Multiple Nominative and Form Sequence*

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1   Introduction

Japanese exhibits multiple nominative constructions, as shown in (1) and (2):

(1)   Bunmeikoku-ga   dansei-ga   heikin-zyumyoo-ga   mizikai.
      civilized.countries-Nom   male-Nom   average-life.span-Nom   short-Pres
      'It is in civilized countries that male's average life span is short.'

(Kuno 1973: 70-71)

(2)   Ano ziko-ga   takusan-no nihonzin-ga   sinda.
      that   accident-Nom   many-Gen   Japanese-Nom   die-Past
      'It was in that accident that many Japanese died.'   (Tateishi 1991: 30)

(1) is an example of the so-called possessive multiple nominative construction, where the possessive *ga*-phrase *bunmeikoku-ga* 'civilized countries' is interpreted as a possessor *no* 'of' of the following *ga*-phrase *dansei-ga* 'male' (Kuno 1973), and (2) is an example of the so-called adjunct multiple nominative construction, where the adjunct *ga*-phrase *ano ziko-ga* 'that accident' is interpreted as a postposition *de* 'at' of the following *ga*-phrase *takusan-no nihonzin-ga* 'many Japanese' (Tateishi 1991).[1]

In the standard analysis in Japanese generative grammar, all *ga*-phrases in the multiple nominative construction are analyzed as occupying multiple specifier or

[1] In the literature, it is reported that multiple nominative constructions are also observed in languages such as Arabic, Brazilian Portuguese, Korean, Hebrew, etc.   For more detailed differences between possessive multiple nominative constructions and adjunct multiple nominative constructions, see Vermeulen (2005) and references cited therein.

adjoined positions in one particular projection, such as Spec-TP or Spec-*v*P, whether it is possessive or adjunct (see Kuno 1973; Saito 1982; 2014; Fukui 1986/1995; Fukui and Speas 1986; Takezawa 1987; Kuroda 1988; Heycock and Lee 1989; Fukuda 1991; Tateishi 1991; Heycock 1993a, b; Ura 1993; Takahashi 1994; Ishii 1997; Namai 1997; Hiraiwa 2001; Vermeulen 2005; Yamada 2013; Narita 2014; Epstein, Kitahara, and Seely 2020).

Thus, for example, under the standard analysis, the structure of the sentence (2) is syntactically represented as follows, where XP represents the adjunct *ga*-phrase (*ano ziko-ga* 'that accident') and YP represents the argument-*ga* phrase (*takusan-no nihonzin-ga* 'many Japanese'):

(3) {XP-*ga*, {YP-*ga*, { …
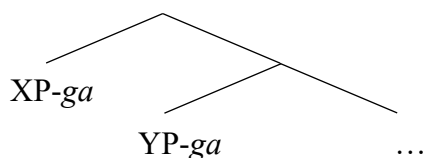
As is clear from the structure above, an important consequence of the standard analysis is that there is a hierarchical structural relation between the multiple nominative phrases, and there is a formal c-command relation between them: XP-*ga* is structurally higher than YP-*ga*, and the former c-commands the latter, but not vice versa.

In this paper, we examine in detail the structural relation between the multiple nominative phrases, presenting new empirical evidence that there is no formal c-command relation between them, contrary to the prediction of the standard analysis. Based on the evidence, we claim that the multiple nominative construction be analyzed as a pure sequence, proposing that it is an instance of order-restricted flat-formation operation *Form Sequence*, which Chomsky (2019b/UCLA, 2020/LSJ, 2021b/WCCFL) proposes as one of the true components of Universal Grammar (UG) along with the order-free set-formation operation *MERGE*.

This paper is organized as follows. In Section 2, we will provide novel data showing that there is no formal c-command relation between multiple nominative phrases. In Section 3, we will propose to derive the multiple nominative construction from Form Sequence, and show that the proposal can provide a principled explanation for the fact

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that the multiple nominative construction is a root phenomenon, which was previously not well understood.   Furthermore, in this section, we will consider why the multiple nominative construction is not allowed in English, presenting a Determinacy-based account for the impossibility.   We will also scrutinize the properties of Form Sequence through a comparison with MERGE, pointing out that Form Sequence may be a more general and basic operation than MERGE, and confirming that the analysis of multiple subject constructions based on Form-Sequence is not ad hoc.   Section 4 concludes.

2   Data

2.1 Properties of adjunct multiple nominative constructions

To examine in detail the hierarchical structural relation between the multiple nominative phrases, we focus on the adjunct multiple nominative construction, putting aside the possessive multiple nominative construction, because the word order of the *ga*-phrases in the possessive multiple nominative construction can be freely altered by scrambling as pointed out by Tateishi (1991).   The free word-order property of the possessive multiple nominative construction is exemplified in (4):

(4) a. Bunmeikoku-ga   dansei-ga   heikin-zyumyoo-ga   mizikai.
         civilized.countries-Nom   male-Nom   average-life.span-Nom   short-Pres
         'It is in civilized countries that male's average life span is short.'   (=(1))

                                                                      (Kuno 1973: 70-71)
     b. Bunmeikoku-ga   heikin-zyumyoo-ga   dansei-ga   mizikai.
         civilized.countries-Nom   average-life.span-Nom   male-Nom   short-Pres
     c. Dansei-ga   bunmeikoku-ga   heikin-zyumyoo-ga   mizikai.
         male-Nom   civilized.countries-Nom   average-life.span-Nom   short-Pres
     d. Dansei-ga   heikin-zyumyoo-ga   bunmeikoku-ga   mizikai.
         male-Nom   average-life.span-Nom   civilized.countries-Nom short-Pres
     e. Heikin-zyumyoo-ga   bunmeikoku-ga   dansei-ga   mizikai.
         average-life.span-Nom   civilized.countries-Nom   male-Nom   short-Pres
     f. Heikin-zyumyoo-ga   dansei-ga   bunmeikoku-ga   mizikai.
         average-life.span-Nom   male-Nom   civilized.countries-Nom   short-Pres

