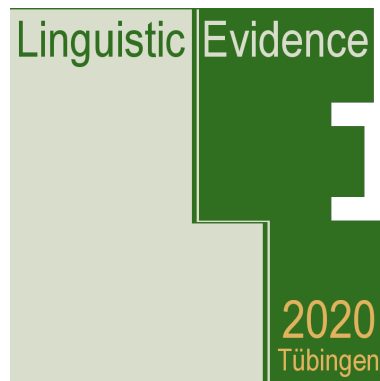Takeshi Kato, Shohei Nagata & Yuichi Ono

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Experimental Survey on the Interaction of Scrambling with Focus
Particles in Japanese

Experimental Survey on the Interaction of Scrambling with Focus Particles in Japanese

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1   Introduction

This paper aims to deepen our understanding of the status of Focus Particles (FPs) in Japanese, and investigates this through interactions with changes in the word order. Japanese shows a flexible word order as seen in (1) and (2):[1]

(1) a. *Taro-ga   hon-o   katta*
         Taro-NOM book-ACC   bought

     b. *hon-o   Taro-ga   katta*
        'Taro bought a book.'   (Miyagawa, 1997: 1)

(2) a. *John-ga   Mary-ni   pizza-o   ageta*
         John-NOM Mary-DAT pizza-ACC gave

     b. *John-ga   pizza-o   Mary-ni   ageta*
        'John gave Mary a pizza.'   (ibid.: 1)

Native speakers of Japanese judge all examples to be equally grammatical without any differences in interpretation. Since Saito (1985) and Hoji (1985), such flexibility has been captured by the assumption that one is derived from the other through a movement operation called *scrambling*. For example, this illustrates the structural relationship between (1a) and (1b) as follows:

(3) a. [IP *Taro-ga* [VP *hon-o katta*]]

     b. [IP *hon-o$_i$* [IP *Taro-ga* [VP *t$_i$ katta*]]]

Given that the SOV order is the underlying structure in Japanese, OSV like (1b) is derived by the adjunction of an object to an IP (Saito, 1992). Consequently, this account captures the thematic equivalence between these two word orders.

However, FPs weaken flexibility. Miyagawa (1997) observed that an object to which a contrastive marker *wa* adjoins undergoes scrambling obligatorily. That is, scrambling is not a truly optional operation. Observe:

(4) a.?? *John-ga   isoide   hon-**wa**   katta*
          John-NOM quickly book-wa   bought

     b. *John-ga   hon-wa$_i$ isoide t$_i$ katta*
        'John bought a BOOK quickly (, opposed to others).'

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[1] The abbreviations used in this paper are as follows: ACC = accusative, DAT = dative, NOM = nominative, PST = past, and TOP = topic.

(5) a.?? *John-ga   isoide   Hanako-ni-**wa**   hon-o   katta*
         John-NOM   quickly   Hanako-DAT-wa   book-ACC   bought

    b. *John-ga Hanako-ni-**wa**$_i$ isoide t$_i$ hon-o   katta*
      'John bought Hanako a BOOK (, opposed to others).'   (Miyagawa, 1997: 10)

Given that manner adverbs adjoin to a VP (Pollock, 1989), Miyagawa suggested that in these cases, these *wa*-phrases move outside the VPs in order for its focus features to be checked (i.e., focus movement).[2] However, the fact is complicated: if the sentence is negative, such an "obligatory" scrambling of a *wa*-phrase is not attested. Instead, scrambling is likely to be optional in such cases. See (6):

(6) a. *John-ga   isoide   hon-**wa**   kaw-anakat-ta*
     John-NOM   quickly   book-wa   buy-NEG-PST

    b. *John-ga   hon-**wa**$_i$ isoide t$_i$ kaw-anakat-ta*
      'John didn't buy a BOOK quickly (, opposed to others).'

If Miyagawa's account were correct, we would not observe the fact that the optionality of *wa*-scrambling depends on the polarity of the sentence. Theoretically, we may be confronted with some difficulties as far as we assume, following Miyagawa, that FPs move out of a VP to some dedicated functional position (e.g., FocusP) to be licensed. Thus, we need to draw on an account that succeeds in explaining such scrambling facts.

    The rest of this paper is organized as follows: Section 2 outlines Kobayashi's (2009) mechanism for licensing focus equipped with some Minimalist apparatuses (Chomsky, 1995, 2001) and its implementation. With Kobayashi's account in mind, this section also introduces three issues that motivate our quantitative survey. Section 3 details our research questions and discusses the design of our experiments. Section 4 presents the results. Section 5 discusses them and identifies related issues to be scrutinized in future research. Finally, Section 6 concludes the paper.

2   Syntactic Properties of FPs in Japanese

In the first part of this section, we outline Kobayashi's (2009) proposal on the behavior of FPs in Japanese. She argued that the fact that the movement of the *wa*-phrase is contingent on the sentence polarity is attributed to its semantic property and proposed that both this fact and the semantic contribution of *wa* are captured by a single syntactic feature. Based on this, we demonstrate three empirical issues in the second part. They are examined using a quantitative rather than a qualitative method because the judgment involved is not discreet enough to fully support Kobayashi's qualitative analysis, and because prosody should be considered.

2.1   Kobayashi's (2009) Account

Before examining Kobayashi's (2009) solution to the problem raised above, let us observe the permutational property of another FP than *wa*. We have shown the curious fact that the *wa*-phrase *must* undergo scrambling in positive sentences as in (5) and *may* in negative sentences, as in (6). An FP *mo* 'also' behaves in the opposite manner with respect to sentence polarity. Observe:[3]

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[2] Hasegawa (2005) arrived at a similar conclusion for another FP *mo* 'also'.

[3] There are two types of *wa* in Japanese: *thematic* and *contrastive* in Kuno's (1973) terms, and it is the latter that our paper is mainly concerned with. There are semantic and syntactic differences between them (cf. Saito, 1985), but it is not irrelevant in this paper. To distinguish between them, we gloss TOP on the former and *wa* on the latter.

