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Local prominence in micro information packaging*

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1. Introduction

Information packaging is generally discussed at its macro level with a clause or an utterance as its domain, often in terms of the notions like focus, topic and new/given information. The goal of this work is to demonstrate the existence of what I would characterize as "micro" information packaging independent of these notions of "macro" information packaging. In particular, I will attempt to motivate the notion 'local prominence,' which is established within each syntactic projection. The existence of local prominence will be demonstrated when we observe that the shift of its semantico-pragmatic interpretation is synchronized with the shift of a prosodic pattern in Tokyo Japanese (henceforth simply 'Japanese').

2. Downstep, metrical boost, and prominence shift

The investigation in this work starts with the description of some prosodic phenomena in Japanese reported in the literature. First, it is generally assumed that an intonational process of 'downstep' or 'catathesis' applies in Japanese, in which a lexically accented phrase iteratively causes the lowering of pitch register for subsequent phrases (Poser 1984, Kubozono 1988b, Pierrehumbert and Beckman 1988). As a result, a series of lexical accents, for instance, manifest themselves in the form of a descending staircase, as indicated by ↓ in (1):[1] (Examples are from Kubozono 1992:373)

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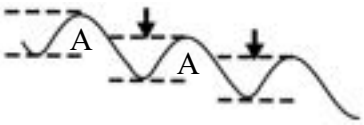
[1] A lexical accent is indicated by an apostrophe (') immediately following the accented mora only on the relevant words.

(1) [[ao'yama-ni ↓a'ru] ↓daigaku]
Aoyama-at exist college
'a college located in Aoyama'



In contradistinction to this observation, Kubozono (1988a), Kubozono (1992) and Kubozono (1993) point out that an extra F_0 boost is constantly observable on the left branch (in a right-branching structure) in Japanese, as indicated by ↑ on *a'ru* 'certain' in (2).[2]

(2) [ao'yama-no [↓↑**a'ru** ↓daigaku]]
Aoyama-GEN certain college
'a certain college in Aoyama'

Since Kubozono's experimental results suggest that downstep also applied to *a'ru* in (2), this F_0 boost cannot be regarded as the pitch range reset at the left boundary of a major phrase (MaP), which is generally considered to constitute the application domain of downstep.[3]

Kubozono calls this upstep process 'Metrical Boost' and claims that it is a phonetic realization rule whose application is *syntactically* conditioned in such a way that it applies cyclically on each syntactic *left*-branch in a right branching construction, as illustrated by ↑ in (3). (The examples are all from Kubozono (1993).)

(3) a. [↑**ao'i** [↑**o'okina** me'ron]]
blue large melon
b. [↑**na'ra-no** [↑**yuumee-na** ryoori]]
Nara's famous cuisine
c. [↑**Yu'mi-no** [↑**ao'i** [↑**yuni'ikuna** eri'maki]]]
Yumi's blue unique muffler
d. [↑**ao'i** [[↑**Yu'miko-ga** a'nda] eri'maki]]
blue Yumiko-NOM knitted muffler
'a blue muffler which Yumiko knitted'

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[2] As is well-known, Japanese is a strictly head-final language whose syntactic phrases constitute of binary branching constructions.

[3] Kubozono's experiment "paradigmatically" confirmed the application of downstep to the item on the left branch (e.g., *a'ru* in (2)) by comparing the F0 properties of the item in this position preceded by an *accented* word as in (ia) below as well as an *unaccented* word as in (ib).

(i) a. [*a'ni*-no [me'n-no eri'maki]]
brother-GEN cotton-GEN muffler
'(my) brother's cotton muffler'
b. [*ane*-no [me'n-no eri'maki]]
sister-GEN cotton-GEN muffler
'(my) sister's cotton muffler'

The word *me'n-no* 'cotton-GEN' was realized in a lower pitch level in (ia) than (ib), exhibiting a downstep effect.

I would like to report the observation here that those words which have undergone Metrical Boost in (2) and (3a-d) are not only prosodically prominent but also *informationally* prominent. The expression in (3d), for example, creates a rather clear impression that its addresser would like to convey the color of the muffler (*ao'i* 'blue') than *eri'maki* 'muffler' itself and the identity of the person who knitted this muffler (*Yumiko*) more distinctly than her action *a'nda* 'knitted'. In fact, in a *syntactically* head-final language like Japanese, speakers predominantly let the non-head item on the left convey more informational weight that specify or elaborate on the semantic content of the head, irrespective of the function of non-head items (i.e., as argument or adjunct) or the syntactic category of the head. The informationally prominent non-head item, furthermore, is pronounced with a noticeable F0 boost. This information-prosody synchronization is illustrated by the boldface accompanied by ↑ in (4).