Since the free word-order property in the possessive multiple nominative construction hinders the verification of the height relation between the multiple nominative phrases, this paper will focus on the adjunct multiple nominative construction. According to Vermeulen (2005), the adjunct multiple nominative construction has two interesting properties: (i) an adjunct *ga*-phrase can be replaced with a postposition, but cannot be replaced with a possessor; and (ii) an adjunct *ga*-phrase must precede an argument *ga*-phrase, and if the argument *ga*-phrase precedes the adjunct *ga*-phrase, the sentence becomes ungrammatical. Thus, for example, in (5), where *ano mise-ga* 'that shop' is an adjunct *ga*-phrase, and *gakusee-ga* 'student(s)' is an argument *ga*-phrase, the adjunct *ga*-phrase can be replaced with the postposition *de* 'at,' but it cannot be replaced with *no* 'of' as in (6a), nor can it be preceded by the argument *ga*-phrase as in (6b)[2]:

(5) Ano   mise-ga   gakusee-ga   hon-o   yoku   kau.

    that   shop-Nom   student-Nom   book-Acc   often   buy-Pres

    'It is at that shop that students often buy books.'   (Vermeulen 2005: 1330)

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[2] Vermeulen (2005) claims that while a possessive multiple nominative construction permits an indefinitely large number of *ga*-phrases, an adjunct multiple nominative construction allows a maximum of two *ga*-phrases as shown in (i):

(i) a. *Siken-mae-ga   tosyokan-ga gakusee-ga   benkyoo-suru.
       exam-before-Nom library-Nom student-Nom study
       Lit. 'It is in the library and it is before their exams that student study.'
   b. Siken-mae-ga   gakusee-ga tosyokan-de benkyoo-suru.
       exam-before-Nom student-Nom library-in   study   (Vermeulen 2005: 1331)

Because of this difference, some people may suspect that adjunct multriple nominative constructions are special and different from general multiple nominative constructions. However, there are cases where an adjunct multiple nominative construction allows more than two *ga*-phrases as shown in (ii) (Tateishi 1991: 312):

(ii) a. Natu-ga   kono kooen-ga hito-ga   takusan   iru.
      summer-Nom this park-Nom people-Nom   many   be
      Lit. 'It is in this park and it is in summer that there are many people.'
   b. Natu-ga   hito-ga   kono kooen-ni takusan   iru.
      summer-Nom people-Nom this   park-in   many   be

Therefore, in this paper, we do not treat the adjunct multiple nominative construciton as a special construction, assuming that the number of *ga*-phrases can in principle appear infinitely in both possessive and adjunct multiple nominative constructions.

(6) a. Ano mise-de/*no gakusee-ga hon-o yoku kau.
         that shop-at/Gen student-Nom book-Acc often buy
     b. *Gakusee-ga ano mise-ga hon-o yoku kau.
         student-Nom that shop-Nom book-Acc often buy

<div align="right">(Vermeulen 2005: 1351)</div>

In what follows, based on these properties of the adjunct multiple nominative construction, we create relevant examples and inspect the structural relation between the multiple nominative phrases based on a variety of syntactic tests, such as order of negative polarity items (NPIs) and *wh*-phrases Condition C.   In the end, it will turn out that there is no hierarchical structural relation between the multiple nominative phrases, and there is no formal c-command relation between them, contrary to the prediction of the standard analysis.

2.2 Order of wh-phrases and NPIs
Aoyagi and Ishii (1994) make an interesting observation about the order of *wh*-phrases and NPIs in Japanese, showing that *wh*-phrases must appear in structurally higher positions than NPIs.   Hence, relevant sentences become unacceptable if *wh*-phrases are c-commanded by *sika*-NPIs.   Consider below:

(7) a. Dono gakusee-ga kudamono-o ringo-sika tabe-na-kat-ta no?
         which student-Nom fruit-Acc apple-only eat-Neg-Past. Q
         'Among fruits, which students ate only apples?'
     b. *Gakusee-ga John-sika dono kudamono-o tabe-na-kat-ta no?
         student-Nom John-only which fruit-Acc eat-Neg-Past. Q
         'Among students, which fruits did only John eat?'

The contrast between (7a) and (7b) is straightforwardly accounted for given the standard assumption that subject is structurally higher than object, and the former asymmetrically c-commands the latter.   In (7a), the *wh*-phrase *dono gakusee-ga* 'which students' appears in the subject position, c-commanding the NPI-phrase *ringo-sika* 'only apples'; the sentence is acceptable.   In (7b), on the other hand, the *wh*-phrase *dono kudamono-o*

'which fruits' appears in the object position, being c-commanded by the NPI-phrase *John-sika* 'only John'; the sentence is unacceptable.

With this c-command requirement in mind, we examine the structural relation between the multiple nominative phrases.   To do so, let us first create a relevant example showing the properties of the adjunct multiple nominative construction.   Consider (8) below, where *kono huru-honya-ga* 'this secondhand bookstore' is an adjunct *ga*-phrase, and *gakusee-ga* 'student' is an argument *ga*-phrase:

(8) Kono   huru-honya-ga   gakusee-ga   hon-o
     this   secondhand.bookstore-Nom   student-Nom   book-Acc
     yoku   kau.
     often   buy-Pres
     'It is at this secondhand bookstore that students often buy books.'