(7)   a.?? *Hanako-wa*   *hashi-de*   *keeki-**wa***   *tabe-ta*
           Hanako-TOP   chopsticks-with   cake-wa   eat-PST
           'Hanako ate a CAKE with chopsticks (, opposed to others).'

       b. *Hanako-wa*   *hashi-de*   *keeki-**mo***   *tabe-ta*
           Hanako-TOP   chopsticks-with   cake-mo   eat-PST
           'Hanako also ate a CAKE with chopsticks.'   (Kobayashi, 2009: 124)

(8)   a. *Hanako-wa*   *hashi-de*   *keeki-**wa***   *tabe-nakat-ta*
           Hanako-TOP   chopsticks-with   cake-wa   eat-NEG-PST
           'Hanako didn't eat a CAKE with chopsticks (, opposed to others).'

       b.?? *Hanako-wa*   *hashi-de*   *keeki-**mo***   *tabe-nakat-ta*

       c. *Hanako-wa*   *keeki-**mo**$_i$*   *hashi-de t$_i$*   *tabe-nakat-ta*
           'Hanako also ate a CAKE with chopsticks.'   (ibid.: 124)

The data indicate that while in positive sentences (7), the *wa*-phrase must escape out of a VP, in negative sentences (8), it is the *mo*-phrase that must escape. The movement of the *mo*-phrase is optional in positive sentences, unlike the *wa*-phrase (cf. (6)):

(9)   a. *Hanako-wa*   *hashi-de*   *keeki-**mo***   *tabe-ta*
       b. *Hanako-wa*   *keeki-**mo**$_i$*   *hashi-de t$_i$*   *tabe-ta*   (ibid.: 124)

The 'obligatoriness' of scrambling of *wa*/*mo* is illustrated in Table 1 below:

Table 1. The scrambling possibilities of FPs (*wa* vs. *mo*) regarding sentence polarity (positive vs. negative)

	wa	*mo*
Positive	Obligatory	Optional
Negative	Optional	Obligatory

For the purpose of accounting for the syntactic behaviors involved, she first represented the semantic descriptions of *wa* and *mo* as in (10):

(10)   a. α$_{wa}$: $\exists x \neq \alpha\ x \in \lambda x\ \neg P(x)$ (Presupposition)
             $\alpha \in \lambda x\ P(x)$ (Assertion)

       b. α$_{mo}$: $\exists x \neq \alpha\ x \in \lambda x\ P(x)$ (Presupposition)
             $\alpha \notin \lambda x\ \neg P(x)$ (Assertion)   (ibid.: 134)

For example, the interpretation of (5a) or (5b) resulting from *wa* is explained as follows: that attaching *wa* to the phrase *hon* 'book' in the sentence *Hanako-wa isoide hon-wa katta* 'Hanako bought a book quickly (, opposed to others)' is contextually accepted only when, according to the semantics of *wa* in (10a), it establishes the presupposition that Hanako has previously *not* bought *x* quickly, whose value is other than books.[4] Then, sentence (5) is asserted appropriately

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[4] Such FPs can scope over entire clauses although they attach directly to objects. This is what Krifka's (2006) *the association of focus* predicts. Thus, not only the utterance in (ia) but also that in (ib) is completely compatible with this context, where even the subject *Hanako* is newly introduced in (ib):

(i)   *Taro-ga*   *piano-o*   *hiita*   *si*
      Taro-NOM   piano-ACC   played   and

      a. *Hanako-ga*   *violin-o*   *hiki-**mo**-sita*
         Hanako-NOM   violin-ACC   play-mo-PST

      b. *Hanako-ga*   *violin-**mo***   *hiita*
         'Taro played a piano, and Hanako played a violin, too.'

Although this is important, we do not consider it any further for the sake of explanation (see Aoyagi, 2006 for an analysis on the association-with-focus effect of FPs in Japanese)

with the presupposition contrasted. The same holds for the *mo*-phrase in (10b); the only difference is that the sentence with *mo* requires the same polarity between the presupposition and this sentence, as opposed to *wa*. In this sense, Kobayashi contended that these FPs are elements associated with polarity. However, these semantics would not provide a straightforward explanation as to why "obligatory" scrambling occurs depending on the sentence polarity, as shown above. She thus assumed that both sides of the semantic and syntactic effects involved in the FPs are ascribed to syntactic features that are visible in narrow syntax. More precisely, based on the fact that they are sensitive to either semantic or syntactic polarity, she proposed that *wa* and *mo* are interpretable focus features [F], whose feature specifications are $F_{Neg(ative)}$ and $F_{Pos(itive)}$, respectively.[5] She assumed that an uninterpretable focus feature [uF] in the C-domain must Agree with F in a Probe-Goal-wise so as not to make the derivation crash (Chomsky, 1995, 2001, 2008). A more crucial assumption for Kobayashi is the intervention effect of Agree, a modification of Rizzi's (1990, 2004) (featural) Relativized Minimality, which can capture the obligatoriness of scrambling of FPs. The Agree [uF, F_α] is blocked by an intervening feature β such that β is the opposite value of α. In this context, F_α corresponds to $F_{Pos/Neg}$ and β corresponds to a polarity feature Pos/Neg occupied on a Pol head (cf. Laka, 1990). The (un)grammatical configurations are schematized as follows:

(11) a.*$[_{CP}$ uF … $[_{\Sigma P}$ Pos … $[_{vP}$ F_{Neg}] …] …] (structure of (7a))

b. $[_{CP}$ uF … $[_{\Sigma P}$ Neg … $[_{vP}$ F_{Neg}] …] …] (structure of (8a))

c. $[_{CP}$ uF … $[_{\Sigma P}$ Pos … $[_{vP}$ F_{Pos}] …] …] (structure of (7b))

d.*$[_{CP}$ uF … $[_{\Sigma P}$ Neg … $[_{vP}$ F_{Pos}] …] …] (structure of (8b))

As in (11b) and (11c), if the polarity value in ΣP and the feature specification of F are identical, the configurations are grammatical.

With this in mind, let us consider how this mechanism accounts for the obligatoriness of scrambling. As the intervention effect is determined in terms of the configuration in which a potential intervener is c-commanded by Probe but c-commands Goal, if Goal F_α occurs structurally above the intervener β via some strategies, the resulting configuration is not ungrammatical. This is the locus of obligatoriness. Scrambling of F_α in each configuration in (11) is illustrated in (12):

(12) a. $[_{CP}$ uF … [… F_{Neg1} …$[_{\Sigma P}$ Pos … $[_{vP}$ t_1] …] …] …] (the structure of (5b))

b. $[_{CP}$ uF … [… F_{Neg1} …$[_{\Sigma P}$ Neg … $[_{vP}$ t_1] …] …] …] (the structure of (6b))

c. $[_{CP}$ uF … [… F_{Pos1} … $[_{\Sigma P}$ Pos … $[_{vP}$ t_1] …] …] …] (the structure of (9b))

d. $[_{CP}$ uF … [… F_{Pos1} … $[_{\Sigma P}$ Neg … $[_{vP}$ t_1] …] …] …] (the structure of (8c))

Let us first consider the derivations of (7a, b), repeated as (13a, b), in terms of this mechanism. The structures of (13a) and (13b) are illustrated in (14a) and (14b), respectively:

(13) a.?? *Hanako-wa hashi-de keeki-**wa** tabe-ta*
Hanako-TOP   chopsticks-with   cake-wa   eat-PST
'Hanako ate a CAKE with chopsticks (, opposed to others).'

b. *Hanako-wa hashi-de keeki-**mo** tabe-ta*
Hanako-TOP   chopsticks-with   cake-mo   eat-PST
'Hanako also ate a CAKE with chopsticks.'