(4) a. [$_{NP}$ ↑**uma'i** nomi'mono]-ga nomita'i
tasty beverage-NOM want.to.drink
'want to drink tasty beverage'

b. [$_{VP}$ ↑**ra'amen-o** tyuumon-sita] okyakusan
ramen.noodle-ACC ordered customer
'the customer who ordered ramen noodle'

c. [$_{VP}$ ↑**ga'tsugatsu** ta'be-teru]
voraciously eating

This observation leads us to surmise that Metrical Boost may in fact be a prosodic reflex of information prominence that is iteratively taking place in a larger syntactic construction. (See section 5.2.2 for more discussion on this possibility.)

Even more interestingly, similar convergence of informational and prosodic prominence on the syntactic head on the right branch can also be detected as in the examples like (5a-c) below, although this phenomenon is observed less frequently.[4]

(5) a. [$_{NP}$ zairyo'o-no ↑**hoore'nsoo**]
ingredient-GEN spinach

b. [$_{NP}$ na'nika ↑**nomi'mono**]
something beverage

c. [$_{VP}$ a'tari-o ↑**haikaisuru-yo'oninatta**] tosiyori
around.there-ACC wander.around-came.to elderly
'an elderly who started to wander around (around there)'

In (5a), for example, it is rather clearly conveyed that the addresser would like to attract some attention to the semantic contents of the head noun *hoore'nsoo* 'spinach', which is

[4] This phenomenon was also reported by Kori (1997). Although head prominence is observed less frequently than non-head prominence, it by no means is an awkward interpretation. It in fact is clearly detectable and all of the numerous informants I consulted with agreed to my judgments.

also accompanied by the extra F0 boost that reminds us of the effect of Metrical Boost. In what follows, I will refer to such convergence of informational and prosodic prominence on the syntactic head on the right branch as 'prominence shift,' reflecting its less frequent existence compared to the prominence on the syntactic non-heads on the left branch. Note, however, that despite the similarity of the observed prosody-information synchronization, the phenomena in (5) cannot be ascribed to Metrical Boost, which is claimed to apply only to the element on the left branch. Metrical Boost therefore seems to describe some prosodic phenomenon correctly, but it seems to be a prosodic reflex of only the default informational pattern. The scope of prosody-information synchronization observed in (3)-(5) above, however, seems to be wider, taking place not only on the left branch but also on the right branch in the syntactic structure of Japanese. Therefore, we can and should reinterpret Metrical Boost so that it becomes more omnibus and synchronizes its effects with the semantico-pragmatic aspects of the linguistic expressions irrespective of the syntactic location of the linguistic expression.[5] In section 3 below, I will characterize the notion of 'local information prominence' in the context of the theory of information packaging. In section 4, I will explore a syntactic analysis which permits us to establish the synchronization of the prosodic and semantico-pragmatic interpretation of local information prominence. In sections 5.1 and 5.2, I will present the results and analyses of the production experiment I conducted. It will be shown that their results verify the native intuition on the prosody-information synchronization reported above and support the proposed analyses. In what follows, I will use the term 'prominence' to refer to such a synchronized state of informational and prosodic prominence unless the term is specified like 'informational prominence', 'prosodic prominence' or 'nuclear prominence'. A word of warning to be given here is that I will use the expression 'prominence' as a relative term describing our intuition. It is not necessarily used to refer to the most salient/weighty status of information or the highest pitch of prosody exhibited by a linguistic expression in sentences.

3. Informational prominence

In this section, I attempt to characterize the notion 'informational prominence,' under the theory of information packaging developed in the dynamic semantic terms, distinguishing

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[5] Kubozono (1988a) attempts to characterize Metrical Boost as a marked prosodic phenomenon reflecting the markedness of right branching in Japanese syntax. He refers to Kuno's (1973:6) remark that Japanese is generally a "left-branching language" as a basis for this markedness decision. However, since a predicate-argument relation in Japanese is typically realized in a right-branching syntactic structure as exemplified in (i) below, we can hardly find a reason to believe that right branching is marked in the syntax of this language.

(i) [*Zyon-wa/-ga* [*ohasi-de* [*supagettii-o* [*taberu*]]]]
John-TOP/-NOM chopstick-with spaghetti-ACC eat
'John eats spaghetti with chopsticks.'

It in fact is not too difficult to find right-branching modification in an NP like as in (ii), either.