(9) a. Kono   huru-honya-de/*no   gakusee-ga   hon-o
         this   secondhand.bookstore-at/Gen   student-Nom   book-Acc
         yoku   kau.
         often   buy-Pres
     b. *Gakusee-ga   kono   huru-honya-ga   hon-o
         student-Nom   this   secondhand.bookstore-Nom   book-Acc
         yoku   kau.
         often   buy-Pres

As shown in (9a) and (9b), since the adjunct *ga*-phrase can be replaced with the postposition *de* 'at,' but it cannot be replaced with *no* 'of,' nor can it be preceded by the argument *ga*-phrase, (8) is identified as an instance of the adjunct multiple nominative construction.

Then, to examine the relation between the multiple nominative phrases, let us consider the following examples, variants of (7) containing *wh*-phrases and NPIs:

(10) a. Dono   huru-honya-ga   ano gakusee-sika
          which   secondhand.bookstore-Nom   that student-only
          kyaku-ga   hon-o   kaw-ana-i   no?

customer-Nom book-Acc buy-Neg-Pres.   Q

Lit. 'Which secondhand bookstore, only that student, customers buy books?'

b. Huru-honya-ga   kono   tenpo-sika   dono   gakusee-ga

secondhand.bookstore-Nom   this   shop-only   which   student-No

hon-o   kaw-ana-i   no?

book-Acc buy-Neg-Pres.   Q

Lit. 'Secondhand bookstores, only this shop, which students buy books?'

In (10a), the *wh*-phrase *dono huru-honya-ga* 'which secondhand bookstore' occupies the adjunct-*ga* position, and the NPI-phrase *ano gakusee-sika* 'only that student' occupies the argument-*ga* position, modifying the argument-*ga* phrase *kyaku-ga* 'customers.'   On the other hand, in (10b), the *wh*-phrase *dono gakusee-ga* 'which student' occupies the argument-*ga* position, and the NPI-phrase *kono tempo-sika* 'only this shop' occupies the adjunct-*ga* position, modifying the adjunct-*ga* phrase *huru-honya-ga* 'secondhand bookstores.'   Note that both sentences are acceptable.   Under the standard analysis in (3), where an an adjunct-*ga* phrase c-commands an argument-*ga* phrase, the acceptability of (10a) would be predicted, since the *wh*-phrase in the adjunct *ga*-position would c-command the NPI in the argument *ga*-position.   The acceptability of (10b), however, remains a mystery.   Since the *wh*-phrase in the argument *ga*-position would be c-commanded by the NPI-phrase in the adjunct *ga*-position, the standard analysis would predict that (10b) is unacceptable, which is contrary to fact.

This observation leads us to expect that the c-command requirement on the order of *wh*-phrases and NPIs holds in multiple adjuncts, because they are standardly assumed to enter the derivation in the configuration with the structural height as in (3) (cf. Chomsky 1986).   The expectation is fulfilled.   Consider below:

(11) a. Dono youbi-ni gengogaku-no   jugyo-sika gakusee-wa

what day-Dat linguistics-Gen class-only   student-Top

shussekishi-nakat-ta   no?

attend-Neg-Past.   Q

Lit. 'On what day, only linguistics class, students didn't attend?'

b. *Mokuyoubi-sika   dono   jugyo-ni   gakusee-wa

Thursday-only   which class-Dat student-Top

shussekishi-nakat-ta   no?
attend-Neg-Past.   Q
Lit. 'Only Thursday, which class didn't students attend?'

In (11a), the *wh*-phrase *dono youbi-ni* 'what day' c-commands the NPI-phrase *gengogaku-no jugyo-sika* 'only linguistics class'; this satisfies the c-command licensing requirement on *wh*-phrases and NPIs.   In (11b), on the other hand, the *wh*-phrase *dono jugyo-ni* 'which class' is c-commanded by the NPI-phrase *Mokuyoubi-sika* 'only Thursday'; this cannot satisfy the c-command licensing requirement.

Thus, the contrast between (10) and (11) shows that while there is a c-command relation among multiple adjuncts, there is no formal c-command relation among multiple nominatives in the adjunct multiple nominative construction.   In fact, for some speakers, (10b) might not be considered perfectly acceptable, but what is important to us is that there is a clear contrast between (10b) and (11b) in acceptability, and the fact of (10b) is contrary to the prediction of the standard analysis.

2.3 Condition C
In Japanese, an R(eferring)-expression is subject to the Condition C of the Binding Theory, and cannot be coreferential to any constituent c-commanding it (Chomsky 1981; Whitman 1982; Saito 1983; Hoji 1985 among others).   Consider below:

(12) a. ?Taroo$_i$-no hon-o   soitu$_i$-ga   mituke-ta.
          Taro-Gen book-Acc guy-Nom found-Past
          'That guy$_i$ found Taro$_i$'s book.'
      b. *Soitu$_i$-ga   Taroo$_i$-no hon-o   mituke-ta.
          guy-Nom Taro-Gen book-Acc gound-Past
          'Taro$_i$'s book, that guy$_i$ found.'

As in the case of the contrast between (7a) and (7b) above, the contrast between (12a) and (12b) is straightforwardly accounted for given the assumption that subject is structurally higher than object, and the former asymmetrically c-commands the latter: in (12a), since the R-expression *Taroo* appears in the subject position and is not c-commanded by *soitu* 'that guy' in the object position, they can be coreferential with each

other without violating Condition C.   In (12b), on the other hand, since the R-expression *Taroo* appears in the object position and is c-commanded by *soitu* 'that guy' in the subject position, they cannot be coreferential each other due to a violation of Condition C.

With this c-command requirement in mind, let us consider the following examples, variants of (8) containing R-expressions, and examine the relation between the nominative phrases in the adjunct multiple nominative construction:

(13) a. Sono   huru-honya$_i$-ga   kono   tyoosa-ni-yoruto
          that   secondhand.bookstore-Nom   this   survey-according.to
          [soko$_i$-o   kiniitteiru gakusee-ga] yoku   hon-o   kau.
            there-Acc   like   student-Nom often book-Acc buy-Pres
          'According to this survey, it is the secondhand bookstore$_i$ that students who like that place$_i$ often buy books.'

      b. ?Soko$_i$-ga   kono tyoosa-ni-yoruto
          there-Nom   this   survey-according.to
          [sono   huru-honya$_i$-o   kiniitteiru gakusee-ga]
            that   secondhand.bookstore-Acc   like   student-Nom]
          yoku   hon-o   kau.
          often book-Acc buy-Pres
          'According to this survey, it is there$_i$ that students who like the secondhand bookstore$_i$ often buy books.'