A feature uF seeks to Agree with an interpretable F feature in its c-command domain. Otherwise, the derivation crashes because it would lead to sending an uninterpretable feature to

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[5] In Kobayashi's (2009) original terminology, she called the feature involved in FPs New Information (NI) feature rather than F feature in order to emphasize a conceptual distinction between focus and NI. However, this distinction is not significant for our argument as far as we are just contingent on Kobayashi's proposal that the Probe-Goal Agree system is relevant for (structural) focus licensing. Thus, we use the more familiar term F.

the interfaces (i.e., PF and LF), resulting in the violation of Full Interpretation (cf. Chomsky, 1995). In the present configuration (14a), the uF indeed finds its Goal, F_{Neg} attaching to *keeki* 'cake', but the Agree relation fails to be established because of the presence of the intervener Pos, whose feature specification is opposed to F_{Neg}. Hence, the structure cannot render the uF deleted, and the derivation ends up crashing, resulting in ungrammaticality.

(14b) yields the opposite result. In this configuration, the feature specification of the intervening element is Pos and that of *mo* is F_{Pos} as well. Thus, the fact that the Pos intervenes between uF and *mo* does not yield an intervention effect under Kobayashi's mechanism. In other words, this configuration converges without moving the *mo*-phrase above Pos.

Let us consider how structure (14a) is rescued via scrambling. The grammatical version of (14a) is illustrated in (15a, b) (cf. (6b)). In this configuration, the *wa*-phrase, *keeki-wa*, moves above ΣP. Let us assume that the landing site of scrambling is TP through adjunction operation (Miyagawa, 2001), which does not directly matter to the discussion involved. By virtue of scrambling, *keeki-wa* occurs more closely to the uF than the Pos feature on the Σ head, thus leading to a successful Agree relation: a grammatical sentence is yielded.

(14)   a.
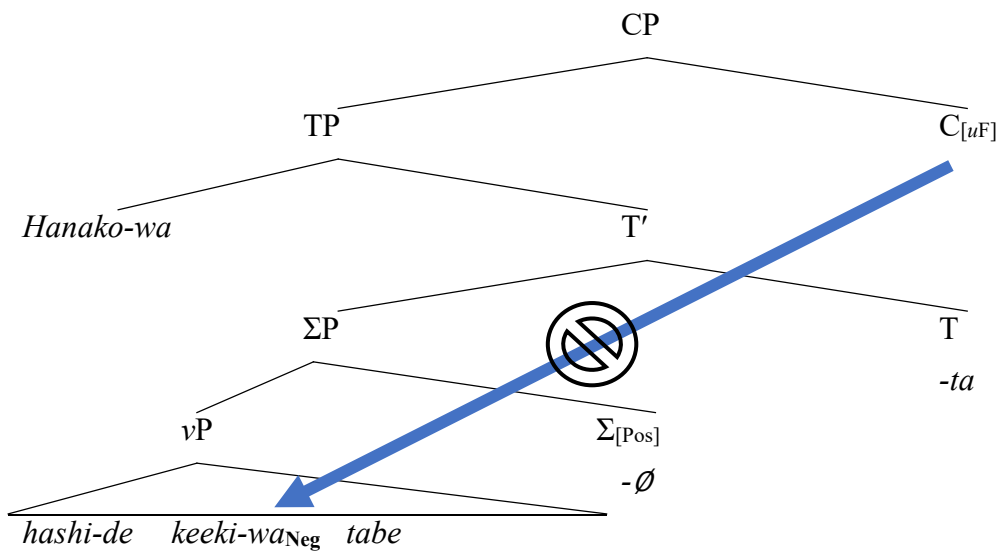
b.
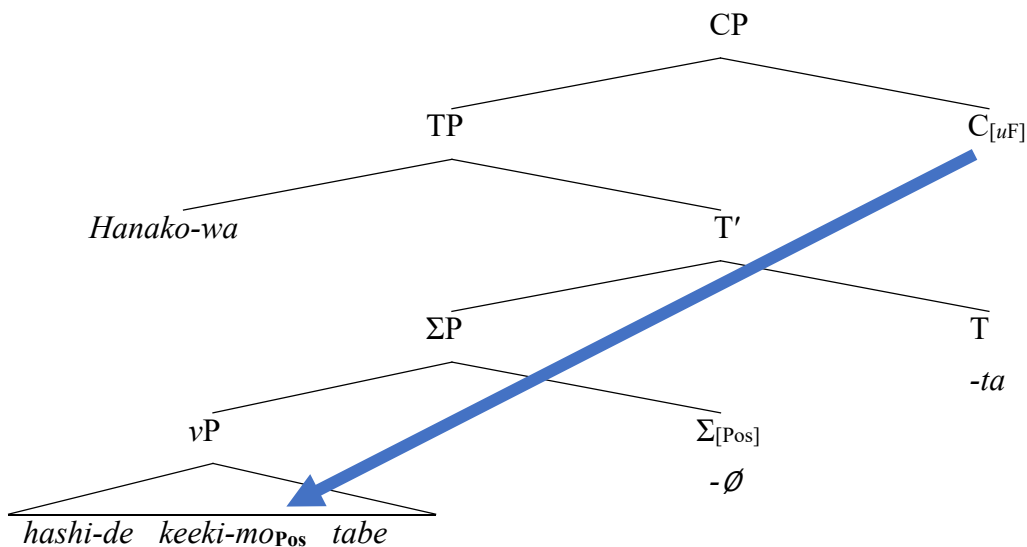
Finally, let us consider where the optionality of scrambling in certain configurations comes from. In the following segment, we show that it is reminiscent of the account for obligatoriness argued in (15). As seen in (14b), we have demonstrated that we do not need movement of a phrase attached to by an F in a configuration where there is no potential intervener. This does not mean, however, that scrambling may not occur. Because this operation is purely optional *per se* (Saito, 1992), there is always a possibility that scrambling is performed. Therefore, both the scrambled counterpart of (14b), that is *Hanako-wa keeki-mo hashi-de tabeta* as in (9b), and the non-scrambled version are possible.