(ii) [Zyon-no [atarasii [yosoiki-no [uwagi]]]]
John-GEN new special jacket
'John's new best jacket'

Characterizing Japanese as a basically left-branching language therefore is somewhat misleading.

it from the more familiar notions that are often discussed in the study of information packaging. The first point I would like to demonstrate is that the prominence shift observed above can be induced independent of the notions focus or discourse-newness (or novelty). More generally, I would like to argue that it *can be* induced without recourse to any discourse context. To begin with, I adopt the definition of the notion 'focus' as in (6).

(6) *Focus* indicates the presence of *alternatives* that are relevant for the interpretation of linguistic expressions. (Krifka 2008:247, cf. Rooth 1985, Rooth 1992)

I will consider that focus has been introduced to a sentence only when an alternative-inducing linguistic expression makes what is asserted by the sentence truthful. Crucially, focus does not characterize the items that are regarded merely as "discourse-new," "important," "highlighted," or "emphasized."

I also adopt the notion of 'topic' as in (7).

(7) The topic constituent identifies the entity or set of entities under which the information expressed in the comment constituent should be stored in the Common Ground (CG) content.[6] (Krifka 2008:265, cf. Reinhart 1982)

Here again, 'topic' does not characterize the items that are regarded merely as discourse-given or indicating old information. It is regarded as the file-card like entity identified as the locus of comment.

I also adopt the notion 'given' as in (8) below, following Schwarzschild (1999).[7]

(8) A linguistic expression is *given* if it is already *entailed by the discourse*.

If an expression is not given, it is regarded as '*novel*' in the discourse. Quite frequently, it is assumed in the literature that an item that is a 'given nonFocus' is not prominent either informationally or prosodically (Schwarzschild 1999, Féry and Samek-Lodovici 2006, Krifka 2008, Selkirk 2008, among others). That is, it is generally assumed that a linguistic expression must be either focalized or novel in the discourse to receive informational (and prosodic) prominence.

3.1 Informational Prominence in context

In this subsection, I would like to argue that a linguistic expression can be informationally and prosodically prominent and may also exhibit 'prominence shift' even when it is a 'given nonFocus.'

First, we can observe that a 'discourse-given nonfocus' item may be prominent, i.e., both informationally and prosodically prominent, even when it co-occurs along with a

[6] CG refers to the information that is mutually known to be shared and continuously modified by the interlocutors in communication. The definition of 'comment' is not clear here. It presumably refers to an item which the interlocutors consider to carry potentially CG-changing information to be added and stored under a file-card presented as topic.

[7] I will describe further details of Schwarzschild's analysis and extends it in section 3.3 below.

focused element:[8]

(9) < On a cooking show >
A: kyoo-wa ***hoore'nsoo***-o tukatte kuriimuni-o tukut-temitai-to omoimasu.
today-TOP spinach-ACC using creamed.food-ACC cook.try.to-that think
'We would like to cook creamed spinach today.'
B: Sensee, [**Topic** zairyo'o-no ***hoore'nsoo***-wa] [Comment [**Focus** **NAN-WA-KU'RAI**]
Master ingredient-GEN spinach-TOP how.many.bunch.about
yooi-si]-tara iinodesuka?
prepare-if good
'Chef, about how many bunches of spinach as ingredient should we prepare?'

In (9B), the prominent head *hoore'nsoo* 'spinach' is repeated from a previous discourse (9A) as a topic (marked by the topic marker *-wa*) and it co-occurs with the *wh*-phrase *NAN-WA-KU'RAI* 'about how many bunches' as a narrow focus. It therefore is a "discourse-given nonfocus" item while it is more prominent than *zairyo'o* 'ingredient' in (9B).

The same point can be shown in a slightly distinct way in (10).

(10) < In the same context, as continuation of (9A) >
Sensee, [**Background** [zairyo'o-no ***hoore'nsoo***-o] mizu-ni tuketeoku-no-wa]
Master ingredient-GEN spinach-ACC water-in soak-NLR-TOP
[**Focus** **DO'OSITE**-desuka]?
why-is.it
'Chef, why is it that you soak the spinach as ingredient in water?'

In this sentence, the prominent head *hoore'nsoo* 'spinach' occurs as part of the background of the *wh*-focus *DO'OSITE* 'why' in a pseudo-cleft construction, again as a 'discourse-given nonfocus' item.

Furthermore, in a similar context, the 'given nonfocus' *tinge'nsai* 'bok choy' in (11) below shows up as a prominent head *within the wh-phrase*, i.e., as part of a larger narrow focus (indicated by Italics).