In (13a), the R-expression *sono huru-honya* 'that secondhand bookstore' occupies the adjunct-*ga* position, while the pronoun *soko* 'there' appears within the argument-*ga* position.   In (13b), on the other hand, the R-expression *sono huru-honya* 'that secondhand bookstore' appears within the argument-*ga* position, while the pronoun *soko* 'there' occupies the adjunct-*ga* position.   Note that both sentences are acceptable even when they are interpreted as coreferential.   Under the standard analysis in (3), where an argument-*ga* phrase would be c-commanded by an adjunct-*ga* phrase, the acceptability of (13a) would be predicted, but that of (13b) would be a mystery.   In (13a), the R-expression *sono huru-honya* 'that secondhand bookstore' would not be c-commanded by the pronoun *soko* 'there'; this does not violate Condition C.   In (13b), on the other hand,

the R-expression *sono huru-honya* 'that secondhand bookstore' would be c-commanded by the pronoun *soko* 'there'; this would be in violation of Condition C, contrary to fact.

Again, as in the case of the order of *wh*-phrases and NPIs, this observation leads us to expect that the Condition C effect holds in multiple adjuncts, since they are standardly assumed to enter the derivation in the configuration with the structural height as in (3). The expectation is fulfilled.　Consider below:

(14)　a.　Mokuyoubi$_i$　kono　kiroku-ni-yoruto　[sono-hi$_i$-no　　subete-no

　　　　　Thursday　　this　record-according.to　that-day-Gen　all-Gen

　　　　　jugyo-de]　gkusee-wa　　tesuto-o　uke-nakat-ta

　　　　　class-in　　　student-Top　test-Acc　take-Neg-Past

　　　　　Lit. 'Thursday$_i$, according to this record, in all classes of that day$_i$, students didn't take a test.'

　　　b. *Sono-hi$_i$　kono　　kiroku-ni-yoruto　　[mokuyoubi$_i$-no　subete-no

　　　　　that-day　this　　record-according.to　that-day-Gen　　　all-Gen

　　　　　jugyo-de]　gkusee-wa　　tesuto-o　uke-nakat-ta

　　　　　class-in　　　student-Top　test-Acc　take-Neg-Past

　　　　　Lit. 'That day$_i$, according to this record, in all classes on Thursday$_i$, students didn't take a test.'

In (14a), the R-expression *Mokuyoubi* 'Thursday' is not c-commanded by *sono hi* 'that day'; they can be coreferential without violating Condition C.　In (14b), on the other hand, the R-expression *Mokuyoubi* Thursday' is c-commanded by *sono hi* 'that day'; they cannot be coreferential due to a violation of Condition C.

Thus, the contrast between (13) and (14) also shows that while there is a c-command relation among multiple adjuncts, there is no formal c-command relation among multiple nominatives in the adjunct multiple nominative construction.　In fact, for some speakers, (13b) might not be considered perfectly acceptable, but what is important to us is that there is a clear contrast between (13b) and (14b) in acceptability, and the fact of (13b) is contrary to the prediction of the standard analysis.

3　Analysis

3.1 Multiple nominative construction as an instance of Form Sequence

In the preceding sections we have observed that there is no hierarchical structural relation between the multiple nominative phrases, and, in fact, there is no formal c-command relation between them, contrary to the prediction of the standard analysis. Now the question is what the theoretical apparatus that enables them to enter the derivation is. Based on the empirical data above, we propose that the multiple nominative construction be analyzed as a pure sequence, claiming the multiple nominative phrases be introduced into the derivation by *Form Sequence* which Chomsky (2019b/UCLA, 2020/LSJ, 2021b/WCCFL) defines as follows:

(15) $<(\&), X_1,\ldots,X_n>$

In (15), it is assumed that the presence of the coordinator & is optional, and if it is present, it usually appears before X_n in externalization (EXT). More specifically, according to Chomsky (personal communication), *"Form Sequence produces a pure sequence, yielding a flat structure where there is no formal c-command relation, but there is a strong tendency for a left-to-right counterpart."* Along with the order-free set-formation operation MERGE, he recently emphasizes the necessity of Form Sequence in narrow syntax, an order-restricted flat-formation operation, especially in order to generate unbounded unstructured sequences, such as *I met someone young, happy, eager to go to college, tired of wasting time, ...* (Chomsky 2019b/UCLA: 49), *John, Bill, my friends ... ran, danced, took a vacation* (Chomsky 2020/LSJ), *John, Mary, the man who lives on the first floor, ...* (Chomsky 2021a: 8), etc. Although the definition of Form Sequence (15) is not uncontroversial, we assume here without discussion that Form Sequence is one of the basic operations in narrow syntax, playing an important role in enabling the multiple nominative phrases to enter the derivation.[3]

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[3] One of the unclear points in the definition of Form Sequence is that there is a difference in accessibility/extractability with Pair-Merge, even though they use the same operational notation, as in <a, b>. In Pair-Merge, elements in <a, b> cannot be accessed or extracted, while in Form Sequence, elements in <a, b> can be. Chomsky (2021b/WCCFL) suggests that the reason why Form Sequence can access and extract elements in <a, b> is that Form Sequence is applied "after" set-Merge is applied, trying to derive the accessibility/extractability in Form Sequence from the timing of operation. Alternatively, Goto and Ishii (2021) notice that <a, b> generated by Pair-Merge can set-theoretically be represented as in {a, {a, b}} as an instance of hierarchical, asymmetrical, structures (Wiener 1914; Kuratowski 1921), suggesting that the

