Determinacy theory of movement[*]

Nobu Goto & Toru Ishii

Toyo University, Meiji University

1.   Introduction

Chomsky (2019) and Chomsky, Gallego, and Ott (2019) reformulate Merge as MERGE, as an operation on *workspace* (WS), not particular syntactic object (SO), as shown in (1), and argue that MERGE should apply in a *deterministic* fashion based on the principle of Determinacy, as stated in (2), which bans ambiguous rule applications:

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

(2) "If the structural conditions for a rule holds for some workspace, then the structural change must be unique, it must be determinate." (Chomsky 2019:275)

However, in these papers, its exact formulations, explications, and consequences are left untouched. Goto and Ishii (2019) thus explicate the principle of Determinacy, proposing that Determinacy be formulated as a condition on the *input* of MERGE. They argue that this proposal gives a unified account of various movement restrictions on different languages, coupled with *the Phase Impenetrability Condition* (PIC), an independently motivated condition on Transfer.

The purpose of this paper is to support Goto and Ishii's (2019) theory of Determinacy further by showing that *the Specificity Effect* and *nonexistence of complementizer-less subject relatives*, the phenomena that have not been discussed in Goto and Ishii (2019), also follow from the theory of Determinacy they propose.

This paper is organized as follows. Section 2 sketches out Goto and Ishii's 2019 theory of Determinacy, introducing a determinacy-based approach to movement. Section 3 demonstrates a new analysis of the above phenomena in terms of Determinacy, with some consequences for *the Vacuous Movement Hypothesis* (VMH) and the notion of *anti-locality*. Section 4 concludes.

2. Goto and Ishii (2019)

Following Chomsky (2019) and Chomsky, Gallego, and Ott (2019), Goto and Ishii (2019) assume the notion of *recursion* (3):

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

Under (3), it follows that 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:

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

They propose that Determinacy apply at the *input* of MERGE; if there is an ambiguous rule application at the *present* stage of a derivation, a Determinacy violation occurs:

(5) **Goto and Ishii's (2019) theory of Determinacy**
Determinacy applies at the *input* of MERGE.

To see how this works, consider (6), where MERGE takes WS1 as its input and maps it to WS2 by applying Internal Merge (IM) to *c*:

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

Here, to map WS1 to WS2 with IM to *c*, there is only one accessible copy of *c* in the base position; hence a Determinacy violation does not occur. Thus, under (5), it is not problematic for MERGE to generate two identical copies of an element in WS.
    Suppose that MERGE takes WS2 as its input and maps it to WS3 by applying IM to *c*:

(7) a. WS2 = [{$\underline{c}$, {a, {b, $\underline{c}$}}}, d}
    b. WS3 = [{**c**, {$\underline{c}$, {a, {b, $\underline{c}$}}}}, d}

Here, to map WS2 to WS3 with IM to *c*, there are two accessible copies of *c* in the base position and the edge of {a, {b, c}}; a Determinacy violation occurs. Under (5), therefore, it is problematic for MERGE to take two identical copies of an element in WS as its input.
    Goto and Ishii (2019) claim that a Determinacy violation does not occur in successive-cyclic IM if we consider the PIC. Consider successive-cyclic IM of *what* (8):

(8) **What** did you say that John bought *t*?
    a. [RP **what** [R(BUY) <u>what</u>]]
    b. [CP **what** [C [TP John [T [vP John [v-R(BUY) [RP <u>what</u> [R(BUY) what]]]]]]]]
    c. [vP you [v-R(SAY) [RP **what** [R(SAY) [CP <u>what</u> [C-that [TP John […
    d. [CP **what** [C-that [TP you [T [vP you [v-R(SAY) [RP <u>what</u> [R(SAY) [CP what …

In (8a), to move *what* to the Spec of R(oot) (Spec-R) for φ-φ labeling (Chomsky 2015:14), there is only one accessible copy of *what* in the base position; there is no Determinacy violation. In (8b), the complement of the phase-head R (R-complement) is transferred in

accordance with *phasehood-inheritance* from *v* to R (Chomsky 2015:11), as shaded in grey, hence to move *what* from Spec-R to the embedded Spec-C, there is only one accessible copy of *what* in Spec-R; there is no Determinacy violation. Similarly, in (8c), the complement of the phase-head C in the embedded clause (the embedded TP) is transferred (Chomsky 2015:11), hence to move *what* from the embedded Spec-C to the matrix Spec-R, there is only one accessible copy of *what* in the Spec-C. In (8d), the matrix R-complement (the embedded CP) is transferred, hence to move *what* from the matrix Spec-R to the matrix Spec-C, there is only one accessible copy of *what* in the Spec-R.

