

The Principle of Determinacy and Its Implications for MERGE*

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1. Introduction

Chomsky et al. (2019) clarify the concept workspace WS and reformulate Merge as MERGE as an operation on WS, not particular syntactic object (SO), where WS is taken to be the stage of the derivation at any given point:

(1) MERGE maps $WS = [X, Y]$ to $WS' = [\{X, Y\}]$

Chomsky et al. argue that MERGE should apply in a deterministic fashion based on the principle of Determinacy (2), which bans ambiguous rule applications, though its explications and consequences left untouched:

(2) If Structural Description for a rule holds for some WS, then Structural Change must be unique.

This paper explicates the principle of Determinacy, arguing that if we define Determinacy as a condition on the *input* of MERGE, it gives us a unified account of various phenomena, which have been explained by different constraints or principles.

The organization of this paper is as follows. Section 2 explicates the principle of Determinacy, proposing that Determinacy apply at the *input* of MERGE. We will then investigate an ambiguous rule application problem with MERGE. More specifically, it is shown that if Internal Merge (IM) applies to the same element more than once, it always causes an ambiguous rule application problem, which results in a Determinacy violation. We will argue that such an ambiguous rule application problem should be resolved by the Phase Impenetrability Condition (PIC). Section 3 explicates consequences of Determinacy. It is shown that Determinacy provides us with a unified account of various phenomena such as the Subject Condition, the *that*-trace effects, no vacuous topicalization, freezing effects with topics, Merge-over-Move, further raising, island violation repairs, and no superfluous steps in a derivation. Section 4 discusses how Determinacy handles with successive cyclicity, especially the intermediate copies of so called “A-movement.” We will also present alternative views regarding the intermediate copies. Section 5 makes concluding remarks.

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2. The Principle of Determinacy

2.1 Recursion

Before turning to the principle of Determinacy, we briefly look at the notion of recursion, which is crucial in the discussion to follow. We adopt Chomsky et al.'s (2019) notion of recursion (3):

(3) Any syntactic object (SO) once generated in WS remains accessible to further operations.

Let us consider WS (4) as an example:

(4) WS = [{a, {b, {c, d}}}]

According to the notion of recursion (3), a, b, c, d, {c, d}, {b, {c, d}} and {a, {b, {c, d}}} in WS (4) are all accessible to further operations including MERGE.

2.2 Chomsky et al.'s (2019) Notion of Determinacy

Chomsky et al. (2019) claim that Determinacy requires subsequent rules to apply in a deterministic fashion, ensuring that WS should be kept minimal throughout a derivation. In other words, Chomsky et al. claim that Determinacy applies at the output of MERGE (5) (see also Epstein, Kitahara and Seely (EKS) 2018 for a similar view on Determinacy):

(5) **Chomsky et al. (2019)**: Determinacy applies at the *output* of MERGE.

Under Chomsky et al.'s notion of Determinacy (5), if MERGE creates WS that could potentially pose an ambiguous rule application problem for the *subsequent* derivation, a Determinacy violation occurs. Suppose, for example, that MERGE takes WS1 as its input and then maps it to WS2, which is the case of Internal Merge (IM) of *c*, i.e. movement of *c* in the traditional sense, as shown in (6):

(6) a. WS1 = [{a, {b, c}}, d]
 b. WS2 = [{c, {a, {b, c}}}, d]

It should be noted that according to the notion of recursion (3), any syntactic object generated in (6) is accessible to MERGE. Under Chomsky et al.'s system, Determinacy (5) applies at the *output* of MERGE, i.e. at WS2 (6b). In WS2, there are two copies of *c*. This poses an ambiguous rule application problem for the subsequent derivation, since if we apply IM to *c* in the *subsequent* derivation, for example, there would not be a unique way to apply IM to *c* due to its two copies. Hence, (6) induces a Determinacy violation under Chomsky et al.'s system. Under Chomsky et al.'s notion of Determinacy (5), therefore, no IM is ever allowed, which is clearly an undesirable result. Chomsky et al. does not present a way out of this ambiguous rule application problem induced by MERGE.¹

¹ One possible way out of this problem is to suppose that such an ambiguous rule application problem can be resolved by the shortest movement corollary (SMC), which says that given two options, the shorter move wins. In (6b), for example, there are two copies of *c*, but the SMC selects the higher copy of *c*, and the lower copy of *c* is not accessible. Hence, there would be no Determinacy violation (see EKS 2018 and Komachi et al. 2019). However, we do not take this view because, as we will see soon below, an ambiguous rule application problem can be resolved solely by an independently motivated condition on Transfer, i.e. the PIC, under our proposal

2.3 A Proposal

2.3.1 Determinacy at the Input of MERGE

Contrary to what Chomsky et al. claim, we argue that Determinacy apply at the *input* of MERGE in that if there is an ambiguous rule application at the *present stage* of a derivation (not at a *subsequent stage* of a derivation), a Determinacy violation occurs:

(7) **Proposal:** Determinacy applies at the *input* of MERGE.

Let us consider (6) (repeated here as (8)) again:

- (8) a. $WS1 = [\{a, \{b, c\}\}, d]$
 b. $WS2 = [\{c, \{a, \{b, c\}\}\}, d]$

According to our notion of Determinacy (7), Determinacy applies at the input of MERGE, *i.e.* at WS1 (8a). Since there is only one copy of *c* in WS1, we have only one option to create WS2, *i.e.*, to move *c* in the base position; there is no ambiguous rule application. Hence, under our notion of Determinacy, there is no Determinacy violation in (8).

Suppose further that MERGE takes WS2 as its input and then maps it to WS3, *i.e.*, we apply IM to *c* again, as shown in (9):

- (9) a. $WS2 = [\{c, \{a, \{b, c\}\}\}, d]$
 b. $WS3 = [\{c, \{c, \{a, \{b, c\}\}\}\}, d]$

In (9), we have two copies of *c* at the input of MERGE, *i.e.* at WS2 (9a). We have two options to create WS3 (9b), *i.e.*, either to move the higher copy of *c* or the lower copy of *c*. This ambiguous rule application violates our notion of Determinacy (7). It should be noted that under our notion of Determinacy, unless we are to apply MERGE to WS2, a Determinacy violation does not occur.

