$_{YP}$ XP_{DEL}, YP}}}

across-the-board labeling of α as XP

In (23a), α undergoes IM out of γ. After a phase is completed, FC applies to the phase. Let us assume that at this point, lower copies are assigned the mark DELETE (DEL) (see Chomsky (2021: 23)).[12] In (23b), FC assigns a copy relation to the two inscriptions of α and marks DEL on the lower α in γ. Subsequently, bottom-up labeling applies to the phasal complement. Here, it starts with β and the copy of α marked with DEL. Then, as shown in (23c), LA applies to β and assigns the YP label to it. As for the labeling of the lower α, an instruction is given to LA to put it off based on the information that the lower α is a DEL-marked copy. In (23d), γ is thus uniquely labeled as YP, since α does not have any label. Then, as shown in (23e), when labeling detects the highest non-DEL-marked α and assigns

to it the label of XP, all the lower copies of α receive the same XP label across the board.

Next, consider the case where the highest copy occupies the phase edge, as shown in (24).

(24) a. $\{\alpha, \{PH, \{_{\delta}\ \alpha, Z \ldots \{_{\gamma}\ \alpha, \beta\}\}\}\}$

b. $\{\alpha, \{PH, \{_{\delta}\ \alpha_{DEL}, Z \ldots \{_{\gamma}\ \alpha_{DEL}, \beta\}\}\}\}$

FC's identification of αs as copies

c. $\{\alpha, \{PH, \{_{\delta}\ \alpha_{DEL}, Z \ldots \{_{\gamma}\ \alpha_{DEL}, YP\}\}\}\}$ *labeling of β as YP*

d. $\{\alpha, \{PH, \{_{\delta}\ \alpha_{DEL}, Z \ldots \{_{YP}\ \alpha_{DEL}, YP\}\}\}$ *labeling of γ as YP*

e $\{\alpha, \{PH, \{_{ZP}\ \alpha_{DEL}, Z \ldots \{_{YP}\ \alpha_{DEL}, YP\}\}\}$

labeling of the entire phasal complement δ as ZP

f. $\{\alpha, \{PH, \{_{ZP}\ XP_{DEL}, Z \ldots \{_{YP}\ XP_{DEL}, YP\}\}\}\}$

across-the-board labeling of αs as XP

In (24a), α first undergoes IM within the phasal complement and then undergoes further IM to the phase edge. In (24b), after the phase is completed, FC assigns a copy relation to the three occurrences of α and marks the lower αs with DEL. Then, bottom-up labeling applies within the phasal complement δ. As shown in (24c), β is labeled as YP. On the other hand, the labeling of α in γ is suspended based on the information that the α is a DEL-marked copy. In (24d), γ is uniquely labeled as YP, since α does not have any label. Subsequently, bottom-up labeling encounters the highest DEL-marked α in δ. Since bottom-up labeling can only have access to the information that the α in δ is just a copy at this stage, however, its labeling is put off as well here as in the case of the lower copy of α in γ. In this case, the DEL-marked αs are labeled only after bottom-up labeling reaches the stage where it labels the whole transfer domain, i.e. the stage where it has learned that

no higher copy of α is detected within the domain. Thus, in (24e), the transfer domain δ is labeled as, for example, ZP, and then, in (24f), the DEL-marked αs are labeled as XP across the board by labeling the highest DEL-marked copy. Thus, copy invisibility is derived from the postponement of labeling DEL-marked copies, under the proposal that copies receive the same label across the board, which reduces the number of applications of search and labeling. In this way, the copy invisibility to labeling is deduced from economy considerations.

This section has presented our bottom-up labeling system, the main framework of this thesis. Especially in section 1.3.2, we have proposed that copy invisibility to labeling can be attributed to the timing of the label determination of copies. This proposal not only answers the question of why copies become invisible to labeling in Chomsky's (2013, 2015) sense, but also ensures that copies themselves can be labeled and properly interpreted at the interfaces, by assuming that the labeling of copies is simply put off at some stage of labeling. The subsequent chapters of this thesis explore the consequences of our proposed labeling mechanism, focusing on movement phenomena.

1.4. Organization

This thesis is organized as follows.

Chapter 2 mainly concerns stranding phenomena. Under our proposal, a set forming an XP-YP configuration is labeled ambiguously while when one of the two constituents forming the set undergoes IM, the other is unambiguously selected as the label of the set. The outcomes of labeling are subsequently evaluated and interpreted at the interfaces. Let us schematically illustrate a set of logically possible derivations listed in (25). Suppose that W and Z take {XP, YP} as their complement, and W should form a

selectional relation with XP but Z does not have to.

(25) a. {W, {$_{\alpha}$ XP, YP}} α=XP/YP

b. XP … {W, {$_{\alpha}$ XP, YP}} α=*YP

c. {$_{\alpha}$ XP, YP} … {W, {$_{\alpha}$ XP, YP}} α=XP/YP

d. XP … {Z, {$_{\alpha}$ XP, YP}} α=YP

Given our proposal, it is predicted that only the configuration in (25b) is ruled out because W cannot satisfy its selectional requirement. On the other hand, (25a) and (25c) are ruled in because α can be labeled as XP (as long as it is the highest copy within a single transfer domain). (25d) is also ruled in because Z is not required to select XP at the CI interface. Chapter 2 will demonstrate that this prediction is correct through the analysis of three phenomena: (i) the *wh*-associated *exactly*-stranding, (ii) quantifier float and (iii) VP-adverb-stranding VP-preposing. We will also show that our approach to *exactly*-stranding is more adequate theoretically and empirically than a previous study, Zyman (2022). In addition, we will demonstrate that our labeling-based analysis of quantifier float provides a theoretical explanation for Bošković's (2004: 685) generalization that quantifiers cannot be floated in θ-positions. Moreover, we will also discuss VP-adverb-stranding VP-ellipsis in comparison to the cases of VP-preposing in terms of labeling.

Chapter 3 is primarily dedicated to pied-piping phenomena in which the entire XP-YP configuration undergoes IM. This thesis has proposed that copies of an SO are assigned the same label within a single transfer domain in an across-the-board manner. This suggests that if the copies are separated by a transfer domain, they can be labeled differently; otherwise, they cannot, as follows:

(26) a. {**XP** XP, YP} … {PH { … {**YP** XP, YP}}}

Transfer Domain 2 Transfer Domain 1

b. * {**XP** XP, YP} … {**YP** XP, YP}}}

Transfer Domain

Chapter 3 will first analyze massive pied-piping as a phenomenon in which the copies of {XP, YP} satisfy more than one criterion by receiving different labels. There, we will demonstrate that (26a) and (26b) are correct. Though this approach would face the issue of criterial freezing (Rizzi (2006)) in the sense that we assume that the massively pied-piped phrase undergoes IM to criterial positions twice, adopting Maeda's (2019) feature-relativized criterial freezing, we will argue that this, in fact, does not pose any problem for our proposal. Subsequently, we will demonstrate that the prediction, especially in (26a), is borne out by such constructions as degree fronting and so-called discontinuous spellout. In these cases, the copies are analyzed as labeled differently so that the verb's selectional requirement is met in the original position and the criterial requirement is satisfied in the final landing site.

Notes to Chapter 1

1 Regarding the structure-building systems before the Minimalist Program, see Chomsky (1957, 1965) for the phrase structure rules of the Standard Theory and Chomsky (1970, 1981) for X′ theory of the Government and Binding theory.

2 See also Collins (2002) and Seely (2006) for the label-free syntax, namely the attempt to entirely eliminate labels from the operation of Merge, which makes it more simplified.

3 See, for example, Epstein, Kitahara and Seely (2015a) for discussion of the notion of minimal search.

4 Under the assumption that XP-YP structures lead to labeling failure and such failures are circumvented by movement of XP, Chomsky (2013, 2015) attempts to derive the Extended Projection Principle (EPP) in English. Specifically, since {DP, *v*P} cannot be labeled as it is, DP is obligatorily moved to the higher position, Spec, TP. However, as will be discussed later, we argue that XP-YP structures can be ambiguously labeled. Thus, EPP needs to be attributed to another factor apart from labeling. See, for example, Mizuguchi (2017).

5 According to Mizuguchi (2019), the ungrammaticality of (8b) is accounted for by assuming that in English, *wh*-phrases can be interpreted only if they merge to CP whose C head carries the Q-feature. On the other hand, in German, there is another configuration in which they are so interpreted: they are in the c-command domain of *wh*-expletives

occupying the specifier of the CP they take scope of.

6 See Obata (2016) for another solution to the labeling ambiguity yielded by the partial *wh*-movement.

7 Mizuguchi's (2019) ambiguous labeling can also be extended to the subject-*because* construction and predicational *wh*-pseudocleft. See Matsuyama (2022) for further details.

8 Murphy and Shim (2020) take a different position from both Chomsky (2013, 2015) and Mizuguchi (2019) regarding copy invisibility, in that they argue that all copies, including the highest copy, are invisible to labeling. See Murphy and Shim (2020) for further details.

9 One might argue that the labelability of XP-YP configurations does not block us from adopting the feature-sharing strategy. In fact, Mizuguchi (2019) also mentions the possibility that {*n*P, TP} can be labeled as <φ, φ> because the <φ, φ> label shows that the two heads *n* and T have the same property, namely, φ. However, we do not adopt the feature-sharing strategy for labeling XP-YP configurations. As Mizuguchi (2019) also wonders, it is uncertain whether the outcome of labeling by the shared features such as <φ, φ> and <Q, Q> can be interpreted at the CI interface. Moreover, Takita (2020) points out that if the traditional TP, VP and DP are all labeled as <φ, φ>, they have to receive the same semantic interpretation at the CI interface, which leads to a wrong result. Furthermore, under our labeling system, if we adopted the feature-sharing strategy, the

traditional VP would be labeled as either <φ, φ> or VP (for the latter, when DP undergoes IM out of {DP, VP}). However, the two different labels assigned to the traditional VP, <φ, φ> or VP, should have the same interpretation, namely a phrase of the type of verb, at the CI interface. Therefore, we assume that {XP, YP} is always ambiguously labeled as long as one of the constituents does not undergo IM. Note that, based on the discussion above, Takita (2020) argues that labels are unnecessary at the CI interface. However, if the feature-sharing strategy itself is discarded, TP, *v*P and DP can receive different labels and be differently interpreted, which means that there remains a possibility of assuming that labels can also play a significant role at the CI interface.

10 Chomsky (2015) provides an account of criterial freezing (Rizzi (2006)) in terms of labeling and copy invisibility. In (i), the *wh*-phrase *which dog* undergoes IM from the criterial position, the specifier of CP in the embedded clause.

(i) * which dog do you wonder [$_{\alpha}$ which dog [C_Q John likes which dog]]

(Chomsky (2015: 8))

According to Chomsky (2015), since the copy left at the edge of the embedded CP is invisible to labeling, α is labeled as C_Q rather than <Q, Q> and is interpreted as a yes-no question, which yields gibberish at the CI interface. In this respect, we will develop a different explanation of the ungrammaticality of (i) by adopting Maeda's (2019) feature-relativized criterial freezing. This issue will be discussed in Chapter 3 in detail.

11 In the case of partial *wh*-movement constructions, we assume with Cheng (2000)

that the *wh*-expletive *was* in the specifier of the matrix CP is a realization of the [+wh]-feature of the *wh*-phrase which undergoes partial movement. Thus, because of this [+wh]-feature, the matrix clause is typed as interrogative. Since the partially moved *wh*-phrase loses the [+wh]-feature, the embedded clause that includes the relevant *wh*-phrase is typed as declarative. See Cheng (1991) for other cases of clausal typing.

12 Chomsky (2021) assumes that when FC applies, lower copies are given the marker of DEL but not completely deleted. This is because if they were deleted at the timing of FC, the case filter in externalization would fail to exclude examples like **who did John try who to win*. Thus, the actual deletion operation of lower copies is executed after the case filter applies.

Chapter 2

Stranding Phenomena*

2.1. Introduction

This chapter will provide part of the consequences, particularly regarding stranding phenomena, derived from our proposal presented in Chapter 1. Among them is that our proposal offers a labeling-based account of the distribution of the *wh*-associated *exactly* that overcomes the insufficiencies of the labeling systems of Chomsky (2013, 2015) and Mizuguchi (2019). Before outlining the organization of this chapter, this section will briefly recapitulate the relevant discussion in section 1.2.4.

As shown in (1), *exactly* can immediately follow and be associated with moved *wh*-phrases.[1]

(1) a. Who(m)/what *exactly* did she blame?
b. How many grapes/how much frosting *exactly* did he eat?
c. What/which pretzel *exactly* did he sell for a million dollars?

(Zyman (2022: 86))

Moreover, (2) illustrates that this also holds for the case of in-situ *wh*-phrases in echo questions.

(2) a. Muriel put what *exactly* on the table with great care?!

b. Harvey gave what *exactly* to the president to annoy you?!

(Zyman (2022: 90))

Given the fact that *exactly* can immediately follow its *wh*-associate both in its original position and the sentence-initial position, it is natural to assume that *exactly* forms a set with its *wh*-associate, as in (3), so that the resulting set can remain in the original position of the *wh*-associate or undergo Internal Merge (IM) to the sentence-initial position as a single unit.

(3) $\{\{_{wh\text{P}}$ wh$\}, \{_{\text{AdvP}}$ exactly$\}\}$

In (3), the set consisting of *exactly* and its *wh*-associate forms an XP-YP configuration. The existence of such an {XP, YP} structure poses a problem for Chomsky (2013, 2015), who assumes that it cannot be labeled and thus interpreted at the interfaces.

Moreover, as shown in (4), *exactly* can also be separated from its *wh*-associate.

(4) a. What/which pretzel did he sell for a million dollars *exactly*?

b. What did Harvey give to the president to annoy you *exactly*?

(Zyman (2022: 90))

In (4), the *wh*-associates undergo IM to the sentence-initial position, stranding *exactly* in the sentence-final position. We call this phenomenon *exactly*-stranding. While this phenomenon has only briefly been mentioned in several studies, such as McCloskey (2000), Zyman (2022) presents its detailed observations. As observed by Zyman (2022), there is a position at which *exactly* cannot be stranded, as shown in (5): the original

position of its moved *wh*-associate within VP.

(5) a. * What did Muriel put *exactly* on the table with great care?

b. * What did Harvey give *exactly* to the president to annoy you?

(Zyman (2022: 90))

Based on the data in (4) and (5), Zyman (2022: 91) provides the generalization that "[*e*]*xactly* cannot be stranded within (big) VP," which is reminiscent of Bošković's generalization on quantifier float that quantifiers cannot be stranded in θ-positions (see section 2.3.3). In Chomsky's (2012, 2015) and our terms, this is understood to mean that *wh*P, if it is a copy, cannot be a label of the set {*wh*P, AdvP}and the resulting label of the set as AdvP cannot satisfy the selectional requirement by the main verb. However, under Mizuguchi's (2019) labeling system, the lowest copy of the *wh*-associate should be visible with respect to the labeling of {*wh*P, AdvP} and satisfy the verb's selectional requirement. Thus, his system cannot account for the ungrammaticality of (5) in terms of labeling.

In sum, the distribution of *exactly* suggests that an XP-YP configuration is labelable and that (lower) copies created by movement are visible in certain configurations and invisible in others. Moreover, the latter fact, namely the variable nature of copies, cannot be captured by either Chomsky's (2013, 2015) or Mizuguchi's (2019) labeling systems.

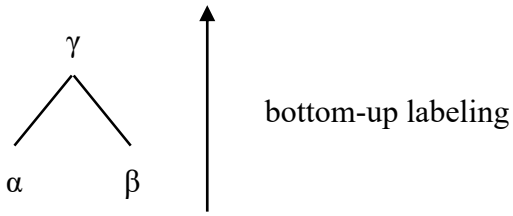
With these in mind, this chapter will demonstrate how our labeling mechanism presented in Chapter 1 works for stranding phenomena, including *exactly*-stranding, overcoming the insufficiencies Chomsky's and Mizuguchi's labeling systems have. This chapter is organized as follows: section 2.2 will reintroduce our labeling system proposed in Chapter 1 and provide predictions regarding stranding phenomena derived from it. Subsequently, section 2.3 will show that these predictions are correct providing a unified

analysis of three stranding phenomena: (i) the *wh*-associated *exactly*-stranding, (ii) quantifier float and (iii) VP-adverb-stranding VP-preposing. Section 2.4 will conclude this chapter. Therefore, it will eventually be shown that our labeling system is superior to Chomsky's (2013, 2015) and Mizuguchi's (2019).