(11) < In a similar context, as continuation of an utterance similar to (9A) >
Sensee, *[**Focus** [zairyo'o-no **tinge'nsai**-no] **DO'NO-BU'BUN**-o]* tukau-ndesuka
Master ingredient-GEN bok.choy-GEN which-part-ACC use-Q
'Chef, [which part of bok choy as ingredient] are we going to use?'

We also observe that a non-head item can be made prominent in the same context as part of the *wh*-focus, as in (12).

[8] Prominence in this sense will be indicated in the examples by bold face while *wh*-focus and nuclear prominence will be indicated with capitalized bold face.

(12) Sensee, *[Focus[* ***yu'deta*** *tinge'nsai-no]* ***DO'NO-BU'BUN-o]*** tukau-ndesuka
Master boiled bok.choy-GEN which-part-ACC use-Q
'Chef, [which part of boiled bok choy] are we going to use?'

'Prominence shift', in other words, can take place between the items that are part of the *wh*-phrase as narrow focus. The contrast between (11) and (12) thus must be captured independent of the notion 'narrow focus.' In all of (9)-(12), the informationally and prosodically prominent element is a 'discourse-given nonfocus,' which is generally expected to remain non-prominent. In short, it seems to be the case that the prominence observed here is independent of 'comment', 'novelty', or 'narrow focus'.

Informational Prominence and its shift can be also shown to co-occur with 'broad focus' when we examine B and B' below as two distinct ways to answer (13A):

(13) A: *[VP-Focus Na'ni-yat]*-te-n-no?
what.doing-Q
'What are you doing?'
B: [NP **huru'i** hoore'nsoo]-ga reezooko-nonakani haitteta-kara
old spinach-NOM refrigerator-in existed-since
[VP-Focus sore-o arat]-ten-n-no.
it-ACC wash-ing
'Since there was old spinach in the refrigerator, I'm washing it.'
B': [NP zairyo'o-no **hoore'nsoo**]-o katteoita-kara ***[VP-Focus sore-o arat]***-ten-n-no.
ingredient-GEN spinach-ACC bought-since it-ACC wash-ing
'I'm washing spinach as ingredient, which I bought earlier.'

In both (13B) and (13B'), the *wh*-question as a VP focus in (13A) is answered with the VP *sore-o araw* 'wash it'. Then, co-occurring with this VP as broad focus are the NPs ***huru'i hoore'nsoo*** 'old spinach' in (13B) and *zairyo'o-no* ***hoore'nsoo*** 'spinach as ingredient' in (13B') exhibiting distinct patterns of prominence, i.e., prominence shift. Note that the anaphoric item *sore* 'it' is referring back to the NP involving non-head prominence in (13B) while it is referring back to the NP involving head prominence in (13B'), both from within a VP focus.

Moreover, the same *wh*-question involving a VP focus in (14A) below can be naturally answered with either (14B) or (14B'):

(14) A: *[VP-Focus Nani-yat]*-te-n-no?
what.doing-Q
'What are you doing?
B: *[VP-Focus [NP* ***huru'i*** *hoore'nsoo]-o arat]*-ten-n-no.
old spinach-ACC wash-ing
'I'm washing old spinach.'
B': *[VP-Focus [NP zairyo'o-no* ***hoore'nsoo*** *]-o arat]*-ten-n-no.
ingredient-GEN spinach-ACC wash-ing
'I'm washing spinach as ingredient.'

Prominence shift is observed this time between the NPs as part of VPs as broad focus — ***huru'i*** *hoore'nsoo-o araw* 'wash old spinach' and *zairyo'o-no* ***hoore'nsoo****-o araw* 'wash spinach as ingredient'. In both (13B-B') and (14B-B'), the asymmetry of prominence patterns must be captured independent of broad focus, whether they are located along with a broad focus or within a broad focus.

Finally, the example in (15) below illustrates that prominence shift in question is also independent of 'nuclear prominence.'[9]

(15) < In the same context, as continuation of (9A) >

A$_2$: mazu arakazime [$_{\text{Topic}}$ zairyo'o-no ***hoore'nsoo***-wa]
first beforehand ingredient-GEN spinach-TOP
[$_{\text{Nuclear Prominence}}$ **SIKKA'RI**] mizu-araisite-okimasu.
thoroughly clean.with.water-in.advance
'First, the spinach as ingredient must have been thoroughly cleaned with water in advance.'

In this sentence, an informationally and prosodically prominent head *hoore'nsoo* 'spinach' as 'discourse-given nonfocus' can co-occur with an item attracting nuclear prominence *SIKKA'RI* 'thoroughly'.