(15) a. *Hanako-wa   keeki-wa₁   hashi-de   t₁   tabe-ta*

       Hanako-TOP   cake-wa   chopsticks-with   eat-PST

       'Hanako ate a CAKE with chopsticks (, opposed to others).'

   b.
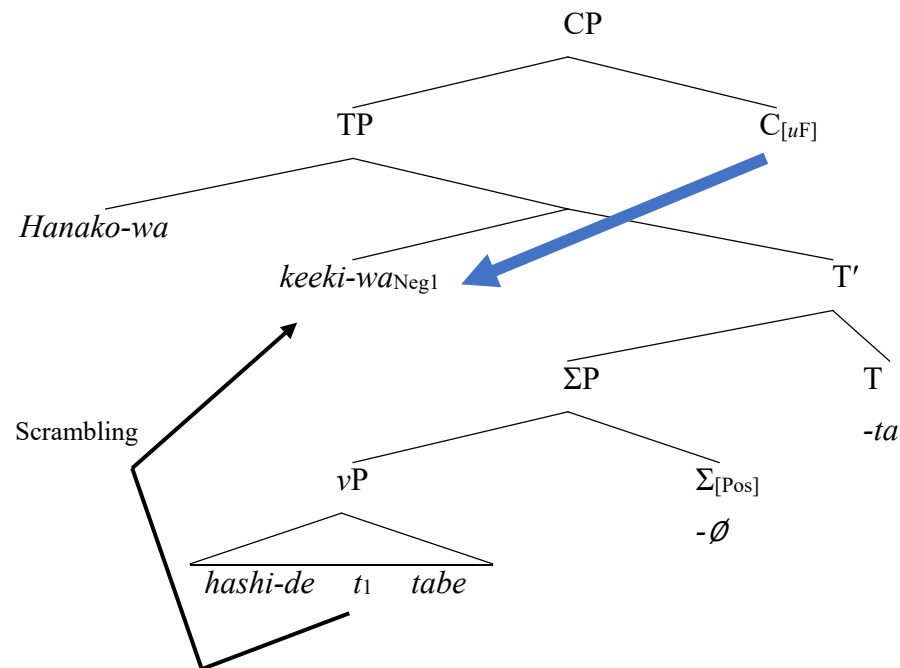
In sum, Kobayashi correctly captured the fact that the obligatoriness of movement involved in *wa* and *mo* relies on the polarity of the sentence by proposing that they involve syntactic features perceptible to polarity from syntactic and semantic perspectives. It is particularly crucial that her analysis implies that the FPs' movement process is not a kind of overt focus movement to a dedicated functional position (cf. Miyagawa, 1997; Rizzi, 1997), but merely scrambling. Accordingly, the apparent obligatoriness in certain contexts is, as Kobayashi claimed, the unavailability of the non-scrambled output. Thus, it is suggested that we do not necessarily deal with overt movement sensitive to information-structural notions under the cartographic approach.

We introduce three issues which, more or less, should be tied to the discussion above. In particular, we consider the follow-up question as to whether the view of FPs' movement as scrambling is maintained or not. This is, we believe, only achieved by a quantitative survey for several reasons which will be illuminated later.

2.2   Setting-up the Issues: Why is a Quantitative Survey Necessary?

In this subsection, we illuminate three issues that emerge from Kobayashi's (2009) analysis. Two of them are related to the validity of the analysis from an empirical perspective and the

third involves the extension of the analysis so that it can be employed as a diagnostic tool for detecting feature specifications of other FPs.

2.2.1 Fuzziness of Judgments

Though the first issue seems trivial, it *is* crucial. Some native speakers of Japanese find it too strong to assign unacceptable (marked by ??) to the relevant sentences, which, according to Kobayashi (2009) or Miyagawa (1997), should be considered ungrammatical (thus *). Or, others may by no means perceive any differences between theoretically "grammatical" and "ungrammatical" sentences. Therefore, some speakers report that the pair in (4a, b), for example, does not exhibit a sufficiently clear difference. This indicates that one can analyze this native speaker's reaction either as evidence against Kobayashi's proposal, or the suggestion that the proposal is indeed correct, but linguistic processing improves judgment. As for the latter, it is interesting to discuss acceptable ungrammaticality in terms of processing (cf. Frazier, 2009; Phillips et al., 2011), but we do not consider it anymore because it is beyond the scope of our paper. Notwithstanding its validity, Kobayashi's analysis is worth examining and confirming. This can only be achieved through quantitative research.

2.2.2 The Influence of Prosodic Strategies

The second issue concerns the influence of prosody on judgments. Before moving on to the discussion, let us briefly look into two types of stress in Japanese that are linked to focal interpretations. In many languages, stress is associated with focus, and its assignment can be determined by the word-order properties of those languages (cf. Neeleman & Reinhart, 1998). In Japanese, there are two types of stress: N(uclear)-stress, which falls on the most deeply embedded XP (Ishihara, 2000a, 2000b) and A(dditional)stress, which is assigned "to any element in a sentence [, and] elements that follows [the stress] are prosodically weakened" (Ishihara, 2000a: 158). The prosodic difference is shown in Figure 1 below.
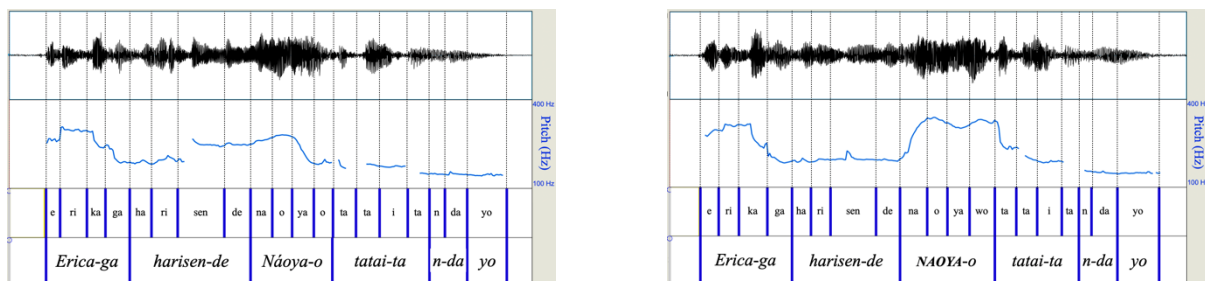
Figure 1. The visualized difference between N-stressing and A-stressing on an object *Naoya-o*.

Let us observe how these stresses correlate with focal interpretations. According to Ishihara, an acute (´) stands for N-stress, a SMALL CAPITAL for A-stress, and small letters for weakened constituents.

(16) a. Q: What happened?

    A1: *Taro-ga*   *hón-o*   *katta*
         Taro-NOM   book-ACC   bought

    A2:# *Taro-ga*   HON-*o*   katta
         'Taro bought a book.'

  b. Q: Who bought a book?