2.2. Labeling and Selection

Within our labeling framework, labeling is applied in a bottom-up fashion. That is, minimal search is applied within a target domain, starting from the most deeply embedded syntactic object (SO) and progressing upward in order. For example, in (6), if the SOs, α, β and γ, are included in the target domain, the label determination of γ is made after the more deeply embedded SOs, namely α and β, are labeled.

(6)



Furthermore, we follow Chomsky (2000, 2001) in assuming that *v*P and CP are phases and VP and TP are transferred as their complements to which labeling applies. We then propose that FormCopy (FC) and labeling apply in this order after the completion of *v*P/CP phase and before the interpretation of the labeled outputs at the interfaces.

(7) a. the completion of a phase
b. the application of FC to the phase

c. the application of bottom-up labeling to the phasal complement

d. the evaluation and interpretation of the output of labeling at the interfaces

After the completion of the *v*P/CP phase, FC applies to *the entire phase* and the markers of DEL are assigned to copies other than the highest copy within the phase (the actual copy deletion is applied later in externalization). Subsequently, labeling is applied to *the transfer domain* (e.g. VP or TP) in a bottom-up fashion when it is transferred. This means that since FC is followed by labeling, minimal search can utilize the information provided by FC, such as whether the SO to be labeled is a DEL-marked lower copy or not. Then, the labeled, transferred SOs are evaluated and interpreted at the interfaces: they are ruled in or out depending on whether they satisfy the selectional or clausal typing requirements at the conceptual-intentional (CI) interface.

In Chapter 1, we have proposed the following labeling algorithm.

(8) a. $\{_{\alpha}$ H, XP$\}$ α=H

b. $\{_{\alpha}$ XP, YP$\}$ α=XP/YP

c. XP … $\{_{\alpha}$ XP, YP$\}$ α=YP

In (8a), α consists of the head H and the phrase XP, and its label is uniquely determined as H by minimal search. On the other hand, in (8b), α consists of two phrases, XP and YP, and minimal search detects both X and Y, leading to labeling α as either XP or YP. In (8c), where XP undergoes IM out of the set of {XP, YP}, YP is uniquely selected as the label of α because the lower copy of XP created by the IM has not yet received any label when the label of α is determined, so that the label of XP cannot participate in the labeling of α.

We argue that the label determination of XP is put off because all the copies of XP in the transfer domain are labeled in an across-the-board manner, minimizing the number of applications of labeling. Lower copies of an SO receive the same label as the highest non-DEL-marked copy within the transfer domain. In the absence of the highest non-DEL-marked copy, which means that it occupies the edge of the phase whose complement is transferred, the across-the-board labeling applies by searching the highest DEL-marked copy, which is possible after the entire transfer domain itself is labeled. To repeat the gist of the discussion on how this system works in 1.3.2, let us have a quick look again at the set of logically possible inputs to labeling listed in (9). Suppose that W and Z take {XP, YP} as their complement, and W should form a selectional relation with XP but Z does not.

(9)
a.	{W, {$_{\alpha}$ XP, YP}}	α=XP/YP
b.	XP … {W, {$_{\alpha}$ XP, YP}}	α=*YP
c.	{$_{\alpha}$ XP, YP} … {W, {$_{\alpha}$ XP, YP}}	α=XP/YP
d.	XP … {Z, {$_{\alpha}$ XP, YP}}	α=YP

Given our proposal, it is predicted that only the configuration in (9b) is ruled out because W cannot satisfy its selectional requirement. On the other hand, (9a) and (9c) are ruled in because α can be labeled as XP (as long as it is the highest copy within a single transfer domain). (9d) is also ruled in because Z is not required to select XP at the CI interface. The next section will demonstrate that this prediction is correct, explaining stranding phenomena, particularly *exactly*-stranding.

2.3. Analysis of Stranding Phenomena

We will analyze *exactly*-stranding in section 2.3.1, quantifier float in section 2.3.2 and VP-adverb-stranding VP-preposing in section 2.3.3 within our labeling framework.

2.3.1. The *Wh*-Associated *Exactly*-Stranding

As discussed in section 2.1, the behavior of the *wh*-associated *exactly* poses problems for the existent systems of labeling. In this subsection, it will be shown that it is accounted for in a principled manner by our proposed labeling system.

First, let us consider the case of echo questions in (10), where *exactly* follows its *wh*-associate. Recall that it constitutes a counter-evidence against Chomsky's (2013, 2015) labeling system.

(10) a. Muriel put what *exactly* on the table with great care?!

b. Harvey gave what *exactly* to the president to annoy you?!

(Zyman (2022: 90))

We analyze (10) as having the following derivation, where the lower copies of an SO are shaded instead of being marked as DEL, and the transfer domain are boxed:

(11) a. {Subj, {*v**, {{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}

completion of the vP phase

b. {Subj, {*v**, {{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}

FC's identification of γs as copies

c. {Subj, {*v**,

{{ε {γ2 {α2 *wh*P}, {β2 AdvP}}, {δ V, {γ1 {α1 *wh*P}, {β1 AdvP}}}}}}

labeling and transfer of ε

In (11a), γ, which consists of {α *wh*P} and {β AdvP}, undergoes IM to so-called Spec, VP to undergo φ-agreement with V (see, e.g. Chomsky (2001) and his subsequent works). After the *v*P phase is completed, FC applies in (11b). At this stage, FC assigns a copy relation to the two inscriptions of γ and marks DEL on the lower copy of γ. Then, in (11c), LA applies to the transfer domain ε in a bottom-up fashion. First, labeling applies to γ_1 and its constituents, but they are DEL-marked copies, so that the determination of their labels is deferred. Then, δ is labeled as VP because V is a head and γ_1 does not receive any label yet. Subsequently, LA encounters the highest (non-DEL-marked) copy of γ. After assigning the *wh*P label to α_2 and the AdvP label to β_2, γ_2 can be labeled as either *wh*P or AdvP. It should be noted that at exactly this point, α_1, β_1 and γ_1 receive the same label as α_2, β_2 and γ_2, respectively. If γ_1 and γ_2 are given the AdvP label, the outcome of the labeling of γ_1 violates the verb's selectional requirement. V is required to select *wh*P, namely a nominal expression, rather than AdvP at the CI interface. Thus, only the derivation where the *wh*P label is assigned to γ_1 and γ_2 converges. Finally, although ε can also be ambiguously labeled, VP becomes the label because of the selectional requirement of *v*.

Next, let us turn to the following examples, where *exactly* is stranded within VP. We argued in section 2.1 that they would be wrongly predicted to be acceptable under Mizuguchi's (2019) labeling system.

(12) a. * What did Muriel put *exactly* on the table with great care?

b. * What did Harvey give *exactly* to the president to annoy you?

(Zyman (2022: 90))

Given that, as mentioned earlier, it is assumed that internal arguments undergo IM within VP, there are logically two positions where *exactly*-stranding may occur within VP: the complement and specifier positions of VP. Thus, in order to account for the ungrammaticality of (12), it is necessary to exclude both derivations of (13a) and (13b).

(13) a. * what … {*v**, {what, {V, {what **exactly**}}}}

b. * what … {*v**, {{what **exactly**}, {V, {what exactly}}}}

In (13a), only the *wh*-associate undergoes IM to Spec, VP, stranding *exactly* at the complement position of VP. In contrast, in (13b), the entire set of the *wh*-associate and *exactly* undergo IM to Spec, VP, and then, only the former undergoes further IM. First, (13a) is excluded as follows:

(14) *Exactly is stranded at the complement position of VP*

a. {{$_{\alpha}$ *wh*P}, {Subj, {*v**, {{$_{\alpha}$ *wh*P}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}}

completion of the vP phase

b. {{$_{\alpha}$ *wh*P}, {Subj, {*v**, {{$_{\alpha}$ *wh*P}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}}

FC's identification of αs as copies

c. {{$_{\alpha 3}$ *wh*P}, {Subj, {*v**,

{$_{\varepsilon}$ {$_{\alpha 2}$ *wh*P}, {$_{\delta}$ V, {$_{\gamma}$ {$_{\alpha 1}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}}

labeling and transfer of ε

In (14a), {$_{\alpha}$ *wh*P} first undergoes IM to the specifier of VP and further IM to the *v*P edge. After the *v*P phase is completed, FC identifies the three inscriptions of α as copies and marks DEL on the lower copies of α in (14b). In (14c), LA applies to the transfer domain ε in a bottom-up fashion. First, β can be labeled as AdvP while the label determination of α_1 is postponed due to its DEL-marker. Thus, γ is uniquely labeled as AdvP. Then, δ is labeled as VP. Although, at this timing, LA encounters α_2, which is the highest copy of α within ε, its labeling is also postponed because it is DEL-marked. Then, the label of ε is uniquely determined as VP. Finally, since the lower copies of α remain unlabeled, across-the-board labeling applies to them. As a result, α_1 and α_2 receive the *wh*P label. Note that before the label of α_1 is determined, the label of γ is already fixed as AdvP. However, the AdvP label cannot satisfy the verb's selectional requirement at the CI interface, so that the outcome is ruled out.

Moreover, (13b) can be correctly excluded under our labeling system, as follows:

(15) *Exactly is stranded at the specifier position of VP*

a. {{$_{\alpha}$ *wh*P}, {Subj, {*v**,
{{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}}
completion of the vP phase

b. {{$_{\alpha}$ *wh*P}, {Subj, {*v**,
{{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}
FC's identification of αs and γs as copies, respectively

c. {{$_{\alpha 3}$ *wh*P}, {Subj, {*v**,
{$_{\varepsilon}$ {$_{\gamma 2}$ {$_{\alpha 2}$ *wh*P}, {$_{\beta 2}$ AdvP}}, {$_{\delta}$ V, {$_{\gamma 1}$ {$_{\alpha 1}$ *wh*P}, {$_{\beta 1}$ AdvP}}}}}}}
labeling and transfer of ε

In (15a), the entire set of γ undergoes IM to the specifier of VP and only α undergoes further IM to the *v*P edge. After the *v*P phase is completed, FC assigns the marker of DEL on the lower copies of α and γ in (15b). In (15c), LA applies to the transfer domain ε. Since the most deeply embedded SO γ_1 and its constituents are DEL-marked copies, the determination of their labels is put off. Then, δ is labeled as VP. As for the labeling of γ_2, its sub-constituent β_2 can be labeled as AdvP, but the label of the DEL-marked α_2 still cannot be determined. Hence, γ_2 is uniquely labeled as AdvP. At this point, β_1 and γ_1 are also labeled as AdvP because their highest copies are labeled. Then, after labeling the transfer domain ε as VP, α_1 and α_2 are assigned the same label, *wh*P. Also in this case, the label of γ_1 violates the verb's selectional requirement because *wh*P fails to be selected by V at the CI interface. This crashes the derivation in (15). In this way, (14) and (15) are both excluded under our labeling mechanism, leading to the ungrammaticality of (12).

Recall that *exactly* can also undergo IM with its *wh*-associate.

(16) a. Who(m)/what *exactly* did she blame?
b. How many grapes/how much frosting *exactly* did he eat?
c. What/which pretzel *exactly* did he sell for a million dollars?

(Zyman (2022: 86))

Our analysis demonstrates that unlike in (12), the selectional requirements are properly satisfied in (16), though the *wh*-associates undergo IM out of VP. The examples in (16) are schematically analyzed as in (17).

(17) a. {{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {Subj, {*v**,
{{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}}
completion of the vP phase

b. {{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {Subj, {*v**,
{{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {V, {$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}}}}}
FC's identification of γs as copies

c. {{$_{\gamma 3}$ {$_{\alpha 3}$ *wh*P}, {$_{\beta 3}$ AdvP}}, {Subj, {*v**,
{$_{\varepsilon}$ {$_{\gamma 2}$ {$_{\alpha 2}$ *wh*P}, {$_{\beta 2}$ AdvP}}, {$_{\delta}$ V, {$_{\gamma 1}$ {$_{\alpha 1}$ *wh*P}, {$_{\beta 1}$ AdvP}}}}}}}
labeling and transfer of ε

In (17a), the entire set of γ undergoes IM to the specifier of VP and further IM to the *v*P edge. After the *v*P phase is completed, FC assigns DEL to the lower copies of γ in (17b). In (17c), LA applies to the transfer domain ε in the following way. First, since γ_1 and its constituents are DEL-marked copies, labeling of them is put off. Then, VP is selected as the label of δ. As for γ_2, its label cannot also be determined at this stage because it is a lower copy of γ. The transfer domain ε is uniquely labeled as VP. After that, LA applies γ_2 and its constituent, which means that γ_1 and its constituents can also receive their labels. If γ_1 is labeled as *wh*P as the result of ambiguous labeling, the *wh*P label satisfies the verb's selectional requirement at the CI interface. Therefore, γ_1 is labeled as *wh*P, resulting in the grammaticality of (16). Note that γ in (17) eventually reaches the sentence-initial position, as follows.

(18) {{$_{\gamma}$ {$_{\alpha}$ *wh*P$_{[+wh]}$}, {$_{\beta}$ AdvP}}, {C, …

In (18), γ can be ambiguously labeled. When γ receives the *wh*P label, the labeling

outcome will satisfy the clausal typing requirement at the CI interface.

Finally, as predicted in the previous section, *exactly* should be able to be stranded at the position where *wh*P is not required to become the label of {*wh*P, AdvP} in terms of selection. For example, the *v*P edge, except when it is the position for an external argument, is not subject to any selectional requirement. The prediction is borne out by (19).

(19) What did Muriel *exactly* put on the table with great care?

(Zyman (2022: 96))

In (19), *exactly* is stranded by IM of its *wh*-associate and immediately precedes the verb *put*. (19) is analyzed as follows (here, the derivation of the *v*P phase is omitted because the relevant domain is derived in the same way as (17)):

(20) a. {{$_{\alpha}$ *wh*P}, {C, {Subj, {T,

{{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {Subj, {*v**, {VP}}}}}}}}

completion of the CP phase

b. {{$_{\alpha}$ *wh*P}, {C, {Subj, {T,

{{$_{\gamma}$ {$_{\alpha}$ *wh*P}, {$_{\beta}$ AdvP}}, {Subj, {*v**, {VP}}}}}}}}

FC's identification of αs and Subjs as copies, respectively

c. {{$_{\alpha 2}$ *wh*P}, {C, {$_{\theta}$ Subj, {$_{\eta}$ T,

{$_{\zeta}${$_{\gamma}$ {$_{\alpha 1}$ *wh*P}, {$_{\beta}$ AdvP}}, {$_{\varepsilon}$ Subj, {$_{\delta}$ *v**, {VP}}}}}}}

labeling and transfer of ζ

In (20a), {$_{\alpha}$ *wh*P} undergoes IM from the *v*P edge to the CP edge. After the CP phase is

completed, FC identifies the two inscriptions of α and assigns the marker of DEL on the lower one in (20b). In (20c), LA applies to the transfer domain θ. First, after labeling of δ, ε is labeled as *v*P. At this stage, the label determination of Subj in the *v*P edge is postponed since it is also a copy left by IM. As for γ and its constituents, γ is uniquely labeled as AdvP because the label of α_1 cannot be determined and only the AdvP label of β is available. ζ can be labeled as either AdvP or *v*P, but the latter becomes the label because of T's selectional requirement. η is labeled as TP and since Subj in the specifier of TP is the highest copy, the copies of Subj receive the same label (e.g. DP) at this point. Then, the label of θ, the whole transfer domain, is determined as TP because of C's selectional requirement. Note that the φ-agreement between Subj and T does not take place for the purpose of labeling the set of {DP, TP}, which can be labeled as either DP or TP independently from the φ-agreement under our analysis (see also note 9 in Chapter 1). Finally, the highest DEL-marked copy of α receives the *wh*P label. Although γ has the AdvP label rather than the *wh*P label, the derivation does not crash because its position is not subject to any selectional requirement. Therefore, (19) is well-formed.[2]

In this way, under our labeling mechanism, we can account for the distribution of the *wh*-associated *exactly*. Thus, our labeling mechanism overcomes the empirical problems of Chomsky's (2013, 2015) and Mizuguchi's (2019) labeling systems.

In the remaining part of this subsection, we will overview another approach proposed by Zyman (2022) regarding *exactly*-stranding and point out its problems. We will thus demonstrate that our proposed analysis in terms of labeling is more adequate theoretically and empirically than his analysis.

To account for the distribution of the *wh*-associated *exactly*, Zyman (2022) proposes an analysis that makes use of the obligatory late adjunction, which is stated as follows:

(21) *Phase-Constrained Obligatory Late Adjunction*

For H a phase head and XP its associated spellout domain (= complement), adjunction within the HP phase must occur immediately before spellout of XP. (Zyman (2022: 86))

According to (21), no operation such as Merge and agreement can intervene between adjunction within the HP phase and spellout of XP because the spellout immediately follows adjunction. This accounts for the ungrammaticality of (22), which shows that *exactly* cannot be stranded within VP.