This shows that under our notion of Determinacy (7), if we apply IM to the same element more than once, it always results in a Determinacy violation. This incorrectly predicts that no successive-cyclic movement is allowed. We will argue in the next subsection that such an ambiguous rule application problem induced by multiple applications of MERGE should be resolved by the PIC.

2.3.2 An Ambiguous Rule Application Problem with MERGE and its Resolution by the PIC

Let us consider (10) as an example of successive-cyclic movement:

- (10) **What** did you say that John bought *t*?
 a. $[_{RP} \text{what } [R(\text{BUY}) \text{ what}]]$
 b. $[_{CP} \text{what } [C [_{TP} \text{John } [T [_{VP} \text{John } [v\text{-R}(\text{BUY}) [_{RP} \text{what } [R(\text{BUY}) \text{ what}]]]]]]]]]]$
 c. $[_{VP} \text{you } [v\text{-R}(\text{SAY}) [_{RP} \text{what } [R(\text{SAY}) [_{CP} \text{what } [C\text{-that } [_{TP} \text{John } [\dots]]]]]]]]]$
 d. $[_{CP} \text{what } [C\text{-that } [_{TP} \text{you } [T [_{VP} \text{you } [v\text{-R}(\text{SAY}) [_{RP} \text{what } [R(\text{SAY}) [_{CP} \text{what } \dots]]]]]]]]]$

that Determinacy applies at the input of MERGE. Furthermore, under their view, there is a redundancy between the SMC and the PIC regarding accessibility; the SMC would make the effects of the PIC vacuous when we decide whether or not an element is accessible. Since the need to eliminate redundancies has been a working hypothesis in the linguistic inquiry, such a redundancy should be eliminated (Chomsky 1995: 152). Under our proposal, we only need the PIC, an independently motivated condition, for restricting accessibility.

In (10), the *wh*-phrase *what* undergoes successive-cyclic movement. In (10a), we apply IM to *what*; *what* moves from its base position to the Spec of Root (R) (for phi-phi labeling; see Chomsky 2013; 2015). In (10b), we apply IM to *what* again to move it to the embedded Spec of C. We assume with Chomsky (2013; 2015) that *v* becomes invisible because of pair-Merge with R so that R inherits phasehood from *v*; the phase-R-complement undergoes Transfer. Although there are two copies of *what*, *i.e.* the copy in the Spec of R and the copy in the base position, the copy in the base position, which is within R-complement, is not accessible because of the PIC after the phase-R-complement Transfer.² There is only one accessible copy of *what*, *i.e.* the one in the Spec of R; there is no violation of our notion of Determinacy (7). In (10c), we apply IM to *what* again. Only the copy of *what* in the embedded Spec of C is accessible and all the other copies of *what* are not accessible because of the PIC after the phase-C-complement (TP) Transfer. There is no Determinacy violation in (10c). Similarly, the PIC avoids Determinacy violations in (10d). Hence, the PIC resolves the problem of an ambiguous rule application induced by multiple applications of MERGE.

In the next section, we will look at various empirical consequences of our notion of Determinacy (7) coupled with the PIC. It is shown that our notion of Determinacy (7) is desirable in that it gives us a unified account of various phenomena, which have been analyzed by different constraints or principles.

3. Consequences of MERGE and Determinacy

3.1 The Subject Condition

3.1.1 The Subject Condition and its Cancellation

First, the Subject Condition such as (11) (cf. Chomsky 1973; Huang 1982) follows from our notion of Determinacy (7). The derivation of (11) is represented in (12):

(11) **Who** did [pictures of *t*] please you?

(12) [CP **who** [C-did [TP [pictures of who] [T [_{VP} [pictures of who] [*v* [...

In (12), if we are to move *who* to the Spec of C, there are two accessible copies of *who*, *i.e.* the one within the Spec of T and the other within the Spec of *v*. This is an ambiguous rule application; (12) violates Determinacy. Hence, Determinacy accounts for the Subject Condition effect.

As pointed out by Lasnik and Park (2003) and Stepanov (2007), when an expletive appears in the Spec of T, the Subject Condition effect is canceled as shown in (13). The derivation of (13) is represented in (14):

(13) **Who** is there [a picture of *t*] on the wall? (Stepanov 2007: 92)

(14) [CP **who** [C-is [TP there [T [_{VP} [a picture of who] [*v* [...

In (14), since the Spec of T is occupied by the expletive *there*, there is only one accessible copy of *who*, which is within the Spec of *v*. Hence, there is no Determinacy violation; cancellation of the Subject Condition effect with expletives follows. The Subject Condition effect and its cancellation with expletives are also observed in Dutch as shown in (15), which follows from Determinacy in the

² Following Chomsky (2000; 2001; 2004; 2013; 2015) and Chomsky et al. (2019), we assume that upon the completion of a phase, the phase-head-complement becomes inaccessible to further operation.

same way:

(15) *Dutch*

- a. **Wat** hebben er [*t* voor mensen] je moeder bezocht?
 what have-3PL there for people your mother visited
 ‘What sort of people have visited your mother?’
- b. * **Wat** hebben [*t* voor mensen] je moeder bezocht?
 what have-3PL for people your mother visited
 ‘What sort of people have visited your mother?’ (Broekhuis 2006: 65)

Unlike extraction out of a subject, extraction out of an object such as (16) is allowed:

(16) **Who** did you see [a picture of *t*]?