    A1:# *Taro-ga*   *hón-o*   *katta*
         Taro-NOM   book-ACC   bought

    A2: *TARO-ga*   hon-o   katta
         'Taro bought a book.'   (adapted from Ishihara, 2000a: 169ff)

In (16a), the question requires a sentence focus. Whereas response (16aA₁) is appropriate in this context, (16aA₂) is not. This is because the constituent *katta* 'bought' preceded by the A-stress is forced to be interpreted as given information, with a prosodic suppression. Thus, this response is rendered appropriate when the preceding question is *what did Taro buy*?, that is, one requiring a focus on the object of buying. Along the same lines, (16b) can be explained. In this dialogue, the A-stressed response (16bA₂) is more appropriate because the question of *who bought a book?* renders the predicate *to buy a book* given information. In this connection, the infelicity of (16bA₁) is accounted for because an element carrying an N-stress is interpreted as a focus. However, it must be assigned to an element adjacent to a verb, unlike A-stress.

With this background in mind, let us observe an interesting example from Miyagawa (1997: 22),[6] according to whom the illicit extraction of a constituent out of a sentential domain (i.e., IP) is rescued if the constituent receives an A-stress. Observe:

(17) a.?? [DP [IP *pizza-o_i* [IP *Tanaka-no* *t_i* *tabeta*]] *mise*]
              pizza-ACC Tanaka-GEN ate store

    b. [DP [IP *PIZZA-o_i* [IP *Tanaka-no* *t_i* *tabeta*]] *mise*]
      'the restaurant where Mr. Tanaka ate a pizza.'

This observation indicates that a prosodic strategy may influence grammatical judgment. This sheds light on the issue presented in Section 2.2.1. We have reported that the native speakers' judgment of the examples developed in our paper is far from uniform, and that even for those who can perceive the acceptability difference sharply, the sentence does not sound ungrammatical (i.e., *), but unacceptable (i.e., ??) at best. Along the same lines, it is possible to attribute such un-uniformness and un-sharpness to prosodic influence. Native speakers' self-reading in judging sentences may unexpectedly include A-stressing. Therefore, it is significant to examine whether A-stressing affects the judgment of the sentence that Kobayashi's theory predicts as ungrammatical.

2.2.1 On the Feature Specification of Other FPs

Finally, let us discuss whether Kobayashi's (2009) analysis is extended to FPs other than *wa* and *mo.* In other words, if her system, particularly the intervention effect, is correct, the effect should be a diagnostic tool for the feature specification of FPs in general, resulting in deeper understanding of them. We scrutinize two FPs: *dake* 'only' and *sae* 'even'. The reason we focus on them may be convincing if their semantic contributions are concerned. For the sake of clarity, we observe *only* and *even*, but their meanings are the same as *dake* and *sae*. Observe rough descriptions of them (cf. König, 1991):

(18) a. John invited **only** PIA.
    b. John invited Pia.
    c. $\neg \exists x$, x≠Pia, [John invited x]

                  (adapted from Neeleman & Vermeulen, 2012: 231)

(19) a. John invited **even** PIA.
    b. John invited Pia.
    c. $\exists x$, x≠Pia [[[John invited Pia] $<_{likely}$ [John invited x]] & [John invited x]]

                            (Ibid.: 231)

In each example, sentence (b) describes the meaning that example (a) itself expresses. Thus, the meanings of (18a) and (19a) do not differ. The information behind expressing the meanings

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[6] Miyagawa (1997: 22) did not discuss the prosodic property of stress in (17b); he merely said that (17b) "sounds best if the A'-moved element receives heavy focus stress." Given, however, that N-stressing does not seem to occur in the clause-initial position, it is not implausible to assume that the stress involved is an A-stress. If so, our judgements in (25) are also compatible with Miyagawa's observation.

in (b) marks the distinction between them. As for *only*, the sentence in (18a) not only expresses the meaning in (18b), but also presupposes or implies that there are no alternatives salient which John invited in the context. In this respect, we may remember the semantic contribution of *wa* because (18c), that is, the exclusion of alternatives, can be taken as a negative statement about them, as does the semantics of *wa*. The only difference is that while *dake* 'only' yields a negative statement about all the alternatives, *wa* does not always do so. Thus, if the syntactic behavior of *wa* is, as Kobayashi proposed, tied to its semantics associated with polarity, *dake* should show the same syntactic behavior. Nagata (2019) argued for the featural resemblance between *wa* and *dake* qualitatively. However, as shown above, the judgment for the obligatoriness of scrambling is not sharp among the native speakers consulted. Hence, this should also be examined in a quantitative manner.

The matter is subtly complicated for *sae* 'even'. At first glance, one may consider that *sae* runs parallel with *mo*, as *John invited even Pia*, for example, presupposes that John has already invited another person, on par with *mo*. However, as shown in the semantic description of *even* in (19c), rough though (cf. Frey, 2010; see Potts, 2007 for a more formal description of conventional implicature), *even* requires the speakers' evaluation. To render (19a) felicitous, not only has John invited another person before, but also, under the speaker's evaluation, the probability of John inviting such a person is more likely than that of John inviting Pia. Thus, if the feature specification of *sae* 'even' is differentiated from *mo* 'also' in such an evaluative respect, it is predicted that the syntactic behavior of *sae* does not run parallel with *mo*, and suggested that such an evaluation is relevant in syntactic computation, leading to the establishment of a syntactic feature that is perceptible to evaluation (cf. Gutzmann, 2019).

We have introduced three issues that motivate us to conduct a quantitative survey. Based on these, we framed the following research questions:

(20) (i) Are previous studies' observations of obligatory scrambling of *mo* and *wa* attested even in a quantitative survey?
  (ii) Does the presence of A-stress affect the acceptability of sentences?
  (iii) Do other FPs such as *dake* 'only' and *sae* 'even' run in parallel with either *mo* or *wa*?

The next two sections reveal the design of our experiments and the attested results. From the results, we make some theoretical suggestions as directions for future research.

3   Method

3.1   Participants

A total of 48 native speakers of Japanese (32 men and 16 women) participated in this study on a voluntary basis from an intensive English course at a large national university in Japan. They came from various regions in Japan.

3.2   Materials

Four conditions were included in this study for native Japanese speakers' acceptability judgments of a sentence: FPs (*wa*, *mo*, *dake*, and *sae*), scrambling (+scr or –scr), sentence polarity (Pos or Neg), and A-stress (+A-str or –A-str). We created 16 types of speech stimuli by preparing 32 types of sentences while controlling the 4 conditions. All sentences were read aloud by a female doctoral student of linguistics.

We illustrate our experimental materials in (21) and (22). The speech stimulus of (21) comprised two sentences. Both sentences were positive and contained a *wa*-phrase. The difference between them was the appearance of a scrambled *wa*-phrase. Thus, the purpose of this stimulus was to confirm the obligatoriness of the scrambling of *wa* in a positive sentence.