(22) * What did Muriel put *exactly* on the table with great care?

(Zyman (2022: 90))

Under Zyman's (2022) analysis, the ungrammaticality of (22) is derived as follows:

(23) a. [$_{v\text{P}}$ Subj *v*-V [$_{\text{VP}}$ what [t_{V} on the table]]] *completion of the vP phase*

b. [$_{v\text{P}}$ Subj *v*-V [$_{\text{VP}}$ what exactly [t_{V} on the table]]] *adjunction of exactly*

c. [$_{v\text{P}}$ Subj *v*-V [$_{\text{VP}}$ what exactly [t_{V} on the table]]] *spellout of VP*

d. * what … [$_{v\text{P}}$ Subj *v*-V [$_{\text{VP}}$ t_{what} exactly [t_{V} on the table]]]

(cf. Zyman (2022: 95, 96))

In (23a), the *v*P phase is completed. Then, in (23b), *exactly* is adjoined to its *wh*-associate within VP. In accordance with (21), at this point, VP must be spelled out because adjunction is executed. As a result, as shown in (23d), at this stage, the *wh*-associate is trapped there and cannot undergo IM to the *v*P edge because it is already spelled out with

VP. Therefore, the ungrammaticality of (22) obtains.

However, Zyman's (2022) analysis faces an empirical problem. Let us consider (24), which involves anaphor binding.

(24) a. ? I bought [him$_i$ [paintings *near himself*$_i$]].

b. ? [Which paintings *near himself*$_i$] did you buy him$_i$ *t*?

(24a) shows that the indirect object *him* binds *himself* included in the direct object. In (24b), the direct object undergoes IM to the sentence-initial position and *him* and *himself* can still establish a coreferential relation. This means that *himself* can be reconstructed within VP and bound by *him*. However, under Zyman's (2022) approach, the adjunct *near himself* is obligatorily late-merged. If it is adjoined after *which paintings* undergoes IM, as shown in (25), it should not be reconstructed within VP because it has not any copy within the VP domain.

(25) * [$_{v\text{P}}$ which paintings near himself$_i$ [$_{v\text{P}}$ I buy [$_{\text{VP}}$ him$_i$ [$t_{\text{which paintings}}$]]]]

In (25), *himself* cannot establish a coreferential relation with *him* because the former cannot be c-commanded by the latter.

Let us consider the derivation in (26) as well.

(26) a. [$_{v\text{P}}$ I buy [$_{\text{VP}}$ him [which paintings]]] *completion of the vP phase*

b. [$_{v\text{P}}$ I buy [$_{\text{VP}}$ him$_i$ [which paintings near himself$_i$]]]

adjunction of near himself

c. [$_{v\text{P}}$ I buy [$_{\text{VP}}$ him$_i$ [which paintings near himself$_i$]]] *spellout of VP*

d. * which paintings near himself$_i$ …

[$_{vP}$ I buy [$_{VP}$ him$_i$ [$t_{\text{which paintings near himself}_i}$]]]

In (26b), *near himself* is adjoined to *which paintings* so that *himself* is bound by *him*. However, after adjunction takes place, VP is immediately spelled out. In this case, *which paintings* cannot undergo IM to the sentence-initial position, as shown in (26d). Thus, Zyman (2022) incorrectly excludes (24b), which is the empirical problem of his analysis.

In contrast, our proposed analysis can account for the distribution of the *wh*-associated *exactly* in terms of labeling without facing such a problem: as *exactly* is, other adjuncts are merged with a *wh*-phrase before the latter is merged with the clausal spine.[3] Furthermore, in our labeling system, there is no need to assume late merge, which is essential to Zyman's (2022) analysis but is against the Strong Minimalist Thesis in that it increases computational burden (see Chomsky (2020, 2021)). In the following section, we will extend our labeling-based analysis of the *wh*-associated *exactly*-stranding to other stranding phenomena.

2.3.2. Quantifier Float

Quantifiers such as *all* can immediately precede noun phrases, as follows.

(27) Mary hates all the students. (Sedrins (2011: 207))

The quantifier *all* can also be separated from its associate nominal and immediately precede the verb, as shown in (28), where the associate is *the students*.

(28) The students were all failed by Mary. (Bošković (2004: 696))

Such a quantifier is called a floating quantifier. We now give an account of its distribution under our labeling system. Note that the discussion to follow is only concerned with the case where the associate is an internal argument (see, however, note 4). First, we follow Sportiche (1988) in assuming that floating quantifiers are stranded by IM of their associate noun.

Moreover, we assume that a floatable quantifier such as *all* and its associate noun establish an XP-YP configuration before it is merged with V, as shown in (29).

(29) $\{_{\alpha}\ \{_{FP}$ all$\}, \{_{DP}$ the students$\}\}$ α=FP/DP

Thus, in (29), α can be labeled as either F(unctional)P or DP as far as the outcome of labeling satisfies the requirements of selection and clausal typing.

First, the example of (30a), where the quantifier *all* is not floated, is analyzed as having the *v*P structure in (30b).

(30) a. Mary hates all the students. (Sedrins (2011: 207))

b. $\{\{$Mary$\}, \{v,$

$\boxed{\{_{VP}\ \{_{\gamma 2}\ \alpha_2, \beta_2,\}, \{_{VP}$ V, $\{_{\gamma 1}\ \{_{\alpha 1}$ all$\}, \{_{\beta 1}$ the, students$\}\}\}\}\}}$

In (30b), the entire set of γ undergoes IM to the specifier of VP. The *v*P phase is completed and FC applies and identifies γ_1 as a copy. Then, bottom-up labeling applies to the transfer domain. Since γ_1 is a copy marked with DEL, here shaded, labeling of the whole copy (and its constituents α_1 and β_1) is put off until labeling detects the highest copy in the transfer

domain. After the highest copy γ_2 is detected and labeled, the lower copy receives the same label across the board. Then, let us consider how γ_2 is labeled. First, α_2 and β_2 are labeled as FP and DP, respectively. At the same time, the lower copies α_1 and β_1 receive the same labels. Then, γ_2 can be labeled as either FP or DP. Since γ_2 is the highest copy within the transfer domain, the same label FP or DP is also assigned to the lower copy γ_1. The DP label of γ_1 satisfies the verb's selectional requirement at the CI interface, so only the derivation where the DP label is assigned to γ_1 and γ_2 converges at the CI interface.

Next, the example of (31), where *all* is floated, has the structure in (32).

(31) The students were all failed by Mary. (Bošković (2004: 696))

(32) a. $\{\{_{\gamma 2}\ \alpha_2, \beta_2,\}, \{v, \boxed{\{_{VP}\ V, \{_{\gamma 1}\ \{_{\alpha 1}\ \text{all}\}, \{_{\beta 1}\ \text{the, students}\}\}\}}\}\}$

the *v*P phase

b. $\{C, \boxed{\{_{TP}\ \beta_3, \{_{TP}\ T, \{_{vP}\ \{_{\gamma 2}\ \alpha_2, \beta_2\}, \{_{vP}\ v, \{VP\}\}\}\}\}}\}$ the CP phase

Regarding the structure of passives and unaccusatives, we assume that the internal argument does not raise to the specifier of VP due to the lack of the φ-feature in V, unlike in the case of transitives (Chomsky (2001)), but that *v* is a phase head that transfers its complement, just like transitive *v* (Legate (2003)). With these in mind, first, let us look at the *v*P phase. In (32a), the entire set of γ undergoes IM from the complement of VP to the *v*P edge. After the *v*P phase is completed and FC applies, bottom-up labeling applies to the complement of *v*P. Let us consider the labels of γ_1 and its constituents. In (32a), γ_1 and its constituents are DEL-marked copies. Thus, the determination of their labels is put off and then, the whole transfer domain is labeled as VP. Then, labeling applies to γ_1. It first applies to its constituents, and α_1 and β_1 are labeled as FP and DP, respectively. γ_1 is now labeled as either FP or DP. In (32a), γ_1 is labeled as DP for V's selectional restriction.

Next, in the CP phase in (32b), β undergoes movement from γ_2. FC applies to the CP phase and identifies β_2 as a copy. Then, the label of γ_2 is uniquely determined as FP after its constituent α_2 is labeled as FP. This does not yield an illegitimate outcome because the position of γ_2 is not subject to any restrictions of selection and clausal typing. Thus, quantifier float in (31) is possible.

Finally, our proposal predicts that the structure in (33) is ungrammatical.

(33) * $\{\beta_2, \{v, \boxed{\{_{VP}\ V, \{_{\gamma}\ \{_{\alpha}\ all\}, \{_{\beta 1}\ the, students\}\}\}}\}\}$

In (33), β undergoes IM out of γ to the *v*P edge, stranding *all* in the complement of VP. Therefore, after the *v*P phase is completed, β in γ is identified as a copy by FC. Bottom-up labeling then postpones the labeling of the lower β until the highest copy is detected or labeling of the transfer domain is finished. Thus, γ is automatically labeled as FP after its constituent α is labeled as FP. As a result, the derivation of (33) crashes because the FP label of γ violates the selectional requirement of V. This is borne out by (34).

(34) a. * The students arrived all.
b. * The students were arrested all.
c. * Mary hates the students all. (Bošković (2004: 682))

One might wonder, however, whether the example of (34c) would have another derivation in which the relevant requirement is satisfied because the verb *hate* and the DP *the students* are linearly and structurally adjacent. The derivation, however, will be as follows (where V-to-*v* movement is omitted due to space limitations):

(35) * {Mary, {*v*, {$_{VP}$ {$_{\beta 2}$ the, students}, {$_{VP}$ V, {$_{\gamma}$ {$_{\alpha}$ all}, {$_{\beta 1}$ the, students}}}}}}

In (35), β alone undergoes IM to the specifier of VP to undergo φ-agreement. Thus, when labeling applies to γ, the label of β_1, being a copy, is not determined yet and γ, therefore, is labeled as FP, leading to a violation of the selectional restriction.

This subsection has argued that the (im)possibility of quantifier float depends on whether the outcome of labeling satisfies the selectional restriction. Eventually, our analysis has given crucially with recourse to the notion of copy invisibility discussed in Chomsky (2013, 2015) an account of the following generalization proposed by Bošković (2004):[4, 5]

(36) Quantifiers cannot be floated in θ-positions. (Bošković (2004: 685))

In this sense, our labeling system, incorporating Chomsky's (2013, 2015) insight, has a wider empirical coverage than any labeling system that dispenses with the notion of copy invisibility such as Mizuguchi's (2019).

2.3.3. VP-Adverb-Stranding VP-Preposing

So far, we have seen how our labeling system neatly accounts for the stranding phenomena involving A and A-bar movement of arguments. In this subsection, we are concerned with movement of predicates.

In English, verbal phrases can be fronted to the sentence-initial position, as shown in (37).

(37) Ralph says that he will clean his room, and [clean his room] he will.

(Aarts (2018: 202))

In (37), the verb phrase *clean his room* is fronted to the sentence-initial position of the second conjunct. This phenomenon is called VP-preposing, VP-fronting or VP-topicalization.

Based on the observations by Huang (1993) and Takano (1995), we assume that the moved constituent is *v*P, including the lower copy of the external argument (see also Zagona (1988) and Emoto (2008) for a movement analysis of VP-preposing). Then, (37) is analyzed as having the following structure:

(38) $\{_{CP}\ v\mathrm{P}_{[+Top]}, \{_{CP}\ \mathrm{C}, \{_{TP}\ \mathrm{DP}, \{_{TP}\ \mathrm{T}, v\mathrm{P}_{[+Top]}\}\}\}\}$

In (38), *v*P undergoes IM to the specifier of CP. We assume that the clause where *v*P is preposed is interpreted as a topicalization construction at the CI interface by merging CP and *v*P headed by $v_{[+Top]}$.

*v*P can be modified by adverbs, as shown by the following examples (see Jackendoff (1972) and Ernst (1984) for the classification of adverbs):

(39) a. Ralph says that he will clean his room meticulously.

(Aarts (2018: 204))

b. Ralph says that he will carefully clean his room. (Aarts (2018: 205))

Let us assume here that the adverb and *v*P in (39) form an XP-YP configuration. Thus, the *v*P structure at the CP phase in (39) is analyzed as follows:

(40) {C, {$_{TP}$ DP, {$_{TP}$ T, {$_{\alpha}$ AdvP, *v*P}}}}

In (40), where ambiguous labeling is allowed, either AdvP or *v*P becomes the label of α. However, T should select *v*P at the CI interface and thus, α receives the label of *v*P. Then, it is predicted that *v*P cannot undergo movement stranding AdvP, as illustrated in (41).

(41) * {β_2, {C, {$_{TP}$ DP, {$_{TP}$ T, {$_{\delta}$ {$_{\gamma}$ AdvP}, {$_{\beta 1}$ Subj, {$_{\alpha}$ $v_{[+Top]}$, {VP}}}}}}}}

In (41), β undergoes IM from δ to the CP edge. After the CP phase is completed, FC identifies β_1 in δ as a lower copy. Then, bottom-up labeling applies to the transfer domain TP. Since β_1 in δ and its constituents are DEL-marked copies and labeling of them is deferred, only γ is labeled as AdvP. As a result, the label of δ is uniquely determined as AdvP. At this stage, δ has already been assigned AdvP and the outcome is evaluated as ill-formed at the CI interface due to the failure of the formation of a selectional relation with T, regardless of whether β_1 is later labeled after the label of the transfer domain is determined, i.e. when labeling learns that β_1 is the highest copy in the domain. This is borne out by (42).[6]

(42) a. * Ralph says that he will clean his room meticulously, and [clean his room] he will meticulously. (Aarts (2018: 204))

b. * Ralph says that he will carefully clean his room, and [clean his room] he will carefully. (Aarts (2018: 205))

Thus, the impossibility of stranding VP-adverbs by VP-preposing can be accounted for in terms of labeling.

Based on the analysis given so far, we predict that if VP-preposing pied-pipes the VP-adverbs, the resulting sentences sound acceptable. The schematic structure is given in (43).

(43) $\{\{_{\delta 2}\ \gamma_2, \beta_2\}, \{C,$

$\boxed{\{_{TP}\ DP, \{_{TP}\ T, \{_{\delta 1}\ \{_{\gamma 1}\ AdvP\}, \{_{\beta 1}\ DP, \{_{\alpha 1}\ v_{[+Top]}, \{VP\}\}\}\}\}\}\}}\}$

In (43), the entire set of δ undergoes IM to the specifier of CP. Since δ_1 itself is a DEL-marked copy, the labeling of α_1, β_1 and γ_1 are also postponed. After labeling applies to the transfer domain, β_1 is regarded as an XP-YP configuration which consists of DP and *v*P. Here if DP is used as the label of β_1, it cannot form a modification relation with the adverb such as *meticulously* and *carefully* at the CI interface under the assumption that modification is also a type of selection in a broad sense. Thus, β_1 must be labeled as *v*P. Then, labeling applies to δ_1, which also forms an ambiguous labeling configuration. In order to satisfy T's selectional restriction at the CI interface, δ_1 receives the *v*P label. Next, consider the label of δ_2, which is included in a different transfer domain from δ_1. As assumed earlier, clauses must have their edges occupied by elements of appropriate types for clausal typing purposes. In (43), if δ_2 is headed by $v_{[+Top]}$, CP can be interpreted as a topicalization construction. Thus, *v*P becomes the label of δ_2 so that $\{vP_{[+Top]}, CP\}$ is formed. Then, (43) does not give rise to any problem in terms of selection and clausal typing. This is borne out by (44), where the VP-adverbs are fronted with *v*P.