Under this proposal, therefore, the adjunct multiple nominative construction is analyzed as having the representation below, where XP represents the adjunct *ga*-phrase and YP represents the argument-*ga* phrase; cf. (3):

(16)   <XP-*ga*, YP-*ga*, …>

An important consequence of the proposed analysis is that XP-*ga* and YP-*ga* form a sequence *where there is no formal c-command relation*.[4]   Given this, we can easily solve the mystery of the standard analysis pointed out above, providing a principled account for why there seems no formal c-command relation between the multiple nominative phrases.   That is, in (10a,b) and (13a, b), since there is no formal c-command relationship between argument-*ga* and auxiliary-*ga* clauses in the first place, there is no violation of the c-command requirement imposed on *wh*-NPI order and Condition C.

3.2 Consequences

Given that the adjunct multiple nominative construction is a sequence, it is predicted that the elements involved do not form a constituent with another element outside of the sequence, and they cannot pass constituency tests.   This prediction is born out, as the unacceptability of (17) shows:

(17)   *Ano   mise-ga   [totemo   ookiku]   katu
        that   shop-Nom   very   big-Pres.Conj   and
        [gakusee-ga   hon-o   yoku   kau]
          student-Nom   book-Acc   often   buy
        Intended: 'It is that shop which is very big and [it is at that shop that] students
        often buy books.'   (Vermeulen 2005: 1356)

(18)   a. Ano mise-ga   totemo   ookii.

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inaccessible/nonextractability property of Pair-Merge can be attributed to a violation of Determinacy, which states that operations have to take place in a fixed and determinate manner (Chomsky 2019a: 270).   See discussion below for Determinacy.

[4] A similar idea is found in Sorida (2014), though no empirical evidence is presented in that paper.

that shop-Nom very big

'That shop is very big.'

b. Ano mise-ga gakusee-ga hon-o yoku kau.

that shop-Nom student-Nom book-Acc often buy

'It is at that shop that students often buy books.'

(18a, b) show that the adjunct *ga*-phrase *ano mise-ga* 'that shop-Nom' can be followed by either *totemo ookii* 'very big' or *gakusee-ga hon-o yoku kau* 'students often buy books'. As shown in (17), however, the adjunct *ga*-phrase *ano mise-ga* 'that shop-Nom' cannot be followed by the coordinated predicate, where *totemo ookiku* 'big' is coordinated with *gakusee-ga hon-o yoku kau* 'students often buy books' by the coordinator *katu* 'and'. This fact can be readily explained if the argument-*ga* does not form a constituent with its following elements. Under the Form Sequence-based analysis, since the adjunct *ga*-phrase *ano mise-ga* 'that shop-Nom' and the argument *ga*-phrase *gakusee-ga* 'student-Nom' are ordered in a flat, non-hierarchical, sequence, just as in *<ano mise-ga, gakusee-ga>*, *gakusee-ga* 'students' within the sequence does not form a constituent with *hon-o yoku kau* 'often buy books' outside of the sequence. Given that only constituents can be coordinated, the unacceptability of (17) straightforwardly follows from the sequence analysis of the adjunct multiple nominative construction. [5] Under the standard hierarchical structure analysis, where the argument *ga*-phrase *gakusee-ga* 'student-Nom' forms a constituent with *hon-o yoku kau* 'often buy books,' it is not clear why (17) is unacceptable

It has been known that VP-fronting is possible in Japanese if *su* (*do-*)insertion applies and a focus particle like *sae* 'even' attaches to the verb in the fronted VP (see Funakoshi 2020 among others). Thus, in the example (19), VP-fronting is possible since the conditions are met:

(19) [vP Gengogaku-no jugyo-de gakusee-ga tesuto-o uke-sae]

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[5] This perspective may shed new light on non-constituent conjuncts such as *conjunction reduction*, *right node raising*, *gapping*, *pseudogapping*, *stripping*, etc. i.e., cases involving ellipsis that gives apparent non-constituent phrases or clauses by applying constituent-deletion. We leave for future research the question of whether and how Form Sequence is involved in these cases.

linguistics-Gen class-at   student-Nom test-Acc take-even

sensyuu t_{VP} si-nakat-ta.

last week   do-Neg-Past.

Lit: 'Last week, at linguistics class, students didn't even take a test.'

However, note that in the adjunct multiple nominative construction, even though the conditions are met, the relevant fronting is impossible, as shown in (20):

(20) *[Gakusee-ga   hon-o   yoku   kai-sae]$_i$ ano mise-ga t_i su-ru.

        student-Nom hon-Acc often buy-even] that shop-Nom   do-Pres.

        Intended: 'It is at that shop that students often even buy books.'

(20) shows that the syntactic object containing the argument-*ga* phrase, *gauksee-ga* 'students,' which is equivalent to VP, cannot be fronted to the initial position, *i.e.*, to the edge of the root clause.   This fact can also be explained if the argument-*ga* does not form a constituent with its following elements.   Under the Form Sequence-based analysis, since the adjunct *ga*-phrase *ano mise-ga* 'that shop-Nom' and the argument *ga*-phrase *gakuseei-ga* 'student-Nom' are ordered in a flat, non-hierarchical, sequence, as in <*ano mise-ga*, *gakusee-ga*>, *gakusee-ga* 'students' within the sequence does not form a constituent with *hon-o yoku kai-sae* 'often even buy books' outside of the sequence. Given that movement only applies to a constituent, the unacceptability of (20) straightforwardly follows from the Form Sequence-based analysis of the adjunct multiple nominative construction.   Under the standard hierarchical structure analysis, where the argument *ga*-phrase *gakusee-ga* 'student-Nom' forms a constituent with *hon-o yoku kai-sae* 'often even buy books,' it is not clear why fronting of *gakusee-ga hon-o yoku kai-sae* 'students often even buy books' is not possible.