Incidentally, in a series of lectures at MIT and UCLA (April-May 2019), Chomsky argues that *accessibility* includes not only the PIC but also *minimal search*, suggesting the possibility that minimal search takes care of successive-cyclic IM. However, in this paper, we disregard the possibility and crucially assume, following Goto and Ishii (2019:92, fn.1), that accessibility only includes the PIC, as shown in (8).

Goto and Ishii (2019) argue that the theory of Determinacy (5), coupled with the PIC, gives a unified account of various movement phenomena, such as *the Subject Condition effect*, *the* that-*trace effects*, *vacuous Topicalization*, *freezing effects with topics*, *Merge-over-Move*, *further raising*, *island violations repairs*, *no superfluous steps in a derivation*, and *successive-cyclic A-movement*.

Thus, they explain the Subject Condition effect (9) and its cancellation (10) in English as in (11) and (12):

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

(10) **Who** is there [a picture of *t*] on the wall?

(11) [CP **who** [C-did [TP [pictures of <u>who</u>] [T [vP [pictures of <u>who</u>] [v …

(12) [CP **who** [C-is [TP [there [T [pictures of <u>who</u>] [v …

In (11), to move *who* to Spec-C, there are two accessible copies of *who* in Spec-T and Spec-*v*, thereby violating Determinacy. On the other hand, in (12), Spec-T is occupied by *there* and there is only one accessible copy of *what* in Spec-*v*, thereby not violating Determinacy.

They argue that the absence of the Subject Condition effects in Japanese (13) follows naturally under the assumption that subjects in Japanese stay in situ throughout a derivation, as shown in (14) (Fukui 1986 and Kuroda 1988):

(13) ? 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
        'Who, John thinks that [the fact that Mary met *t*] is a problem.'

(14) [CP **dare-ni** [C [TP [T [vP [Mary-ga <u>dare-ni</u> atta koto]-ga [v …

In (14), to move *dare-ni* to Spec-C, there is only one accessible copy of *dare-ni* in Spec-*v*, thereby not violating Determinacy.

They also explain the *that*-trace effects (15a-b) in English as in (16a-b):

(15) a. * **Who** do you think that *t* saw Bill?

  b. **Who** do you think *t* saw Bill?

(16) a. … [CP **who** [that [TP <u>who</u> [T [*v*P <u>who</u> [*v* …
  b. … [RP **who** [R [CP C(that) → Ø [TP <u>who</u> [T [*v*P <u>who</u> [*v* …

In (16a), to move *who* to Spec-C, there are two accessible copies of *who* in Spec-T and Spec-*v*, thereby violating Determinacy. On the other hand, in (16b), C(*that*) is deleted, *v*P undergoes Transfer via phasehood-inheritance from C to T (Chomsky 2015:11), and hence to move *who* from Spec-T to the matrix Spec-R, there is only one accessible copy of *who* in Spec-T, thereby not violating Determinacy.

 They further argue that the absence of the *that*-trace effect in Italian (17) follows under the assumption that the small *pro* occupies Spec-T in Italian, as shown in (18) (Rizzi 1982):

(17) **Chi** credi [che *t* vincerà]?
  Who think that win
  'Who do you think that t win?'

(18) [CP **chi** [C-che [TP *pro* [T [*v*P <u>chi</u> [v-R(*vincerà*) […

In (18), Spec-T is occupied by *pro* and there is only one accessible copy of *chi* in Spec-*v*, thereby not violating Determinacy.

 Furthermore, they explain the ban against vacuous Topicalization (19) as in (20):

(19) * **John**, *t* came yesterday.

(20) [TP **John** [TP <u>John</u> [T [*v*P <u>John</u> [*v* …

In (20), to move *John* to the higher Spec-T for topic interpretation, there are two accessible copies of *John* in the lower Spec-T and Spec-*v*, thereby violating Determinacy (see subsection 3.2 below for further discussion).

 In this way, the theory of Determinacy (5) gives a unified account of the Subject Condition effect, the *that*-trace effects, vacuous Topicalization, etc. For more detailed analyses of the other phenomena mentioned above, see Goto and Ishii (2019).

 In what follows, we lend further support to (5) by showing that the Specificity Effect and nonexistence of complementizer-less subject relatives follow from Determinacy.