Our notion of Determinacy (7) correctly predicts this subject-object asymmetry with respect to extraction. The derivation of (16) is represented in (17):

(17) [_{CP} **who** [C-did [TP you [T [_{VP} you [_{v-R(SEE)} [_{RP} [a picture of who] [R(SEE) [a picture of who]]]]]]]]]]

In (17), when we are to move *who* to the Spec of C, there are two accessible copies of *who*, *i.e.* the one within the Spec of R and the other within the complement of R. The copy within the complement of R, however, is not accessible because of the PIC after the phase-R-complement Transfer; there is no Determinacy violation in (17).

We can also account for the fact that extraction out of an ECM subject is allowed as exemplified by (18):

(18) **Of which car** did they believe [the picture *t*] to have caused a scandal? (Chomsky 2008: 153)

In (18), the *wh*-phrase *of which car* is extracted out of the ECM subject. The derivation of (18) is represented in (19)

(19) [_{CP} **of which car** [C-did [TP they [T [_{VP} they [_{v-R(BELIEVE)} [_{RP} [the picture of which car] [R(BELIEVE) [[the picture of which car]]]]]]]]]]

In (19), although there are two accessible copies of *of which car*, *i.e.* the one within the matrix Spec of R and the other within the complement of R, the copy in the complement of R is not accessible because of the PIC after the phase-R-complement Transfer. Hence, there is no Determinacy violation.

3.1.2 Absence of the Subject Condition Effects in Japanese and Spanish

Our notion of Determinacy (7) also accounts for the absence of the Subject Condition effects in Japanese and Spanish. It has been pointed out by Kayne (1983), Lasnik and Saito (1992), Ishii (1997; 2011), Saito and Fukui (1998) *inter alia* that Japanese lacks the Subject Condition effects as shown in (20), where *dare-ni* ‘who-dat’ is scrambled out of the subject phrase. The result is slightly degraded, but this is due to the fact that it involves extraction out of the complex NP:

(20) *Japanese*

? **Dare-ni** [John-ga [[Mary-ga *t* atta] koto]-ga mondai-da to] omotteru] no
 who-dat John-nom Mary-nom met fact-nom problem-is that think Q
 Lit. 'Who, John thinks that [the fact that Mary met *t*] is a problem.'

We assume with Fukui (1986) and Kuroda (1988) *inter alia* that subjects in Japanese stay in the Spec of *v* throughout a derivation. The derivation of (20) is represented in (21):

(21) [CP **dare-ni** [C [TP T [_{vP} [Mary-ga dare-ni atta koto]-ga [v [...
 who-dat Mary-nom who-dat met fact-nom

In (21), there is only one accessible copy of *dare-ni* 'who-dat' within the Spec of *v*; there is no Determinacy violation. The absence of the Subject Condition effect in Japanese follows.

In Spanish, as pointed out by Uriagereka (1988: 118) and Gallego (2007: 294), when the subject appears after verb, there is no subject condition effect as shown in (22a). This is in contrast with (22b), which shows that when the subject appears before verb, the subject condition effect emerges:

(22) *Spanish*

[CP **De qué conferenciantes_i** [C te parece que ...
 of what speakers CL-to-you seem-3.SG that

a. *Extraction out of a Postverbal Subject*

... (?) [TP T_s me_z van a impresionar_v [_{vP} [las propuestas *t_i* v t_z t_v]]]?
 CL-to-me go-3.PL to impress-INF the proposals

b. *Extraction out of a Preverbal Subject*

... * [TP [las propuestas *t_i*]_j T_s me_z van a impresionar_v [_{vP} t_j v t_z t_v]]]?
 the proposals CL-to-me go-3.PL to impress-INF

'Which speakers does it seem to you that the proposals by will impress me?'

This contrast between post-verbal and pre-verbal subjects also follow from Determinacy if we assume with Uriagereka and Gallego that post-verbal subjects appear in the Spec of *v* whereas pre-verbal subjects appear in the Spec of T. The derivations of (22a, b) are represented in (23a, b) respectively:

(23)a. [CP **de qué conferenciantes** [C [TP [T me van a impresionar
 of which speakers CL-to-me go-3.PL to impress-INF
 [_{vP} [las propuestas de qué conferenciantes] [v [...
 the proposals of which speakers

b. [CP **de qué conferenciantes** [C [TP [las propuestas de qué conferenciantes]
 of which speakers the proposals of which speakers
 [T me van a impresionar [_{vP} [las propuestas de qué conferenciantes] [v [...
 CL-to-me go-3.PL to impress-INF the proposals of which speakers

In (23a), when we are to move the *wh*-phrase *de qué conferenciantes* 'of which speakers' to the embedded Spec of C, there is only one accessible copy of *de qué conferenciantes* 'of which speakers' within the Spec of *v*; there is no Determinacy violation. In (23b), on the other hand, when we are to move *de qué conferenciantes* 'of which speakers' to the embedded Spec of C, there are two accessible copies of *de qué conferenciantes* 'of which speakers,' *i.e.* the one within the Spec of T and the other within the Spec of *v*; this violates Determinacy. Hence, the absence of the Subject Condition effects in

Japanese and Spanish follows from Determinacy.

3.1.3 Verb-Particle Constructions

Our analysis of the Subject Condition can be extended to verb particle constructions. Recall that our analysis of the Subject Condition claims that when a subject undergoes movement within CP phase, that movement creates two copies of a *wh*-phrase within the subject, which results in a Determinacy violation when we are to move the *wh*-phrase to the Spec of C. A similar pattern is observed in particle movement within RP phase. Lasnik (2001) and Boeckx (2012) observe that, when the object appears after particle, extraction out of the object is allowed as shown in (24a, c). When the object appears between verb and particle, on the other hand, extraction out of the object is not possible as shown in (24b, d):

- (24)a. **Who**₁ did Mary call up [friends of *t*₁]?
 b. * **Who**₁ did Mary call [friends of *t*₁]₂ up *t*₂? (Lasnik 2001: 111)
 c. **Who**₁ did you pick up [friends of *t*₁]?
 d. * **Who**₁ did you pick [friends of *t*₁]₂ up *t*₂? (Boeckx 2012: 22)

We assume with Lasnik and Boeckx that when an object appears between verb and particle, the object moves from post-particle position to the pre-particle position. The derivation of (24b), for example, is represented in (25):

- (25) [_V-R(CALL)] [_{RP} **who** [R(CALL) [friends of who] up [friends of who]]]

In (25), if we are to move *who* to the Spec of R (for phi-phi labeling under successive-cyclic movement), there are two accessible copies of *who* within the RP phase, *i.e.* the one after the particle *up* and the other before the particle *up*. When we are to move *who* to the Spec of R, a Determinacy violation occurs. (24d) can be accounted for in the same way. Hence, we can account for this contrast regarding extraction between pre-particle and post-particle positions under Determinacy.