Note that this analysis implies that the adjunct multiple nominative construction that constitutes a sequence has no label.   This is theoretically compatible with Chomsky's (2013, 2015) *Labeling Algorithm* (LA), according to which an XP-YP structure is not labeled, since *LA by Minimal Search* for the structure is ambiguous, locating the heads X, Y of XP, YP, respectively.   As is clear from the structure (16), repeated below as (21), LA by Minimal Search for the sequence is ambiguous because it is equidistant from α:

(21)   α
            ╱╲
       <XP-*ga*   YP-*ga*>
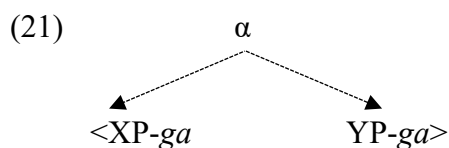
In (21), LA by Minimal Search, which is indicated by the dotted lines, locates the heads X, Y of XP-*ga*, YP-*ga*, respectively, so that the syntactic object α is not labeled due to the ambiguous Minimal Search.[6]

Importantly, the analysis of the adjunct multiple nominative construction as a sequence without a label makes an interesting prediction given that root clauses need not to be labeled (Goto 2012, 2013; Yasui 2014; Blümel 2017; Chomsky, Gallego, and Ott 2019; Miyagawa, Wu, and Koizumi 2019; Blümel and Goto 2020).[7]   If the adjunct multiple nominative construction has no label, and if such an unlabeled syntactic object is privileged in root clauses, then it is predicted that the adjunct multiple nominative construction can appear in a root clause, as we have seen above, but cannot appear in an embedded clause.   This prediction is in fact borne out by (22), where the adjunct multiple nominative construction (*ano mise-ga gakusee-ga yoku hon-o kau* 'it is at that shop that students often buy books;' see (5) above) is embedded in the *if*-clause, resulting in ungrammaticality (??/* judgements are Vermeulen's):

(22) ??/* Mosi ano mise-ga   gakusee-ga   yoku   hon-o   kau-naraba,
            if   that shop-Nom   student-Nom   often   book-Acc   buy-Cond.
            Mary-wa   John-ni   matigatte   hokano   honya-o
            Mary-Top John-Dat   mistakenly   other-Gen   bookshop-Acc
            suisen-sita.
            recommended.

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[6] Specifically, XP and YP stand for {X, …} and {Y, …}, respectively, so XP-YP structure should be represented as {{X, …}, {Y, …}}.   Here, we will use the notations XP and YP just for ease of exposition.

[7] This is an immediate consequence of the idea on labeling that labels are necessary for further computations in narrow syntax (Chomsky 2007, 2008; Hornstein 2009).   To my knowledge, Goto (2013) was the first who noticed the exocentric property of the root clause in terms of LA, suggesting: "given that a label is required for further computations in narrow syntax […], it follows that a label of the SO at the final stage of the derivation is unnecessary, just because computation terminates there." (Goto 2013: 56-57)

'If it is at that shop that students often buy books, Mary has mistakenly recommended the wrong shop to John.' (Vermeulen 2005: 1335, fn. 7)

The unacceptability of (22) can easily be accounted for given that labeling is necessary for further computations: since the adjunct multiple nominative construction has no label, it cannot enter into further computations, such as merge with *if* or selection by the matrix predicate.[8]

Thus, the observation and analysis above confirm the Form Sequence-based analysis of the adjunct multiple nominative construction. The contrasts between (10b) and (11b), between (13b) and (14b), and the unacceptability of (17), (20), and (22) can be explained by assuming that the adjunct multiple nominative construction is a sequence as in (16). If it is analyzed as having the hierarchical structure as in (3), all these facts remain mysterious.

3.3 AGREE under Determinacy

Let us consider why the multiple nominative construction is not allowed in English. As shown in (23), the English counterpart of (1) is ungrammatical:

(23)   *Civilized countries, male, the average lifespan is short.

Given the discussion so far, nothing prevents the application of Form Sequence to generate a sequence as in *<civilized countries*, *male*, *the average lifespan>*, and there is nothing wrong with the structure remaining unlabeled as it appears in a root clause (see the discussion above), so we cannot attribute the unacceptability of the sentence (23) to the procedures of Form Sequence or LA; it must be attributed to something else.

[8] Note that multiple adjuncts do not have such a restriction, as shown below:

(i) Mokuyoubi subete-no jugyo-de gakusee-ga   tesuto-o
    Thursday   all-Gen   class-in   student-Nom   test-Acc
    uke-nakat-ta-naraba, …
    take-Neg-Past-Cond.
    'If students didn't take a test on Thursday,…'

The difference between (22) and (i) suggests that the adjunct multiple nominative construction still has a different structure from the multiple adjunct construction.