To sum up, we have seen that informational prominence and its shift can be established independent of the notions like comment, novelty, or focus. More generally, it seems to have a potential to arise independent of any discourse context.[10] This observation in turn may raise the question whether we should indeed regard informational prominence as

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[9] See Ishihara, et al. (2018) for the experiment-based arguments that nuclear prominence should not be regarded as implicit focus suggested by the context, contrary to Klein and von Stutterheim (1987), van Kuppevelt (1994), Roberts (1996), Büring (2003), among others.

[10] This of course is not to say that the shift of prominence in general is never caused by a discourse context. The contrast between (i) and (ii) below, for instance, is induced presumably by foci showing up in two distinct positions within a noun phrase.

(i) Q: Sensee, zairyoo-ni-wa *[$_{\text{Focus}}$* **DO'NOYOONA** *]* hoore'nsoo-o tukau-ndesuka?
Master ingredient-for-TOP what.kind spinach-ACC will.use
'Chef, what kind of spinach are you going to use?'
A: [$_{\text{NP}}$ *[$_{\text{Focus}}$* ***kanzu'me-no*** *]* hoore'nsoo-o] tukaimasu.
can-GEN spinach-ACC will.use
'I will use canned spinach.'

(ii) Q: Sensee, kyoo-wa kanzume-no oyasai-o tukatta oryoori-toyuu-koto-desuga,
Master today-TOP can-GEN vegetable-ACC using dish-you.said
kanzume-no *[$_{\text{Focus}}$* **NA'NNO** oyasai-o *]* otukai-ninaru-ndesuka?
can-GEN what vegetable-ACC will.use
'Chef, you said you would prepare a dish using canned vegetables today. A can of what vegetable are you going to use?'
A: Hai. Kyoo-wa-desune, [$_{\text{NP}}$ kanzu'me-no *[$_{\text{Focus}}$* **hoore'nsoo**-o *]*] tukaimasu.
yes today-TOP can-GEN spinach-ACC will.use.
'Yes. Today, I will use a can of spinach.'

phenomenon of information packaging. Information packaging typically reflects, roughly speaking, the interlocutors' interest in *how* a message is conveyed rather than *what* is conveyed in the immediate conversational context (Chafe 1976). Observe in this regard the prominence shift between the two discourses (16 A-B_1) and (16 A-B_2):

(16) < On a cooking show > (cf. (9))

A: kyoo-wa ***hoorensoo***-o tukatte kuriimuni-o tukut-temitai-to omoimasu.
today-TOP spinach-ACC using creamed.food-ACC cook.try.to-that think
zairyoo-ni-wa ***reetoo***-no mono-o erabimasita.
ingredient-for-TOP frozen-GEN thing-ACC chose
'We would like to cook creamed spinach today. I chose frozen spinach as today's ingredient.'

B_1: Sensee, [**Topic** zairyo'o-no ***hoore'nsoo***-wa][Comment [**Focus** **DONOKURAI**]
Master ingredient-GEN spinach-TOP how.much
yooi-si]-tara iinodesuka ?
prepare-if good
'Chef, about how much spinach as ingredient should we prepare?'

B_2: Sensee, [**Topic** ***reetoo-no*** hoore'nsoo-wa] [Comment [**Focus** **DONOKURAI-MAE-NI**]
Master freezing-GEN spinach-TOP how.much-in-advance
kaitoosi-hazime]-tara-ii-ndesuka?
defrost-start-if-good
'Chef, about how much time in advance should we start defrosting the frozen spinach?'

Here, the same semantic content of *hoore'nsoo* 'spinach' is presented in two distinct ways, one with prominence and the other without it, while they are preceded by the identical discourse. Moreover, this prominence shift arose while all of *zairyo'o* 'ingredient', *reetoo* 'freezing', and *hoore'nsoo* 'spinach' in the topic phrases marked by the topic marker *-wa* in (16 B_1-B_2) are given, having appeared in the previous sentence (16A). It also co-occurred with a *wh*-focus. In other words, information has been packaged here in two distinct ways in the identical discourse context without involving novelty or focus. We therefore are naturally led to consider that the information packaging involved here is exercised utterance-internally, independent of any of narrow/broad focus, topic, nuclear prominence, 'comment', and 'novelty'. What I would like to propose and demonstrate below is that informational prominence arises when information packaging is exercised in a *local* syntactic domain in a relative manner. That is, at the time of utterance, the interlocutors are constantly paying attention to the informational role and its weight associated with each syntactic element being used within the minimal syntactic projection containing it, and that they exercise information packaging reflecting this cognition.[11]

[11] "Mini-topic" within a nominal expression as observed in