3. Extensions

3.1 The specificity effect

Extraction from specific DPs, namely DPs that have a definite interpretation, is not allowed (Chomsky 1973, 1981, Fiengo and Higginbotham 1981, Enç 1991, Diesing 1992, Stepanov 2007, Haegeman, Jiménez-Fernández, and Radford 2014):

(21) a. **Who** did you see [pictures of *t*]?
  b. * **Who** did you see [the picture of *t*]?

This fact, called the Specificity Effect, follows from Determinacy if we assume with Diesing (1992), Mahajan (1992), and Stepanov (2007) that in a language like English, specific DPs move out of VP (RP, in our terms) prior to *wh*-extraction out of them.[1] The derivations of (21a-b) are represented in (22-23):

(22) [CP **who** [C-did [TP you [T [*v*P you [*v*-R(SEE) [RP [pictures of <u>who</u>] [R(SEE) [picture of who]]]]]]]]]

(23) [CP **who** [C-did [TP you [T [*v*P you [*v*-R(SEE) [RP [the picture of <u>who</u>] [R′ [the picture of <u>who</u>] [R(SEE) [the picture of who]]]]]]]]]]]

A crucial difference between (22) and (23) is whether the movement in question for specific interpretation takes place: in (22) it does not as *[pictures of who]* is not specific, but in (23) it does as *[the picture of who]* is specific. In (22), the phase-head R-complement is transferred, hence to move *who* to Spec-C, there is only one accessible copy of *what* in Spec-R; there is no Determinacy violation (recall that the movement of *[pictures of who]* to Spec-R is required for ɸ-ɸ labeling; see (8) above). On the other hand, in (23), even after the phase-head R-complement Transfer is applied, there are still two accessible copies of *who* in the inner Spec-R and the outer Spec-R; there is a Determinacy violation (recall that the movement to the outer Spec-R is required for specific interpretation).[2]

Uriagerela (1988, 1996) observes that in Galician, the Specificity Effect is cancelled by determiner incorporation into a selecting verb:

(24) *Galician* (Uriagereka 1996:270)
    a. * De quén   liches   **os** mellores poemas de amigo?
        of whom read.2SG the best   poems of friend.
    b.(?) De quén   liches-**los**   mellores poemas de amigo?
        of whom read.2SG-the best   poems of friend
        'Who did you read the best poems of friendship by?'

In (24a), *de quén* is extracted from the specific DP *[os mellores poemas de amigo]* and the effect occurs. However, in (24b), the effect is cancelled by the determiner incorporation of

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[1] We put aside the issue of whether the movement in question is semantically motivated (Diesing 1992; Borer 1994) or syntactically motivated (Stepanov 2007; Mahajan 1992).

[2] In Spanish, a extraction out of *a*-marked objects is not possible (Gallego and Uriagereka 2007):

  (i) ?*¿[De quién]ⱼ has   visitado [DP a muchos amigos *t*ⱼ]ᵢ [*v*p … *t*ᵢ]?
        of whom have.2SG visited   A many   friends
    'Who have you visited many friends of?' (Gallego and Uriagereka 2007:65)

This also follows form Determinacy given that *a*-marked objects in Spanish have specific interpretation (Torrego 1998). The derivation of (i) is represented in (ii):

  (ii) [CP **de quién** [C [T-has [*v*p [*v*-R(VISITADO) [RP [a muchos amigos <u>de quién</u>] [R′ [a muchos amigos <u>de quién</u>] [R(VISITADO) [a muchos amigos de quién]]]]]]]]]

In (ii), to move *de quién* to Spec-C, there are two accessible copies of *de quién* in the inner Spec-R (for ɸ-ɸ labeling) and the outer Spec-R (for specific interpretation), thereby violating Determinacy.

los into the selecting verb *liches* from the specific DP. The presence of the effect in (24a) can be accounted for in the same way as (21b) under the assumption that specific DPs move to the outer Spec-R prior to *wh*-extraction as in (23). Importantly, the cancellation of the effect (30b) also follows from Determinacy if we assume with Stepanov (2012) that {H, XP} structures, H a head, XP a phrase, originally have a syntactic status of H, and is labeled as H as in {H, XP}=H, but once H undergoes head-movement from the constituent, as in H_i … {t_i, XP}, then the status of the resulting SO is modified so that it gets the label of the remaining head of XP, as in {t_i, XP}=X.[3] If this is the case, it follows that the syntactic status of DP in (24b) as (originally) specific is modified to nonspecific after the determiner incorporation of *los* into the verb *liches*. As shown in (22), nonspecific NPs do not have to undergo movement for specific interpretation, there is no Determinacy violation in (24b). Hence, the cancellation of the Specific Effect with determiner incorporation also follows.