(44) a. Ralph says that he will clean his room meticulously, and [clean his room meticulously] he will. (Aarts (2018: 204))

b. Ralph says that he will carefully clean his room, and [carefully clean his room] he will. (Aarts (2018: 205))

Finally, let us consider VP-ellipsis. Johnson (2001) and Maeda (2018) argue that VP-ellipsis is derived from VP-preposing. If it is on the right track, the ill-formedness of (45), i.e. that adverbs cannot be stranded by VP-ellipsis, is predicted under our proposal:

(45) * {~~β2~~, {C, {{TP DP, {TP T, {δ {γ AdvP}, {β1 *v*P}}}}}}}

In (45), β undergoes IM to a higher position and is then deleted there. Importantly, the lower β becomes a DEL-marked copy, so that minimal search uniquely determines the label of δ as AdvP. As a result, (45) is ruled out for the same reason as (41): T fails to select *v*P at the CI interface. Although it has been reported that VP-adverbs cannot occur adjacent to the VP-ellipsis site (e.g. Jackendoff (1971), Brodie (1985), Lobeck (1995), Oku (1998) and Engels (2004)), we can, in fact, find acceptable cases pointed out in several studies (Philips (2003), Engels (2010), Larson (2013), Aarts (2018), Takaki (2020) and Suzuki (2022a, b)).[7]

(46) a. Mary read all the books quickly, and John did slowly.
(Phillips (2003: 56))

b. Ivan ran slowly and Iris did quickly. (Larson (2013: 618))

c. Ray will rudely interrupt the speaker, but Bruce will politely.
(Aarts (2018: 221))

d. Mary must beautifully walk and Peter must energetically, too.
(Takaki (2020: 65))

e. John fixed the car carefully, and Mary did carelessly.

(Suzuki (2022a: 34))

This suggests that these sentences do not have the structure in (45), i.e. the structure that causes a selectional violation at the CI interface. To put it differently, the fact suggests that VP-ellipsis is not derived from VP-preposing (see also Aelbrecht and Haegeman (2012)). Instead of (45), the examples in (46) are analyzed as having the structure in (47), where *v*P does not move out.

(47) $\{C, \boxed{\{_{TP}\ DP, \{_{TP}\ T, \{_{\delta}\ \{_{\gamma}\ AdvP\}, \{_{\beta}\ \sout{vP}\}\}\}\}}\}$

As shown in (47), under this analysis, β is a non-copy, and it will undergo PF deletion after transfer. Therefore, *v*P can become the label of δ, satisfying T's selectional restriction at the CI interface.[8]

In this subsection, we have demonstrated that our labeling system can be extended to movement of constituents other than arguments, such as *v*P, through the analysis of VP-adverb-stranding VP-preposing.

2.4. Conclusion

This chapter has proposed that the (im)possibility of a number of stranding phenomena can be accounted for under out labeling mechanism presented in Chapter 1. We have assumed that XP-YP configurations are ambiguously labeled, but if one of the constituents undergoes IM, the other uniquely becomes the label of the set because the label determination of lower copies of an SO is deferred. The outcome of labeling is

transferred and evaluated at the interfaces. With these assumptions in mind, we have shown that if stranding of YP occurs at the position where XP is required to become the label of the set {XP, YP} in terms of selection, it is ill-formed because the lower copy of XP cannot participate in the labeling of the set by examining (i) *exactly*-stranding, (ii) quantifier float and (iii) VP-adverb-stranding VP-preposing.

In sections 1.2.4 and 2.1, utilizing the data of the *wh*-associated *exactly*, we have pointed out the empirical problems of Chomsky's (2013, 2015) and Mizuguchi's (2019) labeling systems. This chapter has shown that our labeling system overcomes them. Furthermore, this chapter has demonstrated in detail how copies are labeled through the analysis of the three stranding phenomena. This deduces from economy considerations the effect of copy invisibility, which is only stipulated in Chomsky (2013, 2015).

Notes to Chapter 2

* Parts of this chapter appeared in Suzuki (2023), who concerns quantifier float and VP-adverb-stranding VP-preposing, and Suzuki (to appear), who accounts for the distribution of the *wh*-associated *exactly*.

1 In fact, *exactly* can also immediately precede its *wh*-associate, as follows.

(i) Exactly what did they say to you? (Zyman (2022: 88))

According to Zyman (2022: 88), (i) sounds callous, but that is not the case when *exactly* immediately follows its *wh*-associate or is stranded. At this moment, we cannot explain the difference between (i) and the *exactly*-following cases, which will be left for future research.

2 We also analyze (4), repeated in (i), as the cases where the stranding position of *exactly* is not subject to any selectional requirement.

(i) a. What/which pretzel did he sell for a million dollars *exactly*?
b. What did Harvey give to the president to annoy you *exactly*?
(Zyman (2022: 90))

Regarding these cases in which *exactly* is stranded at the sentence-final position, we partly follow Zyman (2022) in assuming that it is stranded at the rightward specifier of FocP from which its *wh*-associate undergoes IM to the higher position. See also Zyman (2022:

107) for alternative analyses regarding the derivation of (i).

3 Zyman (2022) also offers the following example, in which *exactly* immediately follows and is associated with an adjunct-*wh*-phrase.

(i) When/where/why/how *exactly* did she hide the donuts?

(Zyman (2022: 87))

Regarding this type of *wh*-associated *exactly*, our proposed analysis predicts that it can be stranded anywhere if its adjunct-*wh*-phrases do not have to be selected at the CI interface. However, Zyman (2022) does not present the data of this type of *wh*-associated *exactly*. Therefore, in future research, we must investigate whether this prediction is correct and whether our analysis can also win over Zyman's (2022) analysis on this point.

4 Our analysis can also explain the distribution of the floating quantifier whose associate is the external argument. Consider (i).

(i) a. The students all completely understood.
b. * The students completely all understood.
c. The students obviously all understood.
d. The students all obviously understood. (Bošković (2004: 685))

The examples of (i) show that the floating quantifier *all* can either precede or follow the sentential adverb *obviously*, whereas it cannot follow the manner adverb *completely*. The

example of (ib) is analyzed as having the following structure:

(ii) * {$_{CP}$ C, {$_{TP}$ DP, {$_{TP}$ T, {$_{vP}$ completely, {$_{vP}$ {$_{\alpha}$ FP, DP}, {$_{vP}$ *v*, VP}}}}}}

As argued by Bošković (2004), the ungrammaticality of (ib) is accounted for by appealing to the selectional relation between the verb *understand* (or the *v* head) and its external argument: in (ii), it fails to select DP *the students* because the FP label is assigned to the set of α at the position where the external argument is introduced. On the other hand, the examples of (ia, c, d) are ruled in at the CI interface because FP *all* occupies the position which is not subject to any selectional restriction. See also Kawamitsu (2021) for a rather different analysis of quantifier float in terms of labeling.

5 We have restricted the discussion of copy invisibility to the case of IM. However, the labeling mechanism proposed in this thesis may also be extended to the case of obligatory control, a case of the so-called Markovian gap (M-gap) in Chomsky's (2021) term, which is a copy relation assigned to externally merged elements by FC. That is, we may assume that lower copies in M-gaps are also invisible to labeling. Let us consider the following example of obligatory control, in which *all* is floated.

(i) * They tried all to leave. (Baltin (1995: 200))

(i) can be analyzed as follows:

(ii) … {$_{vP}$ {$_{\delta}$ they}, {$_{vP}$ *v*, {$_{VP}$ try, {$_{CP}$ C, {$_{TP}$ {$_{\gamma 2}$ α_2, β_2}, {$_{TP}$ T, {{$_{\gamma 1}$ {$_{\alpha 1}$ all}, {$_{\beta 1}$ they}}, {$_{vP}$ *v*, {VP}}}}}}}}}}

Given the assumption that control clauses do not constitute phases (see, e.g. Kanno (2008) and Grano and Lasnik (2018)), the boxed area in (ii) is a single transfer domain. In (ii), γ_1 undergoes EM to *v*P and then, undergoes IM to the specifier of TP in the embedded clause. Then, δ undergoes EM to *v*P in the matrix clause. After the matrix *v*P is completed, FC assigns a copy relation to γ_1 and γ_2, e.g. $<\gamma_2, \gamma_1>$, and β_2 and δ, $<\delta, \beta_2>$, which is a configuration of an M-gap. Subsequently, bottom-up labeling applies to the transfer domain, namely the boxed area. The labeling of γ_1 and its constituents is put off until γ_2 is labeled and the labeling of β_2 is also put off until bottom-up labeling applies to the whole transfer domain because β_2 is marked with DEL. Thus, β_2 is invisible when γ_2 is labeled. Since α_2 is not a copy and is labeled as FP, γ_2 is automatically labeled as FP. Then, γ_1 receives the same FP label. As a result, the FP label of γ_1 violates the selectional restriction of *leave*, resulting in a crash of the derivation at the CI interface. Thus, our proposal can account for the impossibility of quantifier float in (i), which involves an M-gap. However, we leave further discussion of this issue for future research.

6 In fact, PP adjuncts can be stranded by VP-preposing, as shown in (i) (see Pesetsky (1995) and Bode (2020)).

(i) He could go to the party with a friend.
   a. … and go to the party with a friend he did.
   b. … and go to the party he did with a friend. (Bode (2020: 11))

Our proposal predicts that *with a friend* cannot be stranded if it is in the position which is related to the selectional relation with T. For the moment, we assume that such a PP adjunct undergoes extraction and avoids violating the restrictions imposed by the CI interfaces.

7 Thoms and Walkden (2019) point out that VP-ellipsis and VP-preposing are impossible when they strand adverbs like *probably*, as shown in (i).

(i) a. * You said John would vote Green, and vote Green he will probably.
b. * Fred has not voted Green, but Bill has probably.

(Thoms and Walkden (2019: 167))

One might argue that both (i) and (ii) are excluded by T's selectional violation. We indeed analyze (ia) as ungrammatical because T selects AdvP at the CI interface. However, we claim that (ib) is ruled out by another factor, which means that we do not argue that the deleted constituent does not become invisible to labeling and not violate T's selectional requirement. It is well-known that adverbs like *probably* belong to sentence adverbs, those different from manner adverbs observed in (46). Thus, (ib) is assumed to be excluded by an independent constraint unique to adverbs like *probably*.

8 We assume that an SO to be deleted at the PF side is visible to minimal search for labeling, unlike Emoto (2013) and Maeda (2021), who assume its invisibility with respect to labeling.

Chapter 3

Pied-Piping Phenomena*

3.1. Introduction

In *wh*-interrogatives in English, if a *wh*-phrase is embedded under an object noun phrase, the *wh*-phrase cannot pied-pipe the entire object phrase, as follows:

(1) a. (?) A picture of which president does Jim own?[1] (Cable (2010: 138))

b. ?* A picture of whom did you see? (Abe (2015: 52))

Following Heck (2008) and Cable (2010), this thesis calls such a pied-piping "massive pied-piping." Interestingly, the massive pied-piping construction becomes acceptable when a *wh*-phrase pied-pipes the subject phrase, as shown in (2).

(2) a. A picture of which president hangs in Jim's office?
(Cable (2010: 138))

b. A picture of whom is on sale? (Abe (2015: 52))

However, massive pied-piping is restricted to simplex *wh*-interrogative sentences, the ones consisting of a single *wh*-interrogative clause. Thus, if it applies to a *wh*-containing subject phrase of an embedded clause in a long-distance manner, the resulting sentence sounds unacceptable, as illustrated in (3).

(3) ?* A picture of whom do you think is on sale? (Abe (2015: 52))

Furthermore, embedded *wh*-interrogatives do not allow for massive pied-piping regardless of whether the subject or the object is pied-piped, as follows:

(4) a. * I wonder a picture of whom is on sale.
b. * I wonder a picture of whom you saw.
c. * I wonder a picture of whom you think is on sale. (Abe (2015: 52))

The above examples have shown that massive pied-piping is restricted to the *wh*-containing subject of the simplex *wh*-interrogative sentence. However, the following examples of an embedded *wh*-interrogative, which involve the ellipsis of the embedded clause, exhibit an intriguing contrast: (5a) is well-formed, where the *wh*-containing object phrase further undergoes massive pied-piping to the sentence-initial position, while (5b) is ill-formed, where the *wh*-containing object phrase stays at the initial position of the embedded clause.

(5) a. He has a picture of somebody, but a picture of whom I don't know.
(Ross (1969: 281))
b. * He has a picture of somebody, but I don't know a picture of whom.
(Ross (1969: 262))

This type of construction is referred to as the "topicalized sluicing construction" by Abe (2015) and the "swamp construction" by Abels (2019). These terms reflect the authors' analyses of (5a) (see section 3.2).

This chapter mainly aims to address the following questions under labeling theory: (i) why the possible target of massive pied-piping is restricted to subjects of the simplex *wh*-interrogative sentences (e.g. (1)-(4)) and (ii) why massive pied-piping is applicable in embedded *wh*-interrogatives when the *wh*-containing object is further pied-piped to the sentence-initial position and the embedded clause is elided (e.g. (5)). In Chapter 1, we have proposed a new mechanism of labeling which makes crucial use of Mizuguchi's (2019) ambiguous labeling strategy and Chomsky's (2013, 2015) copy invisibility. As for the latter, we have also argued that it is derived from economy considerations. More specifically, we assume that our labeling mechanism applies in a bottom-up manner and assigns the same label to copies of a syntactic object (SO) within a single transfer domain in an across-the-board manner. This way of labeling implies that if its copies are separated by a transfer domain, they can be labeled differently; otherwise, they cannot. Pursuing this possibility leads to a unified answer to the questions above.

This chapter is organized as follows. Section 3.2 will provide an overview of previous research: Abe (2015) and Abels (2019). Section 3.3 will present our labeling mechanism as the main theoretical framework of this study and some assumptions on massive pied-piping. In section 3.4, we will account for the distribution of massive pied-piping in English based on our labeling mechanism. It will be shown that massively pied-piped expressions are doubly labeled, moving through different criterial positions. Section 3.5 will address the issue of criterial freezing (Rizzi (2006)), which our analysis would face. In section 3.6, we will examine such constructions as degree fronting and so-called discontinuous spellout as further consequences of our current approach. In these cases, the copies are analyzed as labeled differently so that the verb's selectional requirement is met in the original position and the criterial requirement is satisfied in the final landing site. Section 3.7 will conclude this chapter.

3.2. Previous Approaches

3.2.1. Abe (2015)

To provide a unified account of the examples of massive pied-piping in (1)-(5), Abe (2015) hypothesizes that massive pied-piping involves not only *wh*-movement but also topicalization and what is topicalized to a sentence-initial position is a *wh*-containing phrase. The involvement of topicalization is confirmed by the presence of island effects in the type of massive pied-piping in (5), which Abe (2015) calls topicalized sluicing construction. Relevant examples are given in (6), where (6b) and (6d) represent the intended island-violating readings of (6a) and (6c), respectively.

(6) a. ?* John met a person who took a picture of somebody, but a picture of whom I don't know. (Abe (2015: 48))

b. … but I don't know who John met a person who took a picture of. (Abe (2015: 49))

c. ?* John got mad because Mary took a picture of somebody, but a picture of whom I don't know. (Abe (2015: 48))

d. … but I don't know who John got mad because Mary took a picture of. (Abe (2015: 49))

(6a) violates the complex NP island constraint and (6c), the adjunct island constraint (see Ross (1967)). Moreover, Abe (2015) argues that the ungrammaticality of the examples repeated in (7) can be derived from the fact that topicalization is impossible within embedded interrogative clauses, which is shown in (8).

(7) a. * I wonder a picture of whom is on sale. (Abe (2015: 52))

b. * I wonder a picture of whom you saw. (Abe (2015: 52))

c. * I wonder a picture of whom you think is on sale. (Abe (2015: 52))

d. * He has a picture of somebody, but I don't know a picture of whom.
(Ross (1969: 262))

(8) a. Fred asked where John had put the skates.

b. * Fred asked where the skates John had put. (McCawley (1988: 492))

Under Abe's (2015) analysis, the *wh*-phrase undergoes covert *wh*-movement to satisfy the Q-feature carried by C and the *wh*-containing phrase independently undergoes overt topicalization to Spec, TopicP in the massive pied-piping construction. Crucially, assuming that both *wh*-phrases and topicalized phrases carry [Focus] features and move, Abe (2015) proposes a mechanism to determine which occurrence of a phrase bears a [PF] feature, as follows:[2]

(9) The decision of which occurrence of a non-trivial chain carries its [PF] feature is made upon the completion of producing the chain involved, except for the case where phrase carrying a feature F is properly contained in another phrase carrying F. In that case, the decision is postponed until both Fs are satisfied. (Abe (2015: 53))

According to Abe (2015), *wh*-movement is followed by topicalization of *wh*-containing phrases in the massive pied-piping construction. Since *wh*-phrases and topicalized phrases carry [Focus] features under Abe's (2015) system, it is yet to be determined which occurrence of the *wh*-phrase bears its [PF] feature immediately after the *wh*-phrase undergoes *wh*-movement. Rather, the decision is executed after the *wh*-containing phrase

undergoes topicalization. Using this mechanism, Abe (2015) gives an account of the (im)possibility of massive pied-piping in English.

First, let us consider (10a), which has the derivation in (10b-d), where angled brackets indicate that the decision of which occurrence of a phrase carries its [PF] feature is not made at the stage.