3.2 No Vacuous Topicalization

Determinacy also accounts for the contrast between (26a) and (26b). As has been well-known, particularly since Lasnik and Saito (1992), vacuous topicalization of a subjects is not allowed in English as shown in (26a):

- (26)a. * **John**, *t* came yesterday.
 b. **Mary**, John likes *t*.

We assume with Chomsky (1977), Rizzi (1997), Hiraiwa (2010), and Grohmann (2011), among many others, that a topicalized phrase targets a Spec of C, and gets topic interpretation at the CP periphery (pace Lasnik and Saito 1992 or Bošković 1997; they assume that a topicalized phrase targets a Spec of T). The derivation of (26a), for example, is represented in (27):

- (27) [_{CP} **John** [C [_{TP} John [T [_{VP} John [...

In (27), if we are to move *John* to the Spec of C for topic interpretation, there are two accessible

copies of *John*, *i.e.* the one within the Spec of T and the other within the Spec of *v*. This is an ambiguous rule application; (27) violates Determinacy. Unlike topicalization of a subject, topicalization of an object is allowed as shown in (26b). Determinacy correctly predicts this subject-object asymmetry with respect to topicalization. The derivation of (26b) is represented in (28):

(28)_{[CP **Mary** [C [TP John [T [_{vP} John [_{v-R}(LIKE) [_{RP} Mary [R(LIKE) Mary]]]]]]]]]}

In (28), when we are to move *Mary* to the Spec of C for topic interpretation, there are two accessible copies of *Mary*, *i.e.* the one within the Spec of R and the other within the complement of R. The copy within the complement of R, however, is not accessible because of the PIC after the phase-R-complement Transfer; there is no Determinacy violation in (28). The contrast between (26a) and (26b), and more generally, the “anti-locality” effect (cf. Saito and Murasugi 1999; Bošković 1994, 1997; Abels 2003; Grohmann 2003) follows from Determinacy.

3.3 The *That*-trace Effects

3.3.1 The *That*-trace Effects in English

The *that*-trace effects that have received much attention in the literature (Kayne 1983; Lasnik and Saito 1992; Chomsky 1986; Rizzi 1990; Ishii 2004; Mizuguchi 2008; Abe 2015; Bosković 2016, among many others) also follow from Determinacy. Pairs of examples that call for an explanation are like those in (29):

- (29)a. * **Who** do you think that *t* saw Bill?
 b. **Who** do you think *t* saw Bill?

The derivation of (29a) is represented in (30):

(30)_{[CP **who** [C-that [TP who [T [_{vP} who [_{v-R}(SEE) [_{RP} Bill [R(SEE) [...}

In (30), if we are to move *who* to the embedded Spec of C, there are two accessible copies of *who*, *i.e.* the one within the Spec of T and the other within the Spec of *v*. This is an ambiguous rule application; (30) violates Determinacy. Hence, Determinacy accounts for the *that*-trace effect.

If the complementizer *that* does not appear, the *that*-trace effect is canceled as shown in (29b). We assume with Chomsky (2015) that when the complementizer *that* does not appear, C is deleted, T inherits phasehood from C, and the phase-T-complement (*vP*) undergoes Transfer. The derivation of (29b) is represented in (31), where \emptyset stands for C-deletion of the complementizer *that*:

(31)_{[RP **who** [R [C(that) → \emptyset [TP who [T [_{vP} who [_{v-R}(SEE) [...}

In (31), when we are to move *who* from the embedded Spec of T to the matrix Spec of R, there are two accessible copies of *who*, *i.e.* the one within the Spec of T and the other within the Spec of *v*. The copy within the Spec of *v*, however, is not accessible because of the PIC after the phase-T-complement (*vP*) Transfer. Hence, there is no Determinacy violation in (31); cancellation of the *that*-trace effect with C-deletion follows.

3.3.2 Skipping Strategy

The present account of the *that*-trace effect also accommodates Rizzi and Shlonsky's (2007) "skipping strategy," which express a generalization that captures apparent violations of the *that*-trace effect. In English, as pointed out by Rizzi and Shlonsky (2007), when the expletive *there* appears in the Spec of T, the *that*-trace effect is canceled as shown in (32b):

- (32) a. * **What** do you think that *t* is in the box?
 b. **What** do you think that there is *t* in the box? (Rizzi and Shlonsky 2007: 126)

Also in French, if the complementizer is the relative pronoun *qui*, the effect is canceled as shown in (33b) (Kayne 1976; 1983; Rizzi 1990):

- (33) a. * **Quelle étudiante** crois-tu que *t* va partir?
 which student believe-you that go leave
 b. **Quelle étudiante** crois-tu qui *t* va partir?
 which student believe-you that go leave
 Lit. 'Which student do you believe that is going to leave?' (Rizzi and Shlonsky 2007: 131)

The contrasts above follow from Determinacy if we assume with Taraldsen (2001) and Rizzi and Shlonsky (2007) that the suffix *-i* of the complementizer *qui* in French (33b) is an expletive-like element. The derivation of (32b) and (33b) are represented in (34) and (35), respectively:

(34) [_{CP} **what** [C-that] [_{TP} there [T-is] [_{VP} what [v] [...