We then assume, following Sorida (2014), that the culprit lies in a φ-valuation process between a single finite T and multiple nominative phrases (NPs), suggesting that ambiguous application of *AGREE* results in a violation of the principle of *Determinacy*, which essentially states that rule application must be unambiguous (for relevant discussion, see Chomsky 1955/1975, 1964, 1973, 2013, 2019; Chomsky Gallego, and Ott 2019; Goto and Ishii 2020a, b, c).[9]   It is standardly assumed that an AGREE operation is necessary in order to deal with agreement phenomena of human languages (Chomsky 2000, 2001, 2004; Hiraiwa 2005; Chomsky, Gallego, and Ott 2019 among others), and the actual φ-valuation takes place by AGREE relating unvalued φ-features on a probe (uφ) to valued matching φ-features of a goal (vφ).   The relevant AGREE relation is established when the goal is in the probe's c-command domain.   To see how AGREE works, let us consider the following structure that is created by applying MEGRE to a single finite T and a single NP:

(24)   {NP$_{[vφ]}$, T$_{[uφ]}$} (order irrelevant)
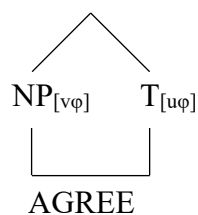
Here T has uφ and NP has vφ, being a probe and a goal, respectively.   Since T c-commands NP, the relevant AGREE relation can be established.   Note that in this

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[9] In passing, Chomsky (2021b/WCCFL) and Kitahara and Seely (2021) argue that Determinacy is a consequence of *Resource Restriction* (Fong, Berwick, and Ginsburg 2019) which is defined as follows:

(i) *Resource Restriction (RR)*
    Accessibility increases by only one from WS to WS'.

In order to regulate accessibility, Chomsky-Kitahara-Seely assume that not only Minimal Search (MS) but also *Phase Impenetrability Condition* (PIC) play a crucial role. However, Goto and Ishii (2020a, b, c) point out that that approach has a look-ahead property or a redundancy between MS and the PIC regarding accessibility, trying to improve the whole system by minimizing the assumptions as well as maximizing the empirical coverage only by the PIC.

configuration, when the actual φ-valuation takes place, its implementation is unambiguous: T can be φ-valued only by the single NP.   Hence in (24), the φ-valuation in EXT can take place without violating Determinacy.

Now let us consider the following structure that is created by applying Form Sequence to a single finite T and multiple NPs:

(25)   <NP1$_{[v\varphi]}$, NP2$_{[v\varphi]}$, NP3$_{[v\varphi]}$> T$_{[u\varphi]}$ …
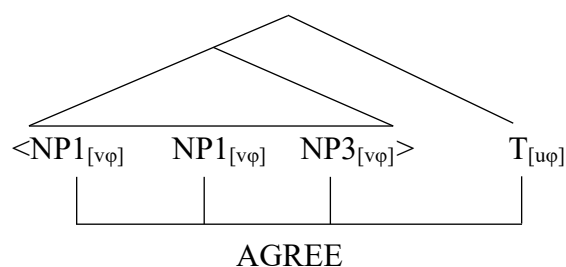
AGREE

Here T has uφ and NPs have their own vφ, being a probe and goals, respectively.   Since T c-commands all the NPs, the relevant AGREE relations can be established with all the NPs.   Note however that in this configuration, when the actual φ-valuation takes place, its implementation is ambiguous: T can be φ-valued ether by NP1, NP2, or NP3.   Hence in (25), the φ-valuation process in EXT violates Determinacy.[10]

In this way, the multiple nominative construction is not allowed in English as it results in a violation of the principle of Determinacy.   It is very important to notice here that even in Japanese the multiple AGREE relations as in (25) can in principle be obtained, even if Japanese finite T also has uφ (cf. Chomsky's 2001 *Uniformity Principle*). However, even so, Japanese does not require finite T to be φ-valued, and more specifically, to be morpho-phonologically realized in EXT, so that the consideration of

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[10] Based on the assumption that an {H, XP} structure, where H a head and XP not a head, can be labeled H (Chomsky 2013), one might point out that the structure in (25) can have the label T, contradicting the argument above that the root does not need a label. So here, following Chomsky (2015), we assume that the TP structure has to be labeled as <φ, φ> via a Spec-Head Agreement between T$_{[u\varphi]}$ and NP$_{[v\varphi]}$, and that the "weak" T alone does not label the TP structure.   It follows from this assumption that the structure in (25) cannot have a label of T.   Instead, it needs to be labeled as <φ, φ> via a Spec-Head Agreement with NPs.   However, since there are multiple NPs, the structure results in a Determinacy violation.

the principle of Determinacy becomes vacuous, and thus the multiple nominative construction can be generated without violating Determinacy.[11]

Therefore, under our analysis, Form Sequence, LA, AGREE, and Determinacy are all equally available in both English and Japanese, but they crucially differ in the demand for morpho-phonological realization of the φ-valuation of finite T in EXT: in English the realization is required, so that the φ-valuation must be unambiguous in accordance with Determinacy, while in Japanese, the realization is not required, so that even if the relevant configuration is ambiguous, there is no such thing as ruling out the multiple nominative construction as a violation of Determinacy.[12]

3.4 Potential of Form Sequence

One might say that the Form Sequence-based analysis of the multiple nominative construction seems ad hoc in that it is construction-specific, worrying that Form Sequence may be eliminated given the generative history that construction-specific mechanisms were reduced to a more general one.   However, a comparison with the most fundamental operation MERGE may dispel the uneasiness, or rather, provide a new perspective on central aspects of structure-building.

Although MERGE is generally assumed to be essential in forming asymmetrical hierarchical structures, it is very important to notice that "first" MERGE actually always yields a "flat," symmetrical, non-hierarchical, structure such as Form Sequence does.[13] Given this similarity and the universal fact that any derivation starts with a sequence, it might be possible to speculate that Form Sequence is a more general and fundamental

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[11] Note that our analysis is also compatible with Saito and Fukui's (1998) claim that unlike English, Japanese lacks φ-features.

[12] For other approaches to explain the difference between Japanese and English with respect to the possibility of the multiple nominative construction in the recent framework, see also Epstein, Kitahara, and Seely (2020).   Our Determinacy-based analysis of the impossibility of multiple nominative constructions in English makes a prediction that subjects that do not involve φ-valuation (e.g. non-NP subjects such as PP and sentential subject) can appear multiply for the same reason it is allowed in Japanese.   We leave the issue open here for future research.   Note incidentally that we do not exclude the possibility for a single probe to enter into multiple AGREE relations with multiple goals, as indicated in (25) (cf. Hiraiwa 2005).   As argued above, the ultimate culprit lies in φ-valuation process in EXT, not in the AGREE relation-making process itself in syntax.