(10) a. A picture of whom is on sale? (Abe (2015: 52))

b. [$_{\text{TopicP}}$ [$_{\text{CP}}$ C_{Q} [$_{\text{TP}}$ [a picture of whom] is on sale]]]

c. [$_{\text{TopicP}}$ [$_{\text{CP}}$ <whom> C_{Q} [$_{\text{TP}}$ [a picture of whom] is on sale]]]

<[PF]> <[PF]>

d. [$_{\text{TopicP}}$ [a picture of whom][$_{\text{CP}}$ <whom> C_{Q} [$_{\text{TP}}$ <a picture of whom>

[PF]

is on sale]]] (Abe (2015: 54))

In (10c), *whom* undergoes *wh*-movement from the subject position to Spec, CP. Since *a picture of whom*, which contains *whom*, carries a [Focus] feature like *whom*, no decision is made at this point regarding which occurrence of *whom* carries its [PF] feature. Next, in (10d), *a picture of whom* undergoes topicalization from the subject position to Spec, TopicP above CP. At this point, it is possible to determine which occurrences of *whom* and *a picture of whom* is pronounced because their [Focus] features are satisfied. Here, Abe (2015) assumes the following condition on copy pronunciation, which says that the overt movement is prohibited when it has no PF effect:

(11) Given a chain C = (α_1, … α_n), the head of each link (α_i, α_j) cannot be pronounced unless it has an effect on PF output. (Abe (2015: 52))

If the head and tail of a chain produced by movement of a phrase are adjacent, the movement is string-vacuous, i.e. has no PF effect. Then, the head must not be pronounced and the tail has a [PF] feature, in conformity with (11). In this connection, Abe (2015) also assumes that in a sequence of lexical strings β-α-γ, β and γ are not adjacent to each other even if α is a member of a chain without a [PF] feature. Based on these assumptions, let us first look at how the copy pronunciation mechanism decides which copy of *a picture of whom* receives its [PF] feature in the representation in (10d). The two members of the chain of *a picture of whom* are not adjacent due to *whom* in Spec, CP in (10d), which means that the movement of *a picture of whom* can have a [PF] effect. Therefore, the upper occurrence of *a picture of whom* in Spec, TopicP is pronounced there rather than in the base-generated position. As for *whom*, the member of its chain in Spec, CP should not carry its [PF] feature because there are no pronounced interveners or chain members between them. It should be noted that the string *a picture of* does not count as an intervener between the two occurrences of *whom* because the string is not a member of the chain of *a picture of whom* itself but is just contained in the member. Thus, the two occurrences of *whom* are adjacent to each other. Nevertheless, as discussed earlier, since the lower occurrence of *a picture of whom* does not carry a [PF] feature, the lower occurrence of *whom* is also not pronounced. As a result, among the occurrences of *whom* and *a picture of whom*, only the upper copy of *a picture of whom* carries a [PF] feature. In this derivation, no crash occurs up to PF, which leads to the grammaticality of (10a).

Next, let us turn to (12a), which is ungrammatical and has the derivation in (12b-d), where T-to-C movement is omitted due to space limitations.

(12) a. ?* A picture of whom did you see? (Abe (2015: 52))

b. [$_{\text{TopicP}}$ [$_{\text{CP}}$ C$_{\text{Q}}$ [$_{\text{TP}}$ you saw [a picture of whom]]]]

c. [$_{TopicP}$ [$_{CP}$ <whom> C_Q [$_{TP}$ you saw [a picture of whom]]]]
<[PF]> <[PF]>

d. [$_{TopicP}$ [a picture of whom] [$_{CP}$ <whom> C_Q [$_{TP}$ you saw <a picture of
[PF] [PF]
whom>]]] (Abe (2015: 56))

In (12c), *whom* undergoes *wh*-movement from the object position to Spec, CP. In (12d), *a picture of whom* undergoes topicalization from the object position to Spec, TopicP above CP. The decision of which occurrences of *whom* and *a picture of whom* bear their [PF] features is executed at this point, in accordance with (9). Regarding *a picture of whom*, the upper occurrence in Spec, TopicP carries its [PF] feature due to the interveners *whom you saw*. As for *whom*, the string *you saw* also serves as an intervener between its two occurrences; the upper *whom* is therefore designated as carrying a [PF] feature. Here, it should be noted that in (12d), the two occurrences of *whom* are required to be pronounced, resulting in linearization failure caused by a contradiction concerning the pronunciation of *whom*.[3] Since both of them have a [Focus] feature, it is impossible to resolve the contradiction by deleting one of them. Thus, the derivation crashes, i.e., (12a) becomes ungrammatical.

Finally, let us consider the derivation of the topicalized sluicing construction in (13a) within Abe's (2015) framework.

(13) a. He has a picture of somebody, but a picture of whom I don't know.
(Ross (1969: 281))

b. [$_{TopicP}$ [$_{TP}$ I don't know [$_{CP}$ C_Q [$_{TP[Delete]}$ he has [a picture of whom]]]]]

c. [$_{TopicP}$ [$_{TP}$ I don't know [$_{CP}$ <whom> C_Q [$_{TP[Delete]}$ he has [a picture of
<[PF]> <[PF]>
whom]]]]]

d. [$_{TopicP}$ [a picture of whom] [$_{TP}$ I don't know [$_{CP}$ <whom> C_Q
[PF]
[$_{TP[Delete]}$ he has <a picture of whom>]]]] (Abe (2015: 58))

In (13c), *whom* undergoes *wh*-movement from the object position to Spec, CP within the embedded clause, which is followed by topicalization of *a picture of whom* from the object position in the embedded clause to Spec, TopicP in the matrix clause, as illustrated in (13d). At this point, the decision of which occurrences of *whom* and *a picture of whom* carry their [PF] features can be made. Regarding *a picture of whom*, the upper occurrence is pronounced because its occurrences are not adjacent to each other. As for *whom*, the members of its chain do not seem to be adjacent because of the intervening string *he has* between them. However, in this derivation, the embedded TP is assigned the label of [Delete] and will later be deleted at the PF interface. Consequently, this deletion makes the two occurrences of *whom* adjacent, so that the movement of *whom* becomes covert, i.e., a contradiction in linear order concerning the pronunciation of *whom* does not arise, unlike in (12). Since it is contained in the non-pronounced copy of *a picture of whom* as in the case of (10), the lower copy of *whom* is not pronounced. The topicalized sluicing construction in (13a) is derived in this way. In the case where the embedded TP is not deleted, *whom* in Spec, CP in (13d) carries a [PF] feature, leading to the contradictory ordering statement that *whom* precedes and follows the string *I don't know*. As shown in (14), even if the copy of *whom* in Spec, CP is not pronounced, the resulting sentence is still ungrammatical because it has a [Focus] feature in this non-sluiced case, and so it

cannot be deleted.

(14) * He has a picture of somebody, but a picture of whom I don't know he has.

(Abe (2015: 59))

Although Abe's (2015) analysis is compelling in that it gives a unified account of the constructions involving massive pied-piping in English, Abels (2019) points out some problems with Abe (2015). First, let us take a look at (15) and (16).

(15) a. ? Joe has a picture of Nixon, but a picture of Kennedy I don't know who has.

b. ?? Joe buys the New York Times, but read it I don't know who has.

(Abels (2019: 1220))

(16) a. * Joe has a picture of Nixon, but a picture of Kennedy I don't know who.

b. * Joe buys the New York Times, but read it I don't know who.

(Abels (2019: 1220))

In (15), *a picture of Kennedy* and *read it* are topicalized out of the interrogative embedded clauses. The examples of (16) illustrate that when sluicing is involved, the grammaticality degrades compared to when it is not. Since Abe (2015) assumes that topicalization and sluicing are also involved in the constructions involving massive pied-piping in English, the ungrammaticality of (16) is problematic for his analysis.

Moreover, (17) also casts doubt on Abe's (2015) framework, wherein topicalization and *wh*-movement co-occur within a single clause. However, as pointed out by Abels

(2019), topicalization cannot occur within interrogative clauses, as shown in (17) (see also Reinhart (1976)).

(17) a. * These petunias, did John plant?

b. * These petunias, when did John plant? (Abels (2019: 1220))

Finally, Abels (2019) raises Abe's (2015) theoretical problem. According to Abels (2019), the mechanism determining which occurrence of a phrase carries a [PF] feature is ad hoc. Furthermore, under the mechanism, (12a) is excluded due to the *wh*-moved *whom* in Spec, CP and *whom* within the topicalized phrase in Spec, TopicP both carrying [PF] features. However, Abe (2015) assumes in Chapter 2 that features including [PF] features are not copied by movement and are instead scattered (the topicalized sluicing construction is addressed in Chapter 4). Therefore, based on this assumption, if the copy of *whom* in the topicalized phrase in Spec, TopicP carries a [PF] feature, the copy of *whom* in Spec, CP should not carry a [PF] feature. Thus, the analysis of massive pied-piping in English proposed by Abe (2015) is at odds with the assumption on the feature composition of copies just mentioned.[4]

With these problems of Abe's (2015) analysis discussed so far in mind, let us turn to Abels (2019), who presents an alternative analysis of the topicalized sluicing construction.

3.2.2. Abels (2019)

As already mentioned in section 3.1, Abels (2019) refers to the topicalized sluicing construction in Abe (2015), as the "swamp construction," in the sense that neither

topicalization nor sluicing (e.g. TP-deletion) is involved in its derivation.

(18) He has a picture of somebody, but a picture of whom I don't know.

(Ross (1969: 281))

Using a wealth of data in German, Abels (2019) demonstrates that the swamp construction shares more properties with contrastive left-dislocation than with topicalization. A standard example of contrastive left-dislocation in German is shown in (19).

(19) Den Hans, den habe ich gesehen.
the.M.SG.ACC Hans dPR.M.SG.ACC have I seen
'Hans I have seen (him).' (Abels (2019: 1212))

In (19), the phrase *den Hans* is dislocated at the sentence-initial position and is followed by what is called a d-pronoun (e.g. *den* in (19)), which agrees in case and φ-feature with the dislocated phrase. Moreover, a V3 order obtains by the verb *habe* 'have' following the d-pronoun.

Under Abels' (2019) analysis, the swamp construction exemplified in (18) is derived from recursive contrastive left-dislocations and CP-deletion, as follows (the derivation is simplified here for ease of exposition):

(20) $[_{\text{CLD-P1}}\ [_{\text{CLD-P2}}\ [\text{a picture of whom}]_l\ \sout{[_{\text{CP2}}\ [\textit{wh}\text{.dPR } t_l]_k\ \text{he has } t_k]}]_j$
$[_{\text{CP1}}\ [\text{dPR } t_j]_i\ \text{I don't know } t_i]]$

(cf. Abels (2019: 1213))

In (20), *a picture of whom* is left-dislocated within the clausal complement of *know*, and the clausal complement of *know* itself is also left-dislocated. That is, contrary to Abe (2015), Abels (2019) assumes that not a nominal element (e.g. *a picture of whom*) but a clausal element containing it (e.g. *a picture of whom he has*) moves to the sentence-initial position in the derivation of the swamp construction. Since *a picture of whom* and the clausal complement of *know* undergo left-dislocation, the d-pronouns corresponding to the dislocated phrases are left behind in the embedded Spec, CP and the matrix Spec, CP, respectively. According to Abels (2019), the d-pronoun in the matrix Spec, CP is null in English. On the other hand, the d-pronoun in the embedded Spec, CP in (20) must serve as not only a d-pronoun but also a *wh*-phrase because a *wh*-feature of the interrogative C is assumed to be checked by the d-pronoun within CP_2 instead of *whom*, which is too deeply embedded to check C's *wh*-feature. Abels (2019) assumes that such a pronoun does not morphologically exist in English and German and the embedded CP including it must therefore be deleted in the swamp construction. In fact, the following sentence is ungrammatical due to the failure to realize the pronoun in question.

(21) * He has a picture of somebody, but a picture of whom he has I don't know.
(Ross (1969: 281))

As seen so far, Abels (2019) focuses on the swamp construction and attempts to explain its properties by reducing the construction to contrastive left-dislocation. However, Abels (2019) does not discuss massive pied-piping in simplex *wh*-interrogative sentences, which is accounted for by Abe (2015) along with the swamp construction, i.e. the topicalized sluicing construction in Abe's (2015) term. The relevant examples are repeated below as (22) and (23).

(22) a. (?) A picture of which president does Jim own? (Cable (2010: 138))

b. ?* A picture of whom did you see? (Abe (2015: 52))

(23) a. A picture of which president hangs in Jim's office? (Cable (2010: 138))

b. A picture of whom is on sale? (Abe (2015: 52))

(22) and (23) indicate that in simplex *wh*-interrogative clauses, massive pied-piping of objects is illegitimate but that of subjects is legitimate. Under Abels' (2019) contrastive left-dislocation approach, the ungrammaticality of (22) may be attributed to the presence of *wh*.dPR, which lacks its morphological counterpart. However, this analysis incorrectly excludes (23), as demonstrated in (24):

(24) * $[_{\text{CLD-P}}$ [a picture of whom]$_j$ $[_{\text{CP}}$ [*wh*.dPR $t_j]_i$ t_i is on sale]]

This problem appears to have a solution if it is assumed that subjects containing a *wh*-phrase remain in Spec, TP and do not undergo contrastive left-dislocation, as follows:

(25) $[_{\text{CP}}$ C $[_{\text{TP}}$ a picture of whom is on sale]]

Since the morphologically unrealizable pronoun *wh*.dPR is not involved in this derivation, the examples in (23) are correctly predicted to be acceptable. However, given Abels' (2019) assumption that it is *wh*.dPR that satisfies a *wh*-feature on C rather than the contained *wh*-phrase, it is unclear how the deeply embedded *wh*-phrase can satisfy a *wh*-feature on C in the absence of *wh*.dPR. Moreover, as repeated below in (26), massive pied-piping is not allowed within embedded clauses even when it targets subjects.

(26) * I wonder a picture of whom is on sale. (Abe (2015: 52))

If Abels (2019) were to explain the ungrammaticality of (26), a possible explanation would have to have recourse to the property of contrastive left-dislocation: *wh*.dPR cannot be morphologically realized. Consequently, Abels' (2019) approach might require the assumption that in the case of (23), *a picture of whom* can stay in Spec, TP whereas in the case of (26), it cannot stay in Spec, TP and must somehow be left-dislocated. This poses a challenge for Abels (2019).

3.3. Proposal

3.3.1. Labeling of Copies

This chapter accounts for the distribution of massive pied-piping in English within our labeling system presented in Chapter 1. Under the system, labels are assigned to SOs in the following manner:

(27) a. $\{_{\alpha}$ H, XP$\}$ α=H

b. $\{_{\alpha}$ XP, YP$\}$ α=XP/YP

c. XP … $\{_{\alpha}$ XP, YP$\}$ α=YP

In (27), α consists of the head H and the phrase XP and is assigned the label of H. In (27b), where α consists of the two phrases XP and YP, α is labeled as either XP or YP. Following Mizuguchi (2019), this labeling strategy is referred to as ambiguous labeling. In (27c), XP, which is one of the two phrases forming α, undergoes Internal Merge (IM). In this case, YP is uniquely designated as the label of α because the lower copy of XP does not

have its own label when the label of α is determined, which means that the label of XP is unavailable for labeling of α.

We have argued that labeling is applied to phasal complements when SOs are transferred to the interfaces. Then, the assigned labels are evaluated at the conceptual-intentional (CI) interfaces: for example, if they violate selectional requirements, they are ruled out. Phases are assumed to be *v*P and CP, so their complements VP and TP are labeled and transferred after they are completed. We also adopt a split CP structure (Rizzi (1997)). When CP is split, following Maeda (2010), we assume that the highest CP is a phase, but the transfer domain is TP rather than the complement of the highest CP.

Moreover, we have proposed that copies of a syntactic object are assigned the same label within a single transfer domain in an across-the-board manner, which is attributed to economy considerations and from which we derive copy invisibility (see Chapter 1 for details). This implies that if copies of a syntactic object belong to different transfer domains, they can be labeled differently; otherwise, they cannot.[5] This chapter argues that this labeling mechanism enables us to offer a unified explanation of massive pied-piping in English.