(35) [_{CP} **quelle étudiante** [C-que] [_{TP} i [T [_{VP} quelle étudiante [v] [...

In (34), since the Spec of T is occupied by the expletive *there*, there is only one accessible copy of *what*, which is within the Spec of v. Hence, there is no Determinacy violation. Likewise, in (35), since the Spec of T is occupied by the expletive-like element *-i*, there is only one copy of *quelle étudiante* 'which student,' which is within the Spec of v. Hence, there is no Determinacy violation; the absence of the *that*-trace effect in these languages follows.

3.3.3 Absence of the *That*-trace Effects in Italian and Japanese

Our notion of Determinacy also explains the absence of the *that*-trace effects in Italian and Japanese. As pointed out by Perlmutter (1971), Italian does not exhibit *that*-trace effects, as shown in (36), where *who* is moved out of a *that*-clause (see also Rizzi 1982; 1990; Uriagereka 1988):

- (36) *Italian*
Chi credi [che *t* vincerà]?
 who think that win
 'Who do you think that *t* will win?' (Rizzi and Shlonsky 2007: 127)

We assume with Rizzi (1982; 1990) that in Italian the small *pro* appears in the Spec of T (to satisfy the Extended Projection Principle, EPP), or with Goto (2017b) that a verb with rich agreement is merged to the Spec of T (for phi-phi labeling). The derivation of (36) is represented in (37):

(37) [_{CP} **chi** [C-che] [_{TP} *pro*/vincerà] [T [_{VP} chi [v-R(VINCERÁ)] [...

In (37), since the embedded Spec of T is occupied by *pro/vincerà* ‘win,’ there is only one accessible copy of *chi* ‘who,’ which is within the Spec of v. Hence, there is no Determinacy violation; the absence of the *that*-trace effect in Italian follows.

As originally pointed out by Ishii (2004), Japanese does not exhibit *that*-trace effects, as shown in (38), where the subject null operator *OP* is moved out of the *that*-clause:

(38) *Japanese*

[*OP* [John-ga [t Mary-ni hanasikaketa to] omotteiru] yorimo]
 John-nom Mary-dat talked to that think than
 harukani ookuno hito-ga Susy-ni hanasi tagatte ita
 far more people-nom Susy-dat wanted to talk
 ‘Far more people wanted to talk with Susy than John thinks that talked to Mary.’

(Ishii 2004: 212)

Again we assume with Fukui (1986) and Kuroda (1988) that subjects in Japanese stay in the Spec of v throughout a derivation. The derivation of (38) is represented in (39):

(39) [_{CP} *OP* [_{TP} [_{SP} *OP* [_{RP} Mary-ni R(HANASIKAKE)] v -R(HANASIKAKE)] T-ta] C-to]

In (39), there is only one accessible copy of *OP* within the Spec of v; there is no Determinacy violation. The absence of the *that*-trace effect in Japanese follows.

3.3.4 Adverb Effects

We can also account for the so-called adverb effects (see, e.g., Bresnan 1977; Culicover 1991; Browning 1996). It has been observed that when adverbs such as *quickly* or *hardly* appear after *that*, the *that*-trace effect is not cancelled, as shown in (40a, 41a), but when adverbs such as *fortunately* or *tomorrow* appear after *that*, the *that*-trace effect is canceled, as shown in (40b, 41b):

(40) a. * **Who** did John say [that [t quickly ran to the store]]?
 b. **Who** did John say [that [fortunately t ran to the store]]? (Brillman and Hirsch 2015: 5)

(41) a. * **Who** did she say [that [t hardly speaks to her]]? (Rizzi 1997: 311)
 b. **Who** did she say [that [tomorrow t would regret his words]]? (Bresnan 1977: 194)

We assume with Douglas (2017) that when the adverbs which cancel the *that*-trace effect appear after *that*, CP structure is layered, with the complementizer *that* being in the higher C head (C₁) and the adverbs being in the lower Spec of C (C₂). On the other hand, when the adverbs which do not cancel the *that*-trace effect appear after *that*, CP structure is not layered, with *that* being in the C head and the adverbs being in the Spec of T. This analysis of the structural positions of the relevant adverbs is supported by (42a, b):

(42) a. John said that **fortunately** Mary ran to the store.
 b. * John said that **quickly** Mary ran to the store. (Brillman and Hirsch 2015: 5)

(42a) shows that adverbs like *fortunately* can appear in a structurally higher position in CP, but (42b) shows that adverbs like *quickly* cannot. Under these considerations, the derivation (42a), for example,

is represented in (43), where CP is not layered, and *who* is moved from its base position to the higher Spec of T via C-to-T feature-inheritance:

(43)_{CP} **who** [C-that [TP who [quickly [T [_{vP} who [v [...

In (43), when we are to move *who* to the embedded Spec of C, there are two accessible copies of *who*, *i.e.* the one within the Spec of T and the other within the Spec of *v*. This is an ambiguous rule application; (43) violates Determinacy. (41a) can be accounted for in the same way.

On the other hand, the derivation of (41b), for example, is represented in (44), where CP is layered by *fortunately*, and *who* is moved from its base position to the lower Spec of C₂ via C₁-to-C₂ feature-inheritance:

(44)_{CP₁} C₁-that [_{CP₂} **who** [fortunately [C₂ [TP [T [_{vP} who [v [...

In (44), we assume with Goto (2011) that “in the layered CP structure, either C₁-to-C₂ feature-inheritance or C-to-T feature-inheritance may take place” (p. 36), and that when C₁-to-C₂ feature-inheritance takes place, phi-feature valuation (phi-phi labeling) occurs in the lower Spec of C₂, accompanying phasehood-inheritance from the higher C₁ head to the lower C₂ head. Suppose that in (44) C₁-to-C₂ feature-inheritance takes place and the lower C₂ head inherits phasehood from the higher C₁ head. Then, in (44), when we are to move *who* to the embedded Spec of C₂, there is only one accessible copy of *who* within the Spec of *v*; there is no Determinacy violation. (41b) can be accounted for in the same way.