Note that some languages do not exhibit the Specificity Effect. Mahajan (1992) observes that effect for Hindi (25), and Stepanov (2007) for German (26) (Mahajan argues that in (25) the specific interpretation of the noun phrase is ensured by overt object shift with Case agreement):

(25) *Hindi* (Mahajan 1992:514)
Kiskii tum socte ho ki   Mohan-ne   kitaab   curaaii   thii?
whose you think   that Mohan-ERG book-FEM stolen-FEM be-PAST-FEM
'Of whom do you think that Mohan stole the book?'

(26) *German* (Stepanov 2007:107)
Über Chomsky habe ich [den letzten Film *t*] leier nicht gesehen
about Chomsky have I   the last   film   unfor nicht seen
'Unfortunately, I have not seen the last film about Chomsky.'

These also follow from Determinacy if we assume Stepanov's (2007) view of the necessity of movement for specific interpretation in these languages. On the basis of binding tests and reconstruction effects in scrambling, he reaches the conclusion that "specific DPs in Hindi [and in German] do not undergo movement, […], they remain in situ, by the time extraction takes place" (pp. 105-108). Since we have assumed with Chomsky (2015) that objects universally move from its base position to Spec-R for φ-φ labeling, we take it as given that specific DPs in Hindi and German undergo movement for φ-φ labeling (like in English and Galician), but crucially not undergoing movement for specific interpretation (unlike in English and Galician). Under this consideration, the derivation of (25) and (26) are represented as in (27) and (28):

(27) [CP kiskii [C-ho [T [vP Mohan-ne [v-R [RP [kitaab <u>kiskii</u>] [R [kitaab kiskii]]]]]]]]

(28) [CP Über Chomsky [C-habe [T [vP ich [v-R [RP [den letzten Film <u>über Chomsky</u>] [R [den letzten Film über Chomsky]]]]]]]]

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[3] For a similar view on {XP, YP}, see Moro 2000 and Chomsky 2013; 2015. They argue that in {XP, YP}, if XP undergoes IM from the constituent, the status of the SO is modified so that it gets the label of Y.

Notice that the specific DPs, *kiskii kitaab* in (27) and *den letzten Film über Chomsky* in (28) move from their base positions to Spec-R for ɸ-ɸ labeling, but do not move for specific interpretation. In (27) and (28), the phase-head R-complement is transferred, hence to move the *wh*-phrase to Spec-C (*kiskii* in (27) and *über Chomsky* in (28)), there is only one accessible copy of the *wh*-phrase in Spec-R; there is no Determinacy violation. Hence, the absence of the Specificity Effect in Hindi and German also follows.[4]

3.2 Nonexistence of complementizer-less subject relatives

Determinacy (5) can also account for the nonexistence of complementizer-less subject relatives in English such as (29):

(29) * the man [*t* likes Mary] (Bošković 1997:26)

Before looking at how to rule out (29), let us consider the structure of a complementizer-less relative. Complementizer-less relatives are potentially ambiguous in that they can be either TPs or CPs. The sentence in (30), for example, can be assigned either (31a) or (31b):

(30) * the man [John likes *t*]

(31) a. the man [$_{TP}$ **OP** [$_{TP}$ John likes *t*]]
  b. the man [$_{CP}$ **OP** [$_{C'}$ C [$_{TP}$ John likes *t*]]]

The empty operator *OP* adjoins to TP in (31a), whereas it moves to Spec-C in (31b). Bošković (1997:25) proposes *the Minimal Structure Principle* (MSP) (32), which is a modified version of the principle of economy of representation proposed by Law (1991):

(32) *The Minimal Structure Principle* (MSP)
  Provided that lexical requirements of relevant elements are satisfied, if two representations have the same lexical structure and serve the same function, then the representation that has fewer projection is to be chosen as the syntactic representation serving that function.