3.3.2. Assumptions on Massive Pied-Piping in English

This subsection introduces several assumptions we make to construct a labeling-based analysis of massive pied-piping in English. First, following Abe (2015), we assume that the derivation of massive pied-piping involves *wh*-movement and topicalization. However, our assumption is different from that of Abe (2015), who assumes that *wh*-phrases alone first undergo *wh*-movement and then, *wh*-containing phrases undergo topicalization across the moved *wh*-phrases. Unlike Abe (2015), we assume that *wh*-

containing phrases (e.g. *a picture of whom*) undergo both *wh*-movement and topicalization in massive pied-piping constructions. That is, the *wh*-containing phrases undergo movement to criterial positions twice. Note that this assumption does not seem viable at first sight. First of all, Abels (2019) raises the impossibility of topicalization crossing *wh*-phrases (see (16) and (17)). However, there are counterexamples (see also Bošković (2008)):

(28) a. To Bill, what will you give for Christmas?
b. And to Cynthia, what do you think you will send?
c. For Fred, what are you going to buy?
d. And on this shelf, what do you think we should put?
e. And a book like this, to whom would you give?

(Delahunty (1983: 384, 385))

One might also wonder whether the assumed movement from one criterial position to another criterial position violates criterial freezing (Rizzi (2006)). We will return to this issue in section 3.5, where the issue of the apparent violation of criterial freezing is resolved under our labeling system. Thus, let us keep our assumption here.

Next, we assume that *wh*-containing phrases form an XP-YP configuration in massive pied-piping constructions, as follows:[6]

(29) $\{_{\alpha}\ XP_{[Top]}, YP_{[Q]}\}$ $\alpha = XP_{[Top]}/YP_{[Q]}$

(29) illustrates that one of the phrases forming α, XP, carries a [Top] feature while the other, YP, carries a [Q] feature. For example, in the case of *a picture of whom*, it is

assumed that $\{_{XP[Top]}$ *a picture*$\}$ and $\{_{YP[Q]}$ *of whom*$\}$ form a set of $\{XP_{[Top]}, YP_{[Q]}\}$. Since ambiguous labeling is possible under our labeling mechanism, α is labeled as either $XP_{[Top]}$ or $YP_{[Q]}$. On the other hand, to satisfy the criteria involving [Top] and [Q], each phrase carrying one of the features must become the label of α to enter into a local structural relation with a relevant one of the Cs composing the split CP (Rizzi (1996)). For example, if α is assigned the label of $XP_{[Top]}$ and occupies Spec, $CP_{[Top]}$, Topic Criterion can be met (e.g. (30a)), and if α is labeled as $YP_{[Q]}$ in Spec, $CP_{[Q]}$, Q-Criterion can be fulfilled (e.g. (30b)).

(30) a. $\{\{_{XP[Top]}\ XP_{[Top]}, YP_{[Q]}\}, \{_{CP}\ C_{[Top]}, \ldots$

b. $\{\{_{YP[Q]}\ XP_{[Top]}, YP_{[Q]}\}, \{_{CP}\ C_{[Q]}, \ldots$

Thus, the two criterial configurations are permitted to be constructed in a single derivation when such an XP-YP configuration as in (29) is formed in the derivation.

3.4. Analysis of Massive Pied-Piping

In this section, we illustrate how the distribution of massive pied-piping in English is accounted for under our labeling mechanism.

First, let us consider (31), which shows that a *wh*-containing object cannot be a target of massive pied-piping in simplex *wh*-interrogative clauses.

(31) a. (?) A picture of which president does Jim own? (Cable (2010: 138))

b. ?* A picture of whom did you see? (Abe (2015: 52))

We analyze (31) as having the following derivation, wherein transferred domains are boxed and lower copies are shaded.

(32) a. $\{_{\alpha}\{_{DP[Top]}$ a picture$\}$, $\{_{PP[Q]}$ of whom$\}\}$

b. $\{\{_{\alpha 1}\ DP_{[Top]}, PP_{[Q]}\}, \{you, \{v, \ldots\}\}\}$

c. $\{\{_{\alpha 2}\ DP_{[Top]}, PP_{[Q]}\}, \{C_{[Q]},$
$\{you, \{T, \{\{_{\alpha 1}\ DP_{[Top]}, PP_{[Q]}\}, \{you, \{v, \ldots\}\}\}\}\}\}$

d. $\{\{_{\alpha 3}\ DP_{[Top]}, PP_{[Q]}\}, \{C_{[Top]}, \{\{_{\alpha 2}\ DP_{[Top]}, PP_{[Q]}\}, \{C_{[Q]},$
$\boxed{\{you, \{T, \{\{_{\alpha 1}\ DP_{[Top]}, PP_{[Q]}\}, \{you, \{v, \ldots\}\}\}\}\}}\}\}$

e. $\boxed{\{\{_{\alpha 3}\ DP_{[Top]}, PP_{[Q]}\}, \{C_{[Top]}, \{\{_{\alpha 2}\ DP_{[Top]}, PP_{[Q]}\}, \{C_{[Q]}, \ldots}$

In (32a), DP *a picture* and PP *of whom* form a set of α, which is then merged as a complement of the verb. In (32b), α undergoes IM to the *v*P edge (the copy of α occupying Spec, *v*P is notated with α_1 for ease of explanation). Next, in (32c), α undergoes IM to the first criterial position, Spec, $CP_{[Q]}$ (the copy of α occupying the first criterial position is notated with α_2). Subsequently, in (32d), α undergoes further IM to the second criterial position, Spec, $CP_{[Top]}$ (the copy of α occupying the second criterial position is notated with α_3). Since the CP phase is completed at this stage, TP is transferred, which means that the SOs contained in TP are labeled. Let us consider the labeling of α_1. Ambiguous labeling can apply to α_1 and the labeling outcome at the *v*P edge is not subject to any CI requirements, so either DP or PP can become the label of α_1 (or it might be the case that the intermediate copy α_1 is eliminated from the LF representation). Finally, in (32e), the remaining structure is transferred and the SOs contained in the domain are labeled. Based on the assumption that copies of a syntactic object are assigned the same label within a single transfer domain under our labeling system, it follows that both α_2 and α_3 are labeled

as DP or both are labeled as PP. Then, one of the relevant criteria, Topic Criterion or Q-Criterion cannot be satisfied because one of the phrases carrying a [Top] or [Q] feature cannot enter into a Spec-Head relation with a relevant C, causing the derivation to a crash.[7]

Next, let us consider the case of massive pied-piping of subjects, which is allowed in simplex *wh*-interrogatives.

(33) a. A picture of which president hangs in Jim's office?
(Cable (2010: 138))

b. A picture of whom is on sale? (Abe (2015: 52))

As further confirmation, we can add the following examples where massive pied-piping of *wh*-containing subjects is always possible, regardless of the type of verb:

(34) a. A picture of whom hung over the table? *unaccusative*

b. A picture of whom fell out of his backpack?

c. A picture of whom was taken by the famous photographer? *passive*

d. A picture of whom was sent to Mary by John?

e. A picture of whom brought tears to her eyes? *transitive*

f. A picture of whom jogged his memory?

(33) is analyzed as in (35).

(35) a. $\{\{_{DP[Top]}$ a picture$\}, \{_{PP[Q]}$ of whom$\}\}$

b. $\{\{_{\alpha 1}\ DP_{[Top]}, PP_{[Q]}\}, \{v, \ldots\}\}$

c. $\{\{_{\alpha 2}\,DP_{[Top]}, PP_{[Q]}\}, \{T, \{\{_{\alpha 1}\,DP_{[Top]}, PP_{[Q]}\}, \{v, \ldots\}\}\}\}$

d. $\{\{_{\alpha 3}\,DP_{[Top]}, PP_{[Q]}\}, \{C_{[Q]},$

$\boxed{\{\{_{\alpha 2}\,DP_{[Top]}, PP_{[Q]}\}, \{T_{[Top]}, \{\{_{\alpha 1}\,DP_{[Top]}, PP_{[Q]}\}, \{v, \ldots\}\}\}\}}$

e. $\boxed{\{\{_{\alpha 3}\,DP_{[Top]}, PP_{[Q]}\}, \{C_{[Q]}, \ldots}$

In (35b), α, which consists of DP and PP, undergoes EM to *v*P. In (35c), α undergoes IM from the *v*P edge to the subject position. In (35d), α undergoes further IM from the subject position to Spec, CP. Notice that in this case, C is not split because following Tanigawa (2018), we assume that a [Top] feature can be inherited by T from C. Then, if α_2 is labeled as DP after the CP phase is completed and its complement is transferred at the stage of (35d), Topic Criterion can be met because of the local structural relation between $DP_{[Top]}$ and $T_{[Top]}$. Given that copies of a syntactic object receive the same label in an across-the-board manner within a single transfer domain, α_1 is also labeled as DP and thus can satisfy the *v*P's selectional requirement. In (35e), Q-Criterion is met by labeling α_3 as PP. As a result, this derivation is legitimately derived.[8, 9, 10]

Recall here that subjects cannot always be the target of massive pied-piping, as shown in (36), where the embedded subject *a picture of whom* is preposed to the sentence-initial position.

(36) ?* A picture of whom do you think is on sale? (Abe (2015: 52))

Under our labeling-based analysis of massive pied-piping, (36) can be analyzed in the same way as the case of massive pied-piping of objects: the set of $\{\{_{DP[Top]}$ a picture$\}$, $\{_{PP[Q]}$ of whom$\}\}$ undergoes IM to the first criterial position in Spec, CP in the matrix clause and then, undergoes further IM to the second criterial position in a higher Spec,

CP. The two criterial positions are contained within a single transfer domain, which means that the two copies of the set are uniquely labeled as $DP_{[Top]}$ or $PP_{[Q]}$ and thus, one of the relevant criteria cannot be met, resulting in the ungrammaticality of (36).

Furthermore, recall that in embedded clauses, massive pied-piping is always impossible:

(37) a. * I wonder a picture of whom is on sale.
b. * I wonder a picture of whom you saw.
c. * I wonder a picture of whom you think is on sale. (Abe (2015: 52))

As also argued by Abe (2015), this can be reduced to the impossibility of topicalization in embedded interrogative clauses. Relevant examples are given in (8), repeated in (38).

(38) a. Fred asked where John had put the skates.
b. * Fred asked where the skates John had put.(McCawley (1988: 492))

Finally, let us consider the massive pied-piping construction involving clausal ellipsis, i.e. what has been called the "topicalized sluicing construction" in Abe's (2015) term or the "swamp construction" in Abels' (2019) term. As shown in (39), massive pied-piping of the object from within the embedded clause to the matrix CP edge is allowed when ellipsis of an embedded clause is involved, but when it stays at the embedded CP edge, the resulting sentence is unacceptable even if ellipsis is involved.

(39) a. He has a picture of somebody, but a picture of whom I don't know ~~he has~~. (Ross (1969: 281))

b. * He has a picture of somebody, but I don't know a picture of whom ~~he has~~. (Ross (1969: 262))

The ungrammaticality of (39b) is readily accounted for: it is reduced to the impossibility of topicalization in embedded interrogative clauses (e.g. (38)). Then, how does our analysis account for (39a)? We analyze (39a) as having the following derivation:[11]

(40) a. {know, {{α_1 DP$_{[Top]}$, PP$_{[Q]}$}, {C$_{[Q]}$, … }}

b. {{α_2 DP$_{[Top]}$, PP$_{[Q]}$}, {I, {*v*, {know, {{α_1 DP$_{[Top]}$, PP$_{[Q]}$}, {C$_{[Q]}$, … }}}}}

c. {{α_3 DP$_{[Top]}$, PP$_{[Q]}$}, {C$_{[Top]}$, {I, {T, {{α_2 DP$_{[Top]}$, PP$_{[Q]}$}, {I, {*v*, … }}}}}}}

d. {{α_3 DP$_{[Top]}$, PP$_{[Q]}$}, {C$_{[Top]}$, …}

In (40a), α undergoes IM from the complement position to the embedded Spec, CP, which is the first criterial position. In (40b), α undergoes IM to the matrix *v*P edge. Then, the matrix *v*P phase is completed and its complement is transferred. α_1 constitutes an ambiguous labeling configuration, but PP$_{[Q]}$ must become the label of α_1 rather than DP$_{[Top]}$ because *know* in this case should select an interrogative clause (the embedded clause in (39a) is interpreted in almost the same way as (*I don't know*) *who he has a picture of*). Next, in (40c), α undergoes IM to the matrix Spec, CP, and TP is transferred after the completion of CP. As for the labeling of α_2, the Spec, *v*P position is not subject to any requirements at the CI interface, so in this respect, either DP or PP can be the label of α_2. In (40d), α_3 is transferred and labeled. The labeling outcome is ruled in if DP is selected as the label of α_3 because Q-Criterion has already been satisfied in the embedded

Spec, CP and Topic Criterion is therefore satisfied in the matrix Spec, CP. Thus, since the two criterial positions belong to separate transfer domains in this case, massive pied-piping becomes possible.

As discussed so far, in our proposed analysis, massive pied-piping constructions in English are required to meet both Topic Criterion and Q-Criterion by moving the same *wh*-containing phrase to two criterial positions. That is, the set of $\{XP_{[Top]}, YP_{[Q]}\}$ must be labeled differently at the two criterial positions so that each phrase enters into a Spec-Head relation with a relevant C head (or instead, T, when it inherits a [Top] feature from C). This doubly-labeled structure is derived from our labeling mechanism: if the two criterial positions belong to separate transfer domains, it is possible that in one transfer domain, the set of $\{XP_{[Top]}, YP_{[Q]}\}$ receives the $XP_{[Top]}$ label while in another transfer domain, it receives the $YP_{[Q]}$ label. In this way, we can account for in terms of labeling (i) the subject/object asymmetry in the possibility of massive pied-piping in simplex *wh*-interrogative clauses and (ii) the topicalized sluicing (swamp) construction.

Recall, however, that (39a) is not allowed if ellipsis is not involved (see (14)). The issue regarding the obligatoriness of ellipsis will be briefly addressed in section 3.5.3, where we suggest that clausal ellipsis might be required by an independent PF-related factor.

3.5. Avoiding a Violation of Criterial Freezing

3.5.1. Criterial Freezing

This section addresses the issue of criterial freezing that might pose a problem for our analysis, which is defined by Rizzi (2006) as follows:

(41) *Criterial Freezing*

A phrase meeting a criterion is frozen in place. (Rizzi (2006: 112))

(41) indicates that the phrase moved to a criterial position cannot undergo further movement. For example, the ungrammaticality of (42b) is explained as violating (41).

(42) a. Bill wonders [which book C_Q [she read *t*]]

b. * Which book C_Q does Bill wonder [*t*′ C_Q [she read *t*]]?

(Rizzi (2006: 112))

In (42b), *which book* undergoes *wh*-movement twice: after undergoing IM to the embedded *wh*-criterial position, *which book* undergoes further IM to the matrix *wh*-criterial position. Since, in accordance with (41), *which book* is frozen when it reaches the embedded Spec, CP, its further movement is banned, giving rise to the ungrammaticality of (42b).

Now, we need to reconsider the examples of massive pied-piping in terms of criterial freezing. The relevant examples are repeated in (43).

(43) a. A picture of which president hangs in Jim's office?

(Cable (2010: 138))

b. He has a picture of somebody, but a picture of whom I don't know.

(Ross (1969: 281))

Recall that we have proposed that the fronted *wh*-containing phrase *a picture of whom* undergoes topicalization and *wh*-movement. If this proposal is on the right track, it

follows that the examples of (43) somehow void a criterial freezing effect. In the next subsection, adopting Maeda's (2019) feature-relativized criterial freezing, we discuss how massive pied-piping in English avoids a violation of criterial freezing.

3.5.2. Feature-Relativized Criterial Freezing

Modifying Rizzi's (2006) criterial freezing, Maeda (2019) proposes feature-relativized criterial freezing as an alternative definition of criterial freezing, which is stated in (44).

(44) *Feature-Relativized Criterial Freezing*

Criterial freezing is sensitive to exhaustive satisfaction of criterial features.

(Maeda (2019: 4))

In light of this definition, (45a) is ruled out while (45b) is ruled in.

(45) a. * XP_{α} … $\{XP_{\alpha}, C_{\alpha}\}$

b. $XP_{\alpha, \beta}$ … $\{XP_{\alpha, \beta}, C_{\alpha}\}$ (cf. Maeda (2019: 11))

(45a) shows that XP carrying a single criterial feature α cannot undergo IM from a criterial position headed by C_{α} because of the lack of motivation for further movement. On the other hand, (45b) indicates that XP carrying multiple criterial features can undergo IM from one criterial position to another criterial position: after satisfying α-Criterion at Spec, CP_{α}, XP can undergo IM to satisfy β-Criterion.

(42b), repeated in (46), corresponds to an example of (45a).

(46) * Which book C_Q does Bill wonder [*t*′ C_Q [she read *t*]]?

(Rizzi (2006: 112))

In (46), *which book* is prohibited from undergoing IM to the matrix C_Q because Q-Criterion has already been satisfied at the position headed by C_Q in the embedded clause.