As shown in (45), the fact that Icelandic does not exhibit *that*-trace effects (Maling and Zaenen 1978) also follows from Determinacy in the same way as in (43), if we assume with Holmberg and Platzack (1995) that embedded CP structures in Icelandic are layered:

(45) *Icelandic*

Hver sagðir þú að *t* hefði borðað þetta epli?
 who said you that had eaten this apple

‘Who did you say had eaten this apple?’

(Maling and Zaenen 1978: 480)

3.4 Freezing Effects with Topics

We can also account for freezing effects with topics. It has been noted that extraction is impossible from topicalized phrases, as shown in (46a, b). In (46a), the *wh*-phrase *who* is extracted out of the topicalized phrase [*pictures of who*] and the result is degraded. Similarly, in (46b), the noun phrase *vowel harmony* is extracted out of the topicalized phrase [*articles about vowel harmony*] and the result is degraded. The grammaticality of (46a, b) is based on Lasnik and Saito (1992), but authors vary considerably in their judgments on such examples. In any case, there is a general tendency for topicalized phrases to trigger freezing effects for extraction:

(46)a. ??**Who**₁ do you think that [[*pictures of t*₁]₂ John would like *t*₂]?

b. ??**Vowel harmony**₁, I think that [[*articles about t*₁]₂ you read *t*₂]?

(based on Lasnik and Saito 1992: 101)

The derivation of (46a), for example, is represented in (47), where [*pictures of who*] moves from its base position to the lower embedded Spec of C₂ for topic interpretation via the Spec of R and the

phase-R-complement undergoes Transfer:

(47) $[_{CP1} \textbf{who} [C_1\text{-that } [_{CP2} [\text{pictures of } \underline{\text{who}}] [C_2 [_{TP} \text{John} [T\text{-would } [_{VP} \text{John} [v\text{-R(LIKE)}] [_{RP} [\text{pictures of } \underline{\text{who}}] [R(\text{LIKE})] [\text{pictures of } \underline{\text{who}}]]]]]]]]]]]]]]]]]]]$

In (47), CP is layered by the topicalized phrase . Under the assumption made in the previous section, there are two possibilities for feature-inheritance, i.e., either to apply C_1 -to- C_2 feature-inheritance or C-to-T feature-inheritance. Suppose that in (47) C_1 -to-T feature-inheritance takes place and C_1 retains the phasehood. Then, in (47), when we are to move *who* to the higher embedded Spec of C_1 , there are two accessible copies of *who*, i.e. the one within the lower Spec of C_2 and the other within the Spec of R. This is an ambiguous rule application; (47) violates Determinacy. (46b) can be accounted for in the same way. Hence, Determinacy accounts for the freezing effect with topics.

3.5 Further-Raising

Determinacy also accounts for why further-raising from the finite clause is not allowed as shown in (48), where *John* and *who* are moved out of a finite clause:

- (48) a. *John seems that reads a book.
 b. *Who seems that will leave.

The derivation of (48a), for example, is represented in (49):

(49) $[_{CP} \textbf{John} [C\text{-that } [_{TP} \underline{\text{John}}] [T [_{VP} \underline{\text{John}}] [v\text{-R(READ)}] [\dots$

In (49), if we are to move *John* to the embedded Spec of C, there are two accessible copies of *John*, i.e. the one within the Spec of T and the other within the Spec of *v*. This is an ambiguous rule application; (49) violates Determinacy. (48b) can be accounted for in the same way.

As pointed out by Fernández-Salguero (2004), further-raising is allowed in *pro*-drop languages such as Italian and Spanish, as shown in (50), where *Juan y Pedro* ‘John and Peter’ is moved out of a finite clause:

- (50) *Spanish*
 Juan y Pedro parece que son muy listos
 John and Peter seems that are very smart
 ‘John and Peter seem to be very smart.’ (Fernández-Salguero 2004: 100)

Again we assume that in *pro*-drop languages, the small *pro* (Rizzi 1982; 1990) or a verb with rich agreement (Goto 2017b) occupies the Spec of T. The derivation of (50) is represented in (51):

(51) $[_{CP} \textbf{Juan y Pedro} [\text{que } [_{TP} \textit{pro/son} [T [_{VP} \underline{\text{Juan y Pedro}}] [v\text{-R(SON)}] [\dots$

In (51), since the Spec of T is occupied by *pro/son* ‘are,’ there is only one accessible copy of *Juan y Pedro* ‘John and Peter,’ which is within the Spec of *v*. Hence, there is no Determinacy violation. The difference between English-type languages and *pro*-drop languages with respect to the possibility of further-raising also follows from Determinacy.

3.6 Merge-over-Move

The contrast in (52) which has received much attention in the minimalist literature (see, e.g., Chomsky 1995; 2000; Shima 2000, Toyoshima 2009; Goto 2013; 2017a; EKS 2014 for previous proposals) also follow from Determinacy if we assume with Abe (2018) and Goto (2017a) that the associate of *there* moves to the Spec of R to receive partitive Case (Belletii 1988; Lasnik 1995):

- (52)a. * There seems a man to be in the room.
 b. There seems to be a man in the room.

The derivations of (52a, b) are represented in (53a, b), respectively:

- (53)a. [**a man** [to [v+R(be) [a man_[Partitive]] [R(be) [a man_[uCase]] in the room]]]]]
 b. [**there** [to [v+R(be) [a man_[Partitive]] [R(be) [a man_[uCase]] in the room]]]]]

In (53a), when we are to move *a man* to the Spec of *to* to derive the surface order, there are two accessible copies of *a man*, i.e. the one in the base position and the other in the Spec of R. This is an ambiguous rule application; (53a) violates Determinacy. In (53b), on the other hand, there are two accessible copies of *a man*, i.e. the one in the base position and the other in the Spec of R, but *a man* does not undergo any further movement; there is no Determinacy violation in (53b).