[13] See Oishi (2015) for relevant discussion.

operation than MERGE in that it is already part of the form of MERGE, playing a vital role in structure-building.[14]

Such a primitive aspect of Form Sequence may also be found in the freedom from the binarity restriction ($n=2$), one of the significant constraints imposed on MERGE.   In case of MERGE, after the first MERGE takes place, further MERGE applies sequentially and recursively to its first output in accord with $n=2$, so that syntactic objects are embedded inside one another, an asymmetrical hierarchical structure yielded.   In case of Form Sequence, however, it applies as a single simultaneous operation without any reference to sequence nor $n=2$, so that syntactic objects are not embedded inside one another, a flat, non-hierarchical, structure obtained throughout a derivation.   Hence, MERGE and Form Sequence are similar in that they form a structure, but different in that MERGE obeys $n=2$, but Form Sequence does not.   Focusing on the similarity, rather than the difference, it might be plausible to unify MERGE and Form Sequence as two possible instantiations of the single operation *FORM,* which just puts syntactic elements in workspace into a relation.   If the input is two, then the output is an asymmetrical hierarchical structure; and if the input is more than two, then the output is a flat, non-hierarchical, symmetrical structure, the difference attributed only to the number of the input:[15]

(26) FORM(n), where $n=2$ or $n \geq 2$:

    a. FORM($n=2$) → hierarchical structures (=MERGE);

    b. FORM($n \geq 2$) → non-hierarchical structures (=Form Sequence).

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[14] If the basic word order between the verb V and its complement O is fixed among languages, and if Form Sequence is an order-restricted flat-formation operation that can substitute for the first MERGE yielding a sequence, then it might be possible to eliminate some general algorithm that converts hierarchical relations between V and O into linear relations by attributing to the operational nature of Form Sequence (cf. Kayne 1994; also Oishi 2015).

[15] (26) does not say anything about the application combination of MERGE and Form Sequence.   All kinds of combinations are possible, such as derivation obtained by applying only MERGE, derivation obtained by applying only Form Sequence, derivation obtained by applying Form Sequence first and then MERGE, and derivation obtained by applying MERGE and Form Sequence alternately.

At the present level of our understanding, it is still unclear what "free" means. But it is clear that Form Sequence is freer than MERGE in that it is not constrained by binarity. Although Chomsky (2001: 3) states that "While Merge 'comes free,' any other operation requires justification," but if the above characterization is correct, we might say, on the contrary, that while Form Sequence comes free, MERGE requires justification.

Furthermore, it is worth noting here that this particular characterization of the two core structure-building operations provides a new perspective on the question of how hierarchical structures arise. Among others, according to Hornstein (2009), it is claimed that hierarchy emerges from Labeling. But in our terms, it turns out that it emerges from binarity, and a structure obtained without following binarity is just a sequence produced by Form Sequence.

In relation to this, it might be interesting to recall that despite the fact that there are striking similarities between birdsong and human language acquisition (see Miyagawa et al. 2014 and references cited therein), it is reported in the literature that birdsong does not contain the rich hierarchical structure characteristic of human language (Berwick et al. 2011a, b, 2012). For example, it is said that the song of the zebra finch has a limited set of "notes" that combine to form sequence of syllables, syllables into motifs, and motifs into complete song "bouts," in which there is no hierarchical structure. This indicates that the most important characteristic that separate birdsong from human language is binarity, and binary-unconstrained Form Sequence is a more primitive operation than binary-constrained MERGE in that the properties that Form Sequence shows are observed in non-human languages as well, suggesting that Form Sequence is a sufficiently evolvable product in nature.

In the recent framework, it is assumed that what are legitimate syntactic operations are determined by Resource Restriction (RR) (see footnote 9). According to RR, only external MERGE and Internal MERGE (Chomsky 2001) are taken to be legitimate, while other variants such as *Parallel Merge*, *Sideward Merge*, *Multidominance*, etc., are not (see Chomsky 2019b/UCLA, 2020/JSL, 2021b/WCCFL, Fong, Berwick, and Ginsburg 2019, and Kitahara and Seely 2021). In response to this, some might point out that Form Sequence that does not follow binarity is a violation of RR and cannot be regarded as a legitimate syntactic operation. However, as mentioned earlier, Form Sequence does not follow sequence nor *n*=2, and is applied to elements in WS all at once (*i.e.*, it ends with one operation application), so there is no derived process that involves an increase of

accessibility in the first place.　　Therefore, Form Sequence can be regarded as a legitimate operation that does not violate RR.

　　Thus, given that Form Sequence carries the first MERGE, is free from binarity, is observed in non-human languages, and satisfies RR, the Form Sequence-based analysis can be said to have a certain amount of theoretical validity, as well.

4　Conclusion

Based on the empirical evidence showing that there is no formal c-command relation between the multiple nominative phrases, we argued that the multiple nominative construction should be generated by Form Sequence as a sequence.　　As a consequence, we provided a principled explanation for the fact that the multiple nominative construction is a root phenomenon that does not show constituency, which can never be explained under the traditional analysis that assumes a c-command relation between the multiple nominative phrases.　　Furthermore, we argued that the multiple nominative construction is not allowed in English because the ambiguous T's φ-valuation process in EXT results in a Determinacy violation, which in effect bans unambiguous rule application.　　Finally, through a comparison with MERGE, we suggested that Form Sequence is by no means theoretically heterogeneous, but rather may be one of the major syntactic operations.　　We believe that the empirical and theoretical findings in this paper introduces a breath of fresh air into the long-standing tradition in the investigation of the multiple nominative construction in Japanese, and can enhance the potential of the new structure-building operation Form Sequence.

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