According to Maeda (2019), the following Japanese sentences including *wh-sae* illustrate the case of (45b).

(47) a. [Kenta-wa [nani-sae tabere ba] yorokobu no]?
Kenta-TOP what-at.least eat if glad Q
'What is it that Kenta is glad if he at least eats?'

b. Yuki-wa [[Kenta-ga nani-sae tabeta ka] wakare ba]
Yuki-TOP Kenta-NOM what-at.least ate Q know if
manzoku desu.
satisfied is
'Yuki is satisfied if she knows what Kenta at least ate.'

(Maeda (2019: 12))

In (47), *wh-sae*, 'what-at.least' in English, is analyzed as having multiple criterial features and undergoing IM to a criterial position twice. More precisely, *wh-sae* has [Q] and [*sae*] features (see Kusumoto (2001) for the latter) and satisfies the relevant criteria by covert movement. In (47a), *wh-sae* undergoes covert IM to the embedded CP headed by *ba*, 'if' in English, to license a [*sae*] feature, and subsequently moves covertly to the matrix C_Q. In (47b), *wh-sae* undergoes covert IM to the embedded C_Q, undergoing further covert IM to the matrix CP headed by *ba*. In both cases, further movement of *wh-sae* from a criterial

position becomes possible, motivated by the need to satisfy another criterial feature, different from the one already satisfied. Maeda (2019) further argues that although feature-relativized criterial freezing operates on movement, regardless of whether it is overt or covert, in principle, overt movement is also subject to another type of criterial freezing, namely the maximality condition proposed by Rizzi (2015a, b, 2017). Thus, movement to multiple criterial positions is only possible when all the relevant movements are covert. The maximality condition is stated as follows (see section 3.5.3 for details):

(48) *Maximality*

Only maximal objects with a given label can be moved.

(Rizzi (2015a: 327))

Contrary to Maeda (2019), however, we discard the maximality condition imposed on overt movement and explore the possibility that criterial freezing is solely defined by Maeda's (2019) feature-relativized criterial freezing in the next subsection. Consequently, under this proposal, the possible examples of massive pied-piping like (43) do not violate criterial freezing, i.e. feature-relativized criterial freezing, because the massively pied-piped {XP, YP} in the construction has multiple criterial features, namely [Q] and [Top] features.

Furthermore, this proposed analysis can be extended to the cases of *wh*-movement of a clefted expression in *it*-cleft constructions. As shown in (49) and (50), *wh*-movement is allowed to apply to clefted phrases but not focus movement.

(49) a. What colour was it that her eyes were?

b. To whom was it that you gave the vodka? (Reeve (2011:169))

(50) a. ?* Green it was that her eyes were.

b. ?? To John it was that I gave the vodka. (Reeve (2011:169))

Given that a clefted phrase has a [Foc] feature and satisfies Focus Criterion at the cleft position immediately following *it* + a copula, the difference regarding the grammaticality between (49) and (50) can be accounted for by assuming feature-relativized criterial freezing: in (49), the clefted phrases can undergo further IM to the sentence-initial position because of a [Q] feature, while in (50), since the sentence-initial expressions have their [Foc] features satisfied at the cleft position once, the clefted phrases cannot undergo further focus movement from there, leading to a violation of feature-relativized criterial freezing.[12]

3.5.3. Apparent Criterial Freezing Effects

As briefly mentioned in the previous subsection, Maeda (2019) argues that not only feature-relativized criterial freezing but also the maximality condition, are imposed on overt movement. Adopting Chomsky's (2013, 2015) LA, Rizzi (2015a, b, 2017) argues that criterial freezing can be deduced from the condition, repeated in (51).

(51) Maximality: only maximal objects with a given label can be moved.

(Rizzi (2015a: 327))

Under Chomsky's (2013, 2015) LA and the maximality condition in (51), (42b) is analyzed as having the structure in (52).

(52) $\{_Q \boxed{\{_Q \{_Q \text{ which}\}, \{_n \text{ book, n}\}\}}, \{_Q \text{ Q}, \{_I \text{ she read } \_\}\}\}$

*

(cf. Rizzi (2015a: 328))

In (52), the set of $\{\{_Q \text{ which}\}, \{_n \text{ book, n}\}\}$ is assigned the Q label and undergoes IM from the complement position of *read* to Q, namely, the specifier position of the embedded CP. Though XP-YP configurations cannot be labeled as either XP or YP under Chomsky's (2013, 2015) LA, taking the strategy of feature sharing enables the embedded clause to be labeled with the shared feature Q. Note that in this structure, the maximal object with the Q label is the entire embedded clause. That is, the set of $\{_Q$ *which book*$\}$ is derivationally a non-maximal Q-labeled object and hence not movable. Thus, further movement of $\{_Q$ *which book*$\}$ is banned, leading to a criterial freezing effect.

Recall that the previous subsection has argued that massive pied-piping constructions and interrogative *it*-cleft constructions circumvent a violation of feature-relativized criterial freezing because the moved constituents have multiple criterial features. However, feature-relativized criterial freezing cannot account for the ungrammaticality of (53b).

(53) a. Non so [quanti ARTICOLI] Q abbiano pubblicato _, non quanti libri
'I don't know how many ARTICLES they have published, not how many books'

b. * [Quanti ARTICOLI] Foc non so _ Q abbiano pubblicato _, non quanti libri
'How many ARTICLES I don't know they have published, not how many books' (Rizzi (2017: 6))

In (53b), *quanti ARTICOLI* undergoes focus movement after *wh*-movement, which should be predicted to avoid a violation of feature-relativized criterial freezing, contrary to fact. Therefore, Maeda (2019) argues that the maximality condition, which is imposed on overt movement, is also necessary for the explanation of the ungrammaticality of (53b). Rizzi (2017) analyzes (53b) as having the following structure:

(54) $\{_Q \boxed{\{_Q \{_Q \text{ quanti}\}, \{_n \text{ ARTICOLI}_{Foc} \text{ n}\}\}}, \{_Q \text{ Q}, \{ \text{ abbiano pubblicato } \_\}\}\}$

*

(Rizzi (2017: 17))

In (54), the set of {*quanti ARTICOLI*} undergoes IM to Q and then, the resulting structure is also labeled as Q, in accordance with Earliness Principle (see Pesetsky (1989) and Pesetsky and Torrego (2001)). As a result, further movement of {*quanti ARTICOLI*}, namely focalization, is derivationally blocked by maximality.

However, there is good evidence that (53b) does not violate the maximality condition. Let us examine (55), where (55a) is the English counterpart of (53b).[13]

(55) a. * They have published articles and books, but how many ARTICLES I don't know they have published, not how many books.

b. They have published articles and books, but how many ARTICLES I don't know ~~they have published~~, not how many books.

(55) demonstrates that the grammaticality of (55a) improves when clausal ellipsis is applied. Therefore, if (55a) were to be an example of a violation of the maximality condition, (55b) would also be ungrammatical. This fact tells us that the ungrammaticality of (55a) comes from a different reason than a violation of the maximality condition and

can be resolved by ellipsis of the embedded clause. Thus, we cannot rely on the maximality condition to explain the ungrammaticality of (53b) and (55a). Based on this discussion, we argue that Maeda's (2019) feature-relativized criterial freezing alone is sufficient for explaining criterial freezing phenomena.

Then, regarding the ungrammaticality of (53b) and (55a), we argue that it might be attributed to a morpho-phonological condition unique to interrogative clauses: for example, the embedded interrogative clauses must be overtly marked as such and the absence of the overt *wh*-phrase in $CP_{[Q]}$ somehow requires C to be filled or the clause to be pronounced with rising intonation, which nonetheless is prohibited in embedded clauses.[14] We assume that these requirements can be nullified through PF deletion of the embedded interrogative clauses, giving rise to the amelioration effect in (55b). At this moment, we leave a detailed account of this matter for future research. However, it should be noted in passing that a contrast like (55) can also be found in the topicalized sluicing/swamp construction, as follows:

(56) a. * He has a picture of somebody, but a picture of whom I don't know he has. (Abe (2015: 59))

b. He has a picture of somebody, but a picture of whom I don't know ~~he has~~. (Ross (1969: 281))

In (56), just as in (55), the embedded clauses are interpreted as interrogative, and massive pied-piping of the embedded objects to the matrix CP is possible only when clausal ellipsis is involved. On the other hand, in interrogative *it*-cleft constructions, their embedded clauses are not interpreted as interrogative, and there is no need for them to be omitted (see (49)). In light of the similarities between (55) and (56), at least, it is

reasonable to consider that the necessity of ellipsis in the topicalized sluicing/swamp construction actually can be attributed to the unique property of the embedded interrogative clause, the details of which, however, remains to be given an explanation.[15]

In the discussion thus far, assuming that copies can be given different labels when included in different transfer domains, we have analyzed massive pied-piping in English as a case where copies of $\{XP_{\alpha}, YP_{\beta}\}$ are labeled differently in different transfer domains, thereby satisfying more than one criterion (e.g. α and β criteria). In the next section, we will shift our focus to cases where copies of {XP, YP} satisfy both selectional and criterial requirements by receiving different labels in different transfer domains. We will analyze three constructions - degree fronting, exclamatory constructions and discontinuous spellout - as examples of such cases.

3.6. Satisfying Selectional and Criterial Requirements

First, let us consider the cases of degree fronting. Relevant examples of degree fronting are given in (57). The adjectives with degree expressions (hereafter, Deg(ree)P) appear on the left side of the indefinite article.

(57) a. He's that/too/as/so reliable a man. (Bresnan (1973: 287))
b. How tall a man did Jane see? (Hendrick (1990: 249))

As shown in (57), a variety of degree expressions (*that*, *too*, *as*, so, *how*) are used in degree fronting. In (57a), the whole nominal phrase involving degree fronting functions as a predicate. In (57b), the entire noun phrase *how tall a man* is moved from the object position to the sentence-initial position. As will be clear later, we argue that in (57b), the

moved nominal expression receives a different label at the sentence-initial position and the original position.

Noun phrases involving degree fronting are argued to be an XP-YP configuration by many researchers, though the details of their analyses differ in, for example, whether it adopts the movement analysis or the base-generation analysis of the DegP (e.g. Bresnan (1973), Baker (1989), Radford (1989), Hendrick (1990), Kennedy and Merchant (2000), Matushansky (2002) and Troseth (2009)). Let us assume the following XP-YP configuration for noun phrases involving degree fronting:

(58) $\{\{_{\text{DegP}}$ how tall$\}, \{_{\text{DP}}$ a man$\}\}$

Thus, it produces ambiguous labeling, as shown in (59).

(59) $\{_{\alpha}$ DegP, DP$\}$ α=DegP
α=DP

Given this, (57b), repeated as (60), is analyzed as in (61), where irrelevant details are omitted.

(60) How tall a man did Jane see? (Hendrick (1990: 249))

(61) a. … $\{v, \boxed{\{_{\text{VP}} \{_{\alpha 2}$ DegP$_{[Q]}$, DP$\}, \{_{\text{VP}}$ V$_{[\varphi]}, \{_{\alpha 1}$ DegP$_{[Q]}$, DP$\}\}\}\}$}

b. $\boxed{\{_{\text{CP}} \{_{\alpha 3}$ DegP$_{[Q]}$, DP$\}, \{_{\text{CP}}$ C$_{[Q]}$, } …

The boxed areas in (61a, b) indicate that α_3 is included in a different transfer domain from α_1 and α_2. In (61a), α_1 and α_2 are required to be labeled as DP because the verb *see* selects

a nominal element. On the other hand, turning to (61b), α_3 must be labeled as DegP. This is because Q-Criteiron is satisfied when the DegP label is selected. Therefore, although α_1, α_2 and α_3 form a copy relation, they are analyzed as having different labels, due to the restrictions on each position.

The same argument holds for the following examples of exclamatory constructions.

(62) a. What lovely teeth you have, my dear! (Elliot (1974: 233))

b. What a delicious dinner you've made!

(Zanuttini and Portner (2003: 54))

Assuming that the fronted nominal is analyzed as an XP-YP structure consisting of *wh*P headed by *what* and DP *lovely teeth*/*a delicious dinner*, the examples of (62) have the following derivation, where [exclamative] features are notated as [Excl]:

(63) a. … $\boxed{\{v, \{_{VP} \{_{\alpha 2}\ wh\text{P}_{[Excl]}, \text{DP}\}, \{_{VP}\ \text{V}_{[\varphi]}, \{_{\alpha 1}\ wh\text{P}_{[Excl]}, \text{DP}\}\}\}}\}$

b. $\boxed{\{_{CP} \{_{\alpha 3}\ wh\text{P}_{[Excl]}, \text{DP}\}, \{_{CP}\ \text{C}_{[Excl]},}$ …

As in the case of degree fronting, α_1 and α_2 are labeled as DP for selection at the stage in (63a). On the other hand, α_3 is assigned the *wh*P label because Exclamative Criterion must be met.

Next, let us turn to the following examples:

(64) a. You think they went *how far inside the tunnel*?

b. *How far inside the tunnel* do you think they went?

(Radford (2016: 361))

In (64b), *how far inside the tunnel* moves from the complement position of the verb in the embedded clause to the sentence-initial position. (64b) can be analyzed in the same way as the cases of degree fronting and exclamatory constructions by assuming that the moved element forms an XP-YP configuration: in the original position, the set of {*wh*P, PP} is labeled as PP for the selectional requirement of the verb *go*, while in the final landing site, it is labeled as *wh*P for Q-Criterion. If *how far inside the tunnel* forms an XP-YP configuration, we predict that the PP *inside the tunnel* can be stranded by IM of *how far*, as shown in (65) (the lower copy of the external argument is omitted due to space limitations).

(65) a. $\{_{CP}$ *wh*P$_{[Q]}$, $\{_{CP}$ C$_{[Q]}$, … $\{_{VP}$ go, $\{_{\alpha}$ *wh*P$_{[Q]}$, PP$\}\}\}\}$

b. $\{_{CP}$ *wh*P$_{[Q]}$, $\{_{CP}$ C$_{[Q]}$, …

$\{_{CP}$ $\{_{\alpha 2}$ *wh*P$_{[Q]}$, PP$\}$, $\{_{CP}$ C, … go, $\{_{\alpha 1}$ *wh*P$_{[Q]}$, PP$\}\}\}\}\}$

In (65a), PP is stranded in the complement position of the verb *go*. In this case, since the verb *go* selects PP, no problem arises even if *wh*P undergoes IM and cannot be a candidate for the label of α. In addition, Q-Criterion can also be satisfied by moving only *wh*P. In (65b), PP is stranded in the embedded CP phase edge. In this case, PP can be chosen as the label of α_1 for selection because both constituents in α_1 are lower copies. Moreover, since no restrictions are imposed on the label of α_2, again, no problem arises even if *wh*P is a lower copy and PP is automatically selected as the label. This is borne out by the following examples of so-called discontinuous spellout:

(66) a. *How far* do you think they went *inside the tunnel*?

b. *How far* do you think *inside the tunnel* they went?

(Radford (2016: 361))

In light of the discussion above, our labeling mechanism predicts that degree fronting like (67) is also well-formed, where only DegP move, because the DP label of α and the DegP label in the edge of CP meet the selectional requirement and Q-criterion, respectively.

(67) $\{_{CP}\ DegP_{[Q]}, \{_{CP}\ C_{[Q]}, \ldots \{_{VP}\ V, \{_{\alpha}\ DegP_{[Q]}, DP\}\}\}\}$

However, as shown in (68), such sentences are ungrammatical, contrary to the prediction.

(68) a. Texas is indeed that large a state.

b. * It is indeed **that large** that Texas is a state. (Clefting)

c. * What Texas is indeed a state is **that large**. (Pseudoclefting)

d. * … and **that large** Texas is indeed a state. (Topicalization)

e. * … How is Texas indeed a state? - ***That large**. (Answer fragment)

(cf. Osborne (2021: 257))

We assume here that (68) can be ruled out independently of labeling: by Left Branch Condition imposed on noun phrases in English (Ross (1986)), which prohibits extraction of the leftmost constituent of a nominal expression from the set labeled as DP. In fact, such extraction is possible in Japanese (see Yatabe (1996) and Takahashi and Funakoshi (2013)) and Serbo-Croatian (see Bošković (2005)), which may be explained if we assume that Left Branch Condition does not hold for those languages. Therefore, the

ungrammaticality of (68) would not cause a crucial problem for our proposal.[16]

3.7. Conclusion

This chapter has proposed that in massive pied-piping in English, non-*wh*-phrases undergo both topicalization and *wh*-movement. Integrating this assumption with our labeling mechanism, we have argued that in possible cases of massive pied-piping, the copies of the moved phrase can meet both Topic and Q-Criteria because they belong to separate transfer domains and can therefore be assigned different labels; conversely, in impossible cases of massive pied-piping, one of the two criteria cannot be met because the relevant copies are included in a single transfer domain and therefore automatically receive the same label.