(21)　a.　*Erica-ga*　　*harisen-de*　　　　*Naoya-**wa***　　*tataita*　　　　　[*wa*, **–scr**, –A-str, Pos]
　　　　　Erica-NOM　paper hammer-with　Naoya-wa　　hit

　　　b.　*Erica-ga*　　*Naoya-**wa***　　*harisen-de*　　　　*tataita*　　　[*wa*, **+scr**, –A-str, Pos]
　　　　　Erica-NOM　Naoya-wa　　paper hammer-with　hit
　　　　　'Erica hit Naoya with a paper hammer.'

Similarly, concerning (22), the difference between the two sentences is the presence of the A-stress of the *wa*-phrase. This stimulus was created to confirm the semantic effect of A-stress. In Figure 2, the pitch drop after the A-stressed phrase (SUSHI-*wa* in (22b)) is larger than the fall of the pitch of the same position in (22a).

(22)　a.　*Hanako-ga*　　*hashi-de*　　　　　*sushi-**wa***　　*tabeta*　　　　[*wa*, –scr, **–A-str**, Pos]
　　　　　Hanako-NOM　chopsticks-with　sushi-wa　　ate

　　　b.　*Hanako-ga*　　*hashi-de*　　　　　SUSHI-***wa***　　*t*　　*abeta*　　[*wa*, –scr, **+A-str**, Pos]
　　　　　Hanako-NOM　chopsticks-with　sushi-wa　　ate
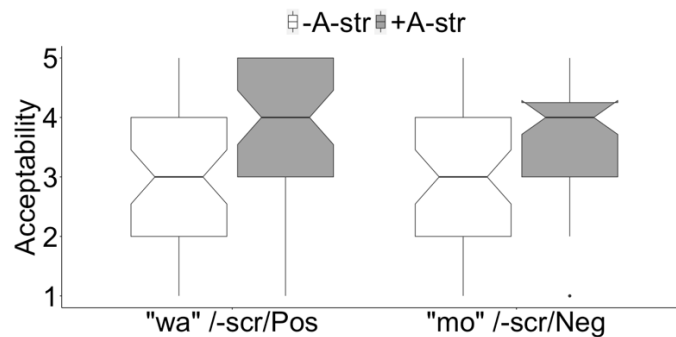　　　　　'Hanako ate SUSHI with chopsticks (, opposed to others).'
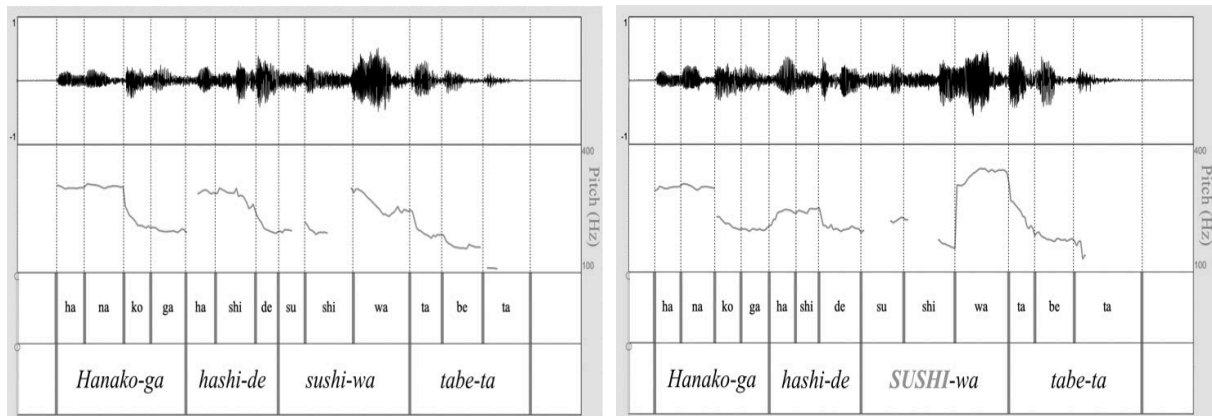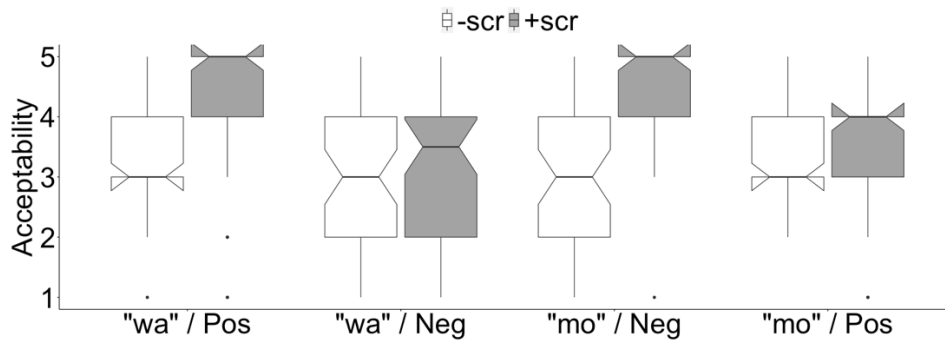
Figure 3. Distribution of the Participants' Acceptability Ratings Relevant to RQ1

Table 2. Summary of the Wilcoxon Signed-Rank Test on the Obligatoriness of Scrambling of *wa*- and *mo*-phrases

FP	Condition	−Scrambling		+Scrambling		*z*	*p*	*R*
		M	*SD*	*M*	*SD*			
wa	[−A-str, Pos]	3.50	1.01	4.33	1.06	-3.74	<.01*	.38
	[−A-str, Neg]	3.23	1.15	3.25	1.25	0.19	.85	.02
mo	[−A-str, Neg]	2.90	1.12	4.56	0.80	-5.40	<.01*	.55
	[−A-str, Pos]	3.33	0.81	3.50	0.95	1.33	.19	.14

Regarding RQ2, we tested whether the presence of A-stress on an FP phrase rescued the acceptability ratings of allegedly degraded cases ((7a) and (8b)). Table 3 summarizes the results of relevant conditions. As expected, the significant differences and effect sizes (*rs* = .50, .36) imply that the presence of A-stress on the FP phrase improves the acceptability of sentences that are usually less acceptable.