In (32), "lexical structure" refers to structure involving projections of heads bearing categorial features, and satisfaction of lexical requirements refers to the satisfaction of Pesetsky's (1994) l-selection (=selection for terminal elements)/Grimshaw's (1979) s(emantic)-selection requirements and checking of features specified in lexical entries. The MSP requires that structures contain only as many functional projections as needed to satisfy lexical requirements. It then follows from the MSP that complementizer-less relative (30) should be assigned TP structure (31a), a more economical option. It should be noted that in contrast to complementizer-less relatives, *wh*-relatives have a *wh*-relative

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[4] As is obvious from the analyses presented above, the presence or absence of the Specificity Effect and the resulting violation of Determinacy crucially rely on the presence or absence of movement for specific interpretation prior to *wh*-extraction. Respecting the previous theories of the behavior of specific DPs, especially the theory of Stepanov (2007), we assume here that it is required for languages like English and Galician, but crucially not for languages like Hindi and German. Needless to say, more investigation is necessary to understand what makes the fundamental difference.

pronoun that has to be licensed by a functional head; *wh*-relatives like *the man who(m) John likes* are CPs in spite of the MSP.

    If we follow this view that complementizer-less relatives are TPs, complementizer-less subject relatives like (29) can be excluded by Determinacy as shown below:

(33) the man [TP **OP** [TP <u>OP</u> [*v*P <u>OP</u> likes Mary]]]

In (33), to adjoin *OP* to TP, there are two accessible copies of *OP* in Spec-T and Spec-*v*, thereby violating Determinacy.

    Unlike in English, complementizer-less subject relatives are allowed in null subject languages like 15th century Italian and Shakespearean English:

(34) *15th century Italian* (Rizzi 1990:71)
      Ch'è faccedenda   tocca   a   noi
      for is matter   concern to us
      'For this is a matter that concerns us.'

(35) *Shakespearean English* (Bošković 1997:185)
      a. There is a lord will hear you play tonight. (*Taming of the Shrew)*
      b. Youth's a stuff will not endure. (*Twelfth Night*)

These facts can also be accounted for by Determinacy. The derivations of (34) and (35) proceed as follows:

(36) Ch'è faccedenda [TP **OP** [TP *ex* [*v*P tocca a noi <u>OP</u>]]].

(37) a. There is a lord [TP **OP** [TP *ex* will [*v*P <u>OP</u> hear you play tonight]]].
      b. Youth's a stuff [TP **OP** [TP *ex* will [*v*P <u>OP</u> not endure]]].

In (36) and (37), Spec-T is occupied by a null expletive *ex*, and there is only one accessible copy of *OP* in Spec-*v*; thereby not violating Determinacy.

    The present analysis is compatible with the VMH, first proposed by George (1980) and adopted, for example, by Chomsky (1986; 2013), Ishii (2004), and Agbayani (2006), which states that a *wh*-subject does not move locally to Spec-C, as shown in (38a):

(38) **Who** left?
      a.   [TP **who** [T [*v*P <u>who</u> [*v*-R(LEAVE) […
      b. * [CP **who** [C [TP <u>who</u> [T [*v*P <u>who</u> [*v*-R(LEAVE) […

In (38a), there is only one accessible copy of *who* in Spec-*v*; thereby not violating Determinacy. On the other hand, in (38b), where *who* moves from Spec-T to Spec of C, there are two accessible copies of *who* in Spec-T and Spec-*v*; thereby violating Determinacy. Hence, the VMH is deduced from Determinacy.

    Our determinacy-based approach to the complementizer-less subject relative as well as the vacuous Topicalization is reminiscent of anti-locality (Saito and Murasugi 1999, Abels 2003, Grohmann 2011). Our theory can answer the following two questions in a principled way, to which any theory of *anti-locality* has to:

(39) a. Why is that specific domain relevant for anti-locality?
　　 b. How can locality and anti-locality constrains be unified?

Under our approach, locality and anti-locality are unified based on the notion of phase, which is an independently motivated condition on Transfer. This also provides an answer to the first question; a phase is the relevant domain for anti-locality, since it is operative in all kinds of locality, whether it is a standard locality which imposes an upper-bound distance on movement or an anti-locality constraint which restricts a lower-bound distance on movement. Hence, the notion of anti-locality is explained by Determinacy.

4. 　 Conclusion

In this paper, we have shown that Goto and Ishii's (2019) theory of Determinacy (5) provides us with a unified account of the Specificity Effect and the nonexistence of complementizer-less subject relatives, together with some consequences for the VMH and the notion of anti-locality.

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Nobu Goto, Toru Ishii
ngoto@toyo.jp, tishii@meiji.ac.jp