Moreover, we have addressed the issue of criterial freezing. In this respect, we have argued that feature-relativized criterial freezing proposed by Maeda (2019) alone is sufficient for explaining criterial freezing phenomena. Therefore, massive pied-piping in English can be legitimately derived without yielding criterial freezing effects.

Finally, we have demonstrated that our proposal is more promising by arguing that in several constructions such as degree fronting, copies of the moved phrase receive different labels in different transfer domains, so that both selectional and criterial requirements are satisfied.

Notes to Chapter 3

* Section 3.6 in this chapter is a revised version of section 4.1 in Suzuki (2023).

1 In Cable (2010), (1a), repeated in (ia), is marked with (?) to indicate its marginality, and contrasted with the worse examples of (ib, c) marked with *.

(i) a.(?)A picture of which president does Jim own?
b. * No picture of which president does Jim own?
c. * Only picture of which president does Jim own? (Cable (2010: 138))

In contrast, as shown in (2a), repeated in (ii), massive pied-piping of subjects is perfectly possible, which means that (ia) and (ii) clearly differ in grammaticality.

(ii) A picture of which president hangs in Jim's office? (Cable (2010: 138))

2 Abe (2015) simply assumes [Focus] features as triggering movement of a phrase. That is, carrying a [Focus] feature does not entail that the phrase that does so receives a focus interpretation. Rather, the interpretation of the phrase depends on its position: if it occupies Spec, TopicP, it receives a topic interpretation. Thus, according to Abe (2015), [Focus] features can be rephrased as [A´] or [Operator] features.

3 One might wonder whether *whom* within Spec, TopicP does not carry a [PF] feature because it is adjacent to *whom* in Spec, CP in (12d). However, the two occurrences do not produce a chain by movement. Thus, both can carry [PF] features independently.

4 Abels (2019) further discusses the problems of Abe (2015). For example, although Abe (2015) argues that what is preposed to the sentence-initial position in the topicalized sluicing construction is DP, Abels (2019) presents evidence supporting the claim that it is CP (see Abels (2019) for details). However, following Abe (2015), this thesis still assumes that the preposed constituent is DP. We leave this issue for future research.

5 It should be noted that copies in different transfer domains may not always be labeled differently. Consider the examples of (i).

(i) a. Whatever books she has *is/are marked up with her notes.
(Bresnan and Grimshaw (1978: 339))

b. What books he has written hasn't/*haven't been established.
(McCawley (1988: 432))

The number agreement and the selectional restriction of the verb *mark* in (ia) show that the subject in the matrix clause is interpreted as a free relative. On the other hand, those in (ib) show that the subject in the matrix clause is interpreted as an interrogative clause. As argued in section 1.2.3, both a free relative and an interrogative clause are analyzed as forming {*wh*P, CP}: if it is labeled as *wh*P, it is interpreted to be a free relative; it is interpreted to be an interrogative clause if it is labeled as CP. Then, the examples of (ia, b) are analyzed as (iia, b), respectively.

(ii) a. $\{_{TP}\ \{_{whP}\ wh\text{P, CP}\}, \{_{TP}\ \text{T, …}\ \boxed{\{_{VP}\ \text{mark, }\{_{whP}\ wh\text{P, CP}\}\}}\}\}$ (ia)

b. $\{_{TP}\ \{_{CP}\ wh\text{P, CP}\}, \{_{TP}\ \text{T, …}\ \boxed{\{_{VP}\ \text{establish, }\{_{CP}\ wh\text{P, CP}\}\}}\}\}$ (ib)

As shown in (iia), the subject should be labeled as *wh*P, given the interpretation as a free relative, and its copy in the original position should also be labeled as *wh*P for the selectional requirement of the verb *mark*. On the other hand, in (iib), the subject should be labeled as CP, because of the interpretation as an interrogative clause, and its lower copy should also be labeled as CP for the selectional requirement of the verb *establish*. In this way, the examples in (i) show that copies appearing in different transfer domains receive the same label when such labeling is required for interpretation. We leave a more detailed investigation of this issue for future research.

6 One might argue that *wh*-containing phrases in massive pied-piping should have the following structure rather than {XP, YP}.

(i) {a, {picture, {of, {who}}}}

(i) illustrates that the indefinite article *a* is merged to {picture, {of, {whom}}}, in which *picture* already forms a set with *of whom*. However, let us consider the following example, where the phrase *which picture* is separated from the phrase *of who* through movement.

(ii) Which picture have you chosen of who? (Radford (2016: 378))

Given the possibility of (ii), the assumption that *wh*-containing phrases in massive pied-piping form an XP-YP configuration may be supported. Note in passing that we do not analyze *of whom* in (ii) as occupying the complement position of the verb because, if so, it would violate the verb's selectional requirement. Therefore, in this regard, we argue

that *of who* occupies a higher position than the complement position of the verb, like *exactly* stranded at the sentence-final position (see note 2 in Chapter 2).

7 The following example seems to be problematic for our analysis.

(i) A: He has a picture of somebody.
B: Oh, a picture of whom?
B′:* A picture of whom does he have? (Abe (2015: 50))

In (iB), *he has* is omitted and *a picture of whom* remains as a remnant. If *a picture of whom* were to be moved to the sentence-initial position, our analysis would incorrectly predict that (iB) is ungrammatical, like (iB′). Following Bechhofer (1976), we assume that in (iB), movement of *a picture of whom* does not take place and non-constituent deletion is applied, as follows:

(ii) Oh, ~~he has~~ a picture of whom?

If *a picture of whom* does not undergo IM, (iB) does not become an obstacle to our analysis. Furthermore, the following example provides support for the in-situ analysis of (iB).

(iii) A: He doesn't have any pictures of John.
B: Any pictures of whom?

(iii) shows that the negative polarity item *any* (*pictures of whom*) is properly bound and licensed by the negation, which means that its movement does not occur.

However, at this moment, questions remain about why there is no need for movement of the *wh*-phrase and how the in-situ *wh*-phrase is interpreted in (ii). We will leave these matters for future research.

8 One might wonder why a [Top] feature rather than a [Q] feature must be inherited by T from C. Let us demonstrate what happens if a [Q] feature is inherited by T instead of a [Top] feature. (35d) is repeated in (i):

(i) $\{\{_{\alpha 3}\, DP_{[Top]}, PP_{[Q]}\}, \{C_{[Q]},$
$\{\{_{\alpha 2}\, DP_{[Top]}, PP_{[Q]}\}, \{T_{[Top]}, \{\{_{\alpha 1}\, DP_{[Top]}, PP_{[Q]}\}, \{v, \ldots\}\}\}\}\}$

If T inherits a [Q] feature, α_2 must be labeled as $PP_{[Q]}$ to satisfy Q-Criterion. Then, since α_1 belongs to the same transfer domain as α_2, it also receives the $PP_{[Q]}$ label. However, at the CI interface, *v* is required to select $DP_{[Top]}$ as the subject. Thus, the outcome of labeling, the $PP_{[Q]}$ label of α_1, violates the *v*'s selectional requirement. Therefore, only the option of [Top] feature inheritance makes the derivation converge.

9 If a [Top] feature is not inherited by T and remains in C, $\{DP_{[Top]}, PP_{[Q]}\}$ must undergo movement twice within a single transfer domain, i.e. to Spec, $CP_{[Q]}$ and to Spec, $CP_{[Top]}$, to satisfy both Topic and Q-Criterion. Such a derivation is excluded in the same way as the case of massive pied-piping of objects. See the explanation of (32).

10 We should consider the possibility that the set of {{$_{DP}$ a picture}, {$_{PP}$ of whom}} is formed in such a way that PP has a [Q] feature while DP does not have a [Top] feature, because it seems to be able to undergo massive pied-piping as well: in such a case, since there is no need to satisfy Topic Criterion, {DP, $PP_{[Q]}$} only satisfies Q-Criterion and is thus labeled only once as $PP_{[Q]}$ when transferred. Thus, it would wrongly be predicted that massive pied-piping is applicable to *wh*-containing objects, contrary to fact. However, it should be noted that in that case, DP need not (and must not) be pied-piped, as shown by the following sentence.

(i) Of whom did you see a picture? (Ike-uchi (1996: 533))

We argue that if an object DP lacks a [Top] feature, massive pied-piping of the object is excluded by economy considerations which require that movement targets the smallest constituent whenever possible (Radford (1997: 277)). Thus, the sole movement of $PP_{[Q]}$ as in (i) takes precedence over the massive pied-piping of {DP, PP}. Therefore, massive pied-piping of *wh*-containing objects is still excluded when they do not carry a [Top] feature.

Let us turn to the cases of massive pied-piping of *wh*-containing subjects. Regarding the subjects, unlike the objects, the sole movement of PP is excluded independently (i.e. subject condition (Chomsky (1973)). It then follows that the smallest movable constituent is {DP, PP}, which means that massive pied-piping of {DP, PP} is the only derivational step that enables the whole derivation to converge. Thus, massive pied-piping of subjects is possible even when they lack a [Top] feature.

However, at this moment, our proposed analysis cannot correctly exclude the

ungrammatical example of (36) when the set of {{a picture}, {of whom}} lacks a [Top] feature. Thus, we must carefully consider the issue of the distributions of [Q] and [Top] features. We will leave this matter for future research.

11 One might wonder whether (39a) can be derived from (i), where *a picture of whom* undergoes IM within the embedded clause and the embedded clause itself is preposed to the sentence-initial position.

(i) He has a picture of somebody, but a picture of whom ~~he has~~ I don't know.

This type of derivation is adopted by Abels (2019), but under our analysis, (i) is excluded as in (32) because *a picture of whom* must undergo both topicalization and *wh*-movement within the embedded clause, which fails to meet one of the relevant criteria, causing the derivation to a crash. Furthermore, even when *a picture of whom* only has a [Q] feature, and the embedded clause is preposed by its [Top] feature, (i) is excluded by economy considerations, based on the fact that there is no need for pied-piping of the entire *a picture of whom* (see also note 10).

(ii) He has a picture of somebody, but who (he has a picture of) I don't know.
(Abels (2019: 1206))

12 Rizzi (2015b) also recognizes that examples like (49) are possible, where clefted phrases undergo *wh*-movement in *it*-cleft constructions and argues that such cases avoid a violation of maximality by having the following derivation:

(i) a. Foc_{Q} it was [$_{FocPCleft}$ what colour Foc_{Cleft} that her eyes were]

b. Foc_{Q} it was [$_{FocPCleft}$ what colour Foc_{Cleft} _] [that her eyes were]

c. [$_{FocPCleft}$ what colour Foc_{Cleft} _] Foc_{Q} was it [that her eyes were]?

(cf. Rizzi (2015b: 39))

First, in (ia), *what colour* satisfies Focus Criterion by IM to Foc_{Cleft}. Then, in (ib), the cleft sentence *that her eyes were* is extraposed out of $FocP_{Cleft}$. Finally, in (ic), the entire $FocP_{Cleft}$ containing *what colour* undergoes IM to Foc_{Q} rather than *what colour* itself. In this derivation, preposing applies to the highest Foc_{Cleft} label assigned to the clausal remnant and obeys maximality. However, this approach of Rizzi (2015b) cannot explain the ungrammaticality of (50), where the clefted phrases undergo focus movement. In contrast, our proposed analysis can account for the difference between (49) and (50) without stipulating such an extraposition of cleft sentences.

13 One might wonder whether the same amelioration effect as in (55) can be observed in the case of Italian. We leave this issue for future research.

14 See Chomsky (2015) and Epstein, Kitahara and Seely (2015b) for an explanation of criterial freezing in terms of the interaction of the labeling strategies of copy invisibility and feature sharing.

15 Maeda (2019) also presents (i) as an example which cannot be explained by feature-relativized criterial freezing.

(i) * Who thinks that which problem, Mary hates? (Bošković (2008: 254))

In (i), the *wh*-phrase *which problem* undergoes topicalization within the embedded clause. Based on the assumption that in-situ *wh*-phrases undergo covert movement, Maeda (2019) analyzes the ungrammaticality of (i) as violating the maximality condition, because (i) cannot be excluded by feature-relativized criterial freezing in that *which problem* seem to have multiple criterial features: [Q] and [Top]. However, since we do not assume the maximality condition, an alternative account should be explored. Although Maeda (2019) assumes covert movement of in-situ *wh*-phrases, we follow Stroik (1996) and Simpson (2000) and so on in assuming that in-situ *wh*-phrases do not covertly move. This means that the ungrammaticality of (i) is due to a different factor other than a violation of criterial freezing. At this moment, we cannot present any further discussion, which will be left for future research.

16 Moreover, Radford (2016: 393) reports the following examples sourced from radio and TV broadcast or the internet.

(i) a. Let's find out *how good* you are [_ a driver]

(Jeremy Clarkson, BBC2 TV)

b. I'm surprised at *how hostile* she's had [_ a reaction]

(Interviewee, BBC Radio 5)

c. *How big* is this [_ an opportunity] for him?

(Mike Graham, Talk Sport Radio)

d. I can imagine *how sad* it was [_ a nursing home]

(havealaughonme.com)

Unlike the examples of (68), those of (i) support our prediction, although further investigation is needed to explain the contrast in grammaticality between (68) and (i).

Chapter 4

Conclusion

This thesis has attempted to address the following two controversial questions regarding labeling and propose a new labeling mechanism as a response, aiming to further refine labeling theory.

(1) a. How are XP-YP configurations labeled?

b. How is the (in)visibility of lower copies of a phrase derived with respect to labeling?

In Chapter 1, we have proposed a new labeling mechanism, under which labeling applies upon transfer to the phasal complement in a bottom-up fashion. In our proposal, ambiguous labeling of $\{_{\alpha}$ XP, YP$\}$ is possible, but if one of the constituents of α is a copy, then the other is selected as the label of α. Thus, our labeling mechanism integrates Mizuguchi's (2019) ambiguous labeling and Chomsky's (2013, 2015) disambiguation by Internal Merge (IM). We have also argued that the outcome of labeling is evaluated at the conceptual-intentional (CI) interface in terms of selection and clausal typing. Furthermore, we have proposed that copy invisibility to labeling can be attributed to the timing of the label determination of copies. This proposal not only answers the question of why copies become invisible to labeling in Chomsky's (2013, 2015) sense, but also ensures that copies themselves can be labeled and properly interpreted at the interfaces, by assuming that the labeling of copies is simply put off for a while.

Chapters 2 and 3 have explored the consequences of our proposed labeling mechanism, focusing on movement phenomena.

Chapter 2 has proposed that the (im)possibility of a number of stranding phenomena can be accounted for under our labeling mechanism. By examining (i) the *wh*-associated *exactly*-stranding, (ii) quantifier float and (iii) VP-adverb-stranding VP-preposing, we have shown that the prediction emerging from our labeling mechanism is correct: if stranding of YP occurs at the position where XP is required to become the label of the set {XP, YP} in terms of selection, it is ill-formed because the lower copy of XP cannot participate in the labeling of the set. In Chapters 1 and 2, utilizing the data of the *wh*-associated *exactly*, we have pointed out the empirical problems of Chomsky's (2013, 2015) and Mizuguchi's (2019) labeling systems. Thus, Chapter 2 has effectively demonstrated that our labeling system empirically surpasses their labeling systems because it accurately captures the distribution of the *wh*-associated *exactly*.

Chapter 3 has assumed that in massive pied-piping in English, non-*wh*-phrases undergo both topicalization and *wh*-movement. Integrating this assumption with our labeling mechanism, we have argued that in possible cases of massive pied-piping, the copies of the moved phrase can meet both Topic and Q-Criteria because they belong to separate transfer domains and can therefore be assigned different labels; conversely, in impossible cases of massive pied-piping, one of the two criteria cannot be met because the relevant copies are included in a single transfer domain and therefore automatically receive the same label. In this connection, we have addressed the issue of criterial freezing. We have argued that feature-relativized criterial freezing proposed by Maeda (2019) alone is sufficient for explaining criterial freezing phenomena. Therefore, massive pied-piping in English can be legitimately derived without yielding criterial freezing effects. Finally, we have demonstrated that our proposal is more promising by arguing that in several

constructions such as degree fronting, copies of the moved phrase receive different labels in different transfer domains, so that both selectional and criterial requirements are satisfied.

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