3.7 Determinacy Violation Repair by Ellipsis

Merchant (2001: 185) observes that the Subject Island effect is cancelled if the extraction site is elided, as shown in (54b) (see also van Craenenbroeck and den Dikken 2006):

- (54)a. * **Which Marx brother** is [a biography of *t*] going to appear this year?
 b. A biography of one of the Marx brothers is going to appear this year, but I don't know **which (Marx brother)**.

This fact follows from Determinacy if we assume with Merchant (2001) that the subject in (54b) stays in the Spec of *v* throughout a derivation. The derivation of (54b) is represented in (55):

- (55)[_{CP} **which (Marx brother)** [_{TP} T [_{VP} [a biography of which (Marx brother)] [*v* [is going to appear]]]]]]

In (55), there is only one accessible copy of *which (Marx brother)* within the Spec of *v*. Hence, there is no Determinacy violation; cancellation of the Subject Condition effect with ellipsis follows.

The same account extends to the fact that the *that*-trace effect is also cancelled if the extraction site is elided, as shown in (56b) (Merchant 2001: 185; see also Kandybowicz 2006):

- (56)a. * John said that someone would write a new textbook, but I can't remember **who** John said that *t* would write a new textbook.
 b. John said that someone would write a new textbook, but I can't remember **who**.

The derivation of (56b) is represented in (57):

(57) [CP **who** [C-that [TP [T-would [vP who [v [write a new book]]]]]]]]

In (57), there is only one accessible copy of *who* within the Spec of *v*. Hence, there is no Determinacy violation; cancellation of the *that*-trace effect with ellipsis also follows.

3.8 Determinacy Violation Repair by Resumptive Pronouns

Assuming our notion of Determinacy (7), Nakashima (2018) proposes that the Adjunct Condition such as (58) follows from Determinacy, claiming that MERGE maps $WS = [X, Y]$ onto $WS' = [\{X, Y\}, X]$ only if *X* is an adjunct (in other words, adjuncts may be left in the WS without removed from WS, unlike the derivation (1) where *X* is removed from WS). The derivation for (58) he proposes is represented in (59):

(58) ***Who** did they leave [CP *t* before speaking to *t*]?

(59) * $WS = [\{\mathbf{who}, \{C, \{TP, \{CP \underline{who}, C'\}\}\}\}, \{CP \underline{who}, C'\}]$

In (59), if we are to move *who* to the matrix Spec of *C*, there are two accessible copies of *who*, i.e. the one within $\{C, \{TP, \{CP \underline{who}, C'\}\}\}$ (main clause) and the other within $\{CP \underline{who}, C'\}$ (adjunct clause). This is an ambiguous rule application; (59) violates Determinacy. In this way, the Adjunct Condition effect follows from Determinacy, Nakashima argues.

As originally pointed out by Ross (1967), when a resumptive pronoun instead of a copy appears in the adjunct clause, the Adjunct Condition effect is cancelled as shown in (60):

(60)a. * **Which woman** did John started laughing [after *t* kissed Bill]?

b. (Tell me again:) **which woman** was it that John started laughing [after **she** kissed Bill]?

(Boeckx 2012: 81)

We suggest that this fact also follows from Determinacy if we assume with Nakashima that adjuncts may be left in the WS without removed from WS. The derivation of (60b) is represented in (61):

(61) $WS = [\{\mathbf{which\ woman}, \{C, \{TP, \{CP \underline{which\ woman}, C'\}\}\}\}, \{CP \underline{she}, C'\}]$

In (61), there is only one accessible copy of *which woman* within $\{C, \{TP, \{CP \underline{which\ woman}, C'\}\}\}$ (main clause). Hence, there is no Determinacy violation; cancellation of the Adjunct Condition effect with resumptive pronouns follows.

The circumvention of island effects with resumptive pronouns is also observed in a complex NP environment as shown in (62), which follows from Determinacy in the same way, given that the *that*-clause selected by *N* is an adjunct (cf. Stowell 1981):

(62)a. * **Who** did Sue read [the claim that *t* was drunk] in the Times?

b. **That man**, Sue read [the claim that **he** was drunk] in the Times?

(Boeckx 2012: 6)

The derivation of (62b) is represented in (63):

(63) $WS = [\{\mathbf{that\ man}, \{C, \{TP, \{CP \underline{that\ man}, C'\}\}\}\}, \{CP \underline{he}, C'\}]$

In (63), there is only one accessible copy of *that man* within {C, {TP, {CP that man, C'}}} (main clause). Hence, there is no Determinacy violation; cancellation of the complex NP island constraint with resumptive pronouns also follows.

3.9 No Superfluous Steps

Determinacy provides us with an important insight to understand the last resort nature of successive-cyclic movement that avoids superfluous steps. Let us compare two possible derivations of (64), which are represented in (64a, b) (where the derivations of the embedded clause are omitted for simplicity):

(64) **What** did you say that John bought *t*?

- a. [CP **what** [that [TP John [vP John [v-R (BUY) [RP what [R(BUY) [...
- b. * [CP **what** [that [TP what [TP John [v-R (BUY) [RP what [R(BUY) [...

In (64a), *what* moves from the Spec of R to the Spec of C successive-cyclically, without stopping over the other intermediate positions. In (64b), on the other hand, *what* moves from the Spec of R to the Spec of T before moving to the Spec of C, adjoining to the intermediate position “superfluously.” In the minimalist literature, it has been assumed (particularly since Chomsky 2013; 2015) that the derivation (64a) is favored over the derivation (64b). But the question is why.

In Chomsky (1991; 1993; 1994, and Chomsky and Lasnik 1993), for example, the derivation (64b) with superfluous steps was excluded by the principle of Economy of Derivation, which can be formulated as in (65) (from Müller and Sternefeld 1996: 480-481):

(65) If two derivations D1 and D2 are in the same reference set and D1 involves fewer operations than D2, then D1 is to be preferred over D2. Two derivations D1 and D2 are in the same reference set iff they yield the same LF output.