Figure 4. Distribution of the Participants' Acceptability Ratings Relevant to RQ2

Table 3. Summary of the Wilcoxon Signed-Rank Test on the effect of A-stress of *wa*- and *mo*-phrases

FP	Condition	−A-stress		+A-stress		*z*	*P*	*R*
		M	*SD*	*M*	*SD*			
wa	[−scr, Pos]	3.06	1.16	3.98	1.02	-4.50	.01*	.50
mo	[−scr, Neg]	3.17	1.00	3.79	0.97	-3.50	.01*	.36

Regarding RQ3, we explored the parallelism of *dake* 'only' and *sae* 'even' to *wa* and *mo* from the perspective of the impacts of the following conditions on acceptability judgments: scrambling of FP phrases, the presence or absence of A-stress on the phrases, and sentence polarity. Tables 4 and 5 show the effects of scrambling and A-stress of the *dake*- and *sae*-phrases in positive and negative sentences.
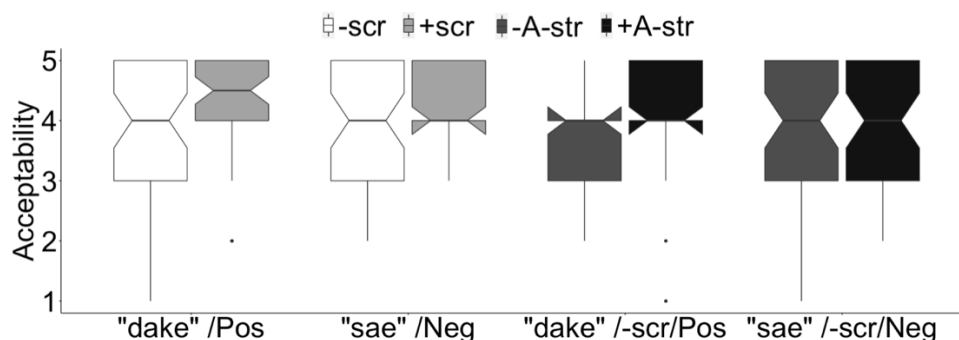
Figure 5. Distribution of the Participants' Acceptability Ratings Relevant to RQ3

Table 4. Summary of the Wilcoxon Signed-Rank test on the effect of scrambling of *dake*- and *sae*-phrases

FP	Condition	–Scrambling		+Scrambling		z	p	R
		M	SD	M	SD			
dake	[–A-str, Pos]	3.79	1.01	4.33	0.81	-2.66	.01*	.27
sae	[–A-str, Neg]	4.04	0.82	4.04	0.71	0.11	.91	.01

Table 5. Summary of the Wilcoxon Signed-Rank test on the effect of A-stress of *dake*- and *sae*-phrases

FP	Condition	–A-stress		+A-stress		z	p	r
		M	SD	M	SD			
dake	[–scr, Pos]	3.83	0.86	4.17	0.95	-2.24	.03*	.23
sae	[–scr, Neg]	3.90	1.02	3.79	1.03	0.83	.40	.09

First, we focus on the results for the *dake*-phrases. The significant differences in the tables suggest that *dake*-phrases require scrambling in a positive sentence and that the presence of A-stress on an unscrambled *dake*-phras*e* improves the acceptability rating. These results parallel those of *the wa*-phrase (cf. Tables 2 and 3). Turning next to the results of the *sae*-phrase, no significant differences were found in either analysis. This implies that *sae* is not parallel to *mo*.

In summary, we may answer the RQs we raised in the following manner:

(23) (i) Kobayashi's (2009) analysis is maintained from a quantitative perspective.
   (ii) A-stressing may improve the acceptability of degraded cases.
   (iii) The syntactic behavior of *dake* 'only' is parallel to *wa* in being sensitive to the polarity of the sentence, but that of *sae* 'even' is neither to *mo* nor *wa* in the same respect.

In the next section, we discuss these results.

5   Discussion

We have demonstrated that one of the results of native speaker's perception tasks on *wa* and *mo* are in conformity with what Kobayashi (2009) predicted. From a theoretical perspective, this implies that grammar (at least in Japanese) may consider an optional movement operation a process of expressing information-structural notions. This goes against the Rizzian view that such notions remain uninterpretable until a constituent with some feature moves to a dedicated functional projection either overtly or covertly (i.e., Focus Criterion). In this sense, we suggest that Kobayashi's view for the syntax-information structure interface is somehow in line with Zubizarreta's (1998) *p*-movement analysis of focus-sensitive word-order phenomena in Spanish.

As for RQ2, we have illuminated the following fact: A-stressing on an FP-focused phrase renders the ungrammatical sentence less degraded in *wa* and *mo*. This is more suggestive than RQ1 in that it may involve the issue of whether and how we should deal with prosodic

information in syntax (cf. Aboh, 2010; Katz & Selkirk, 2011; Krifka, 2006; Selkirk, 1995). If we assume that Kobayashi's view is on the right track, as attested in RQ1, A-stress would be analyzed as a (reflex of) the syntactic feature. For our purposes, let us briefly observe a well-known fact in English below:

(24) a.* What$_{+[Q]i}$ do you wonder [how$_{+[Q]}$ to solve t_i] ?
      b.? Which problem$_{+[Q]+[N]i}$ do you wonder [how$_{+[Q]}$ to solve t_i]?

<div align="right">(Rizzi, 2013: 179)</div>

In (24a), it has been analyzed as a violation of *wh*-island in that the initial phrase *what* moves out of an island created by *how*. If the fronted *wh*-phrase is D-linked, the judgment becomes less degraded (24b). To account for the influence of the D-linked *wh*-phrase, Rizzi (1990, 2004, 2013) proposed the notion of (featural) relativized minimality. According to this, both facts observed in (24a, b) are explained at once as follows: in the former, the C-domain in the main clause searches for the *wh*-phrase *what*, which originates in a position expressed by a trace in the embedded clause. However, movement fails to take place because relativized minimality is violated in this configuration: the other *wh*-phrase *how* is intervening between C and *what*. What is crucial for (featural) relativized minimality is the identity of the feature specification. In (24a), the intervener *how* and the moved element share the same feature specification, namely Q. On the other hand, if the feature specification of one is not identical to the other, more particularly a subset of the other, the violation of relativized minimality is not predicted to occur. This is instantiated by (24b). In this configuration, the fronted *wh*-phrase *which* involves not only a feature Q but also N. It is not identical to the intervening phrase. Thus, the violation of minimality does not occur, resulting in the grammaticality of (24b).

Based on this background, let us consider how we may take A-stressing into consideration. Example (25) below is repeated from (22), with slight modifications.

(25) a.?? *Hanako-ga*   *hashi-de*   *sushi-wa*   *tabeta*   [wa, –scr, **–A-str**, Pos]
          Hanako-NOM   chopsticks-with sushi-wa   ate

      b.(?) *Hanako-ga*   *hashi-de*   *SUSHI-wa*   *tabeta*   [*wa*, –scr, **+A-str**, Pos]
          'Hanako ate SUSHI with chopsticks (, opposed to others).'

(25a) is ungrammatical in Kobayashi's theory, whereas (25b) is less degraded in our research. If we interpret the difference in terms of the (featural) relativized minimality introduced above, we have to assume A-stress to be a reflex of a syntactic feature not identical to FPs, say Emp(hatic)-feature for convenience. To illustrate, the configurations of (25a, b) are as follows:

(26) a.* [$_{CP}$[$_{TP}$ *Hanako-ga* [$_{ΣP}$ [$_{vP}$ *hashi-de* [$_{vP}$ *sushi-wa*$_{+[FNeg]}$ *tabe*]]-∅$_{+[Pos]}$]-*ta*] uF]
      b. [$_{CP}$ [$_{TP}$ *Hanako-ga* [$_{ΣP}$ [$_{vP}$ *hashi-de* [$_{vP}$ *SUSHI-wa*$_{+[FPos]+}$**[Emp]** *tabe*]]-∅$_{+[Pos]}$]-*ta*] uF]

The ungrammaticality should occur in (26a) because a polarity feature Pos intervenes between the Probe uF and the Goal *wa* and *wa* involves, by assumption, a polarity-sensitive feature. Thus (featural) relativized minimality is violated. The only way this structure will converge is if the scrambling of the *wa*-phrase occurs above ΣP, which would result in an "obligatory" scrambling. On the other hand, if A-stress is an instantiation of the feature Emp, there should be no violation of minimality, because the feature specification of *SUSHI-wa* is not identical to Pos, explaining that (26b) is less degraded than (26a).[7] As this account presupposes not only relativized minimality but also the hypothesis that A-stress is a realization of a syntactic feature, additional elaboration on A-stressing from a syntactic perspective will help us determine

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[7] As observed, adopting (featural) relativized minimality strictly in Rizzi's sense would be confronted with some difficulty in a configuration where the feature specification of F is the same as that of a Σ head, such as a *wa*-phrase in a negative sentence. Although they seem to share the same feature specification: *Neg*, the structure is convergent without scrambling. We must await an account of the problem for further research.

whether we should be for or against the view that prosody involves syntax as morphosyntactic features, as do morphemes (cf. Aboh, 2010).

The result for RQ3 is found to be what we stated in Section 2.2.3. There are three main contributions to understanding the status of FPs. First, the fact that the syntactic behavior of *dake* 'only' is parallel to that of *wa* tells us that one of the semantic functions of *dake* overlaps with that of *wa*, and involves syntactic computation. As stated before, we estimate that the overlapped meaning involves a negative statement on alternatives. The nontrivial difference does exist: for *dake*, it ranges over all alternatives and for *wa*, it does not always hold for all of them. The results suggest that what is relevant in syntax (at least in Japanese) is not such a difference, but to make a negative statement on alternatives in discourse.[8]

Second, we showed that *sae* 'even' does not behave in a parallel way with *mo*, despite the fact that they apparently express the same meaning with respect to polarity, as shown in Section 2.2.3. However, we also demonstrated in the subsection that *sae* is differentiated from *mo* in that it expresses the speaker's evaluation. In this respect, Kobayashi's analysis implies that the feature specification of *sae* should differ from that of *mo* in that its syntactic behavior is irrelevant to sentence polarity, unlike *mo*. This might suggest that syntactic computation is insusceptible to the sense of evaluation. Then, we may have to relegate the evaluative part of language outside of grammar, such as pragmatics. Alternatively, we may analyze the behavior of *sae* in line with A-stressing discussed above. Even if we assume that the feature specification of *sae* comprises at least two features: one is F_{Pos} as with *mo* and another is, say, Emp, the fact that the movement of a *sae* phrase is not sensitive to polarity may be explained without dismissing the semantic resemblance between *sae* and *mo*. In either account, we can safely say that we should make a distinction between *sae* and *mo*, even from a syntactic perspective.

The third is more general: an analysis like Kobayashi (2009) can be a diagnostic tool to understand the meaning of certain FPs. This is because her crucial tool, the intervention effect as a violation of featural relativized minimality, hypothesized that features α and β interact with each other if they are of the same type. In other words, as long as we rely on the hypothesis, the intervention effect can diagnose the kind of meaning that exists as a feature and the kind of lexical element that has such a feature. At this point, our research has illuminated that there are two types of features: one is sensitive to alternatives and polarity: *wa*, *mo*, and *dake*; the other is not dedicated to polarity, but may be associated also with a speaker's evaluation: *sae*.

Finally, a remaining question arises as to why it has been reported that the judgment discussed here is not uniform and sharp among native speakers of Japanese. We suggest that it is a processing matter that may cause the speakers to consider the "ungrammatical" sentence degraded at best. As the "ungrammatical" sentence (i.e., non-scrambled) in question is not complex and the lexical items in it are quite the same as those in the grammatical (scrambled) counterpart, we can readily accommodate the "ungrammatical" sentence to a comprehensible one in processing it. While processing such an ungrammatical sentence with an FP—one without scrambling—we can easily *coerce* the appropriate reading insofar as it is consistent with the relevant discourse. Such ease comes, perhaps because only the alignment differs between the ungrammatical, non-scrambled sentence and its grammatical scrambled counterpart. In this way, we may wrongly take the sentence as grammatical or not unacceptable at least. However, this is just a speculation. Thus, we must examine whether it is really a matter of processing in the future.

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[8] See Nagata (2019) for an analysis of the semantic overlap between *wa* and *dake* in terms of the concept *contrast* advocated by Molnár (2006) (see also Kiss, 1998).

6   Conclusion

In this paper, we showed that the obligatory movement of FPs in Japanese is accounted for not by focus movement to some dedicated functional position, but by "obligatory" scrambling, as Kobayashi (2009) explained. In doing so, we raised three issues regarding the lower stability of the judgment of grammaticality, prosodic influences, and extension of Kobayashi's proposal to other FPs. They were analyzed using quantitative methodology, particularly because of the first two issues. The experimental results demonstrated the validity of Kobayashi's focus licensing mechanism and the influence of A-stressing on the grammaticality of the phenomena in question. These results shed light on the possibility of dealing with prosodic information as a morphosyntactic feature. We also revealed that the syntactic behavior of *dake* 'only' is the same as *wa* 'opposed to others' because of their semantic overlap, and observed the non-parallelism of *mo* 'also' and *sae* 'even', suggesting that the intervention effect is a diagnostic means to understand the feature specification of FPs, or meanings of FPs relevant in syntactic computation more generally.

Acknowledgments

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Appendix

Appendix 1. The Online Interface of the Experiment (utilizing Google Forms)