According to this principle (65), the derivation (64a) (D1) is preferred over the derivation (64b) (D2) because D1 involves fewer operations than D2 in that D2 requires two applications of movement to the matrix *wh*-phrase *what*, while D1 requires only one.

The principle of Economy of Derivation follows from Determinacy. In (64a), when we are to move *what* to the Spec of C, there is only one accessible copy of *what* within the Spec of *v*; there is no Determinacy violation. In (64b), on the other hand, when we are to move *what* to the Spec of C, there are two accessible copies of *what*, *i.e.* the one within the Spec of T and the other within the Spec of *v*; this violates Determinacy. Hence, the last resort nature of successive-cyclic movement, and more generally, the principle of Economy of Derivation follows from Determinacy, which restricts the intermediate landing site of successive-cyclic movement to a phase edge position and forces an element to move out of a phase interior domain to a phase edge.

4. Successive Cyclicity

4.1 A-movement

Taking (66) for example, let us consider how our Determinacy-based approach to successive-cyclic movement leads us to analyze A-movement:

(66) John is likely to be arrested.

On A-movement, two kinds of approaches have been developed in the literature. The first approach assumes that vPs involved in A-movement are not phases and A-movement takes place in one fell swoop (*i.e.* non-successive-cyclically), skipping the intermediate positions entirely. This approach is advocated by Chomsky (2000; 2007; 2008), according to which (66) is analyzed as in (67):

(67) $[_{TP} \text{John is } [_{vP} \text{likely } [_{to} [_{vP} [\text{be arrested } \underline{\text{John}}]]]]]$

In (67), *John* moves in one fell swoop from its base position to the matrix Spec of T, without leaving its copies in the intermediate positions. This derivation is supported by Lasnik (1999), Chomsky (1995), and Epstein and Seely (2006).

The second approach assumes that vPs involved in A-movement are phases and A-movement takes place successive-cyclically, without skipping over the intermediate positions. This approach is advocated by Legate (2003), according to which (66) is analyzed as in (68):

(68) a. $[_{vP} \text{John } [_{v} [\text{arrest } \underline{\text{John}}]]]$
 b. $[_{vP} \text{John } [_{v} [\text{likely } [_{T\text{-to}} [_{vP} \text{John } [_{v} [\text{arrest } \underline{\text{John}}]]]]]]]$
 c. $[_{TP} \text{John } [_{T} [_{vP} \text{John } [_{v} [\text{likely } [\dots$

In (68), *John* moves from its base position to the Spec of the matrix T successive-cyclically phase by phase, leaving its copies in the intermediate positions.

Notice that neither approach violates Determinacy. In (67), even if we are to move *John* to the matrix Spec of T, there is only one accessible copy of *John* in its base position; there is no Determinacy violation. Also in (68), even if we are to move *John* to the matrix Spec of T, the intermediate copies of *John* become inaccessible because of the PIC after each-phase-*v*-complement (RP) Transfer; there is no Determinacy violation. Hence, our Determinacy-based approach to successive-cyclic movement is compatible with both approaches.

4.2 An Alternative View

If A-movement leaves copies in the intermediate positions, as in (68), that becomes an important open question for any theories that assume the principle of Determinacy. As one of the possible ways out of this problem, Kitahara (2018) suggests a way summarized as follows:

(69) IM optionally leaves copies:
 a. The copy in the base position and the one in the criterial position must be left for θ -interpretation and labeling through feature-sharing, respectively.
 b. The copy in the intermediate position may be deleted by weakening the Non-Tampering Condition.

Under this approach, (66) is analyzed as in (70):

(70) $[_{TP} \text{John}_1 \text{ is } [_{vP} \text{John}_2 [\text{likely } [\text{John}_3 \text{ to } [_{vP} \text{John}_4 [\text{be } [\text{John}_5 \text{ arrested } \underline{\text{John}}_6]]]]]]]$

In (70), the copies of *John* in the intermediate positions, *i.e.* *John*₂, *John*₃, *John*₄, and *John*₅, can be deleted; there is no Determinacy violation.

Sugimoto (2018) also suggests a way, which is summarized as follows:

(71) Determinacy applies at Interface levels. A Determinacy violation occurs if two identical copies of an element occupy two different criterial positions.

Under this approach, even if (66) has the derivation as in (72) (whether before or after Transfer), a Determinacy violation does not occur:

(72)_{[TP John₁ is [_{VP} John₂ [likely [John₃ to [_{VP} John₄ [be [John₅ arrested John₆]]]]]]]]]}

In (72), only one of the copies of *John* occupies only one criterial position at the interfaces, i.e. *John*₁ in the matrix Spec of T; there is no Determinacy violation.

Both approaches are interesting and seem to merit further consideration. Among other things, Kitahara's approach opens up a new possibility of weakening the No-Tampering Condition (NTC) (cf. Chomsky 2008: 138) (aside from the issue of whether it is on the right track), and Sugimoto's approach promotes a free-Merge system further (cf. Chomsky 2013: 40; 2015: 14). We leave for future research an investigation of how these approaches are compatible with our notion of Determinacy (7).

5. Conclusion

We have proposed that Determinacy applies at the input of MERGE (7), and the PIC resolves an ambiguous rule application problem with MERGE. Consequently, we have shown that Determinacy provides us with a unified account of various phenomena such as the Subject Condition, the *that*-trace effects, no vacuous topicalization, freezing effects with topics, Merge-over-Move, further raising, island violation repairs, no superfluous steps in a derivation, and so on. Furthermore, we have discussed how Determinacy handles with successive cyclicity, especially the intermediate copies of so called A-movement. Though many questions still remain, Determinacy can, it seems, open up a new possibility of explaining various phenomena that could be dealt with separate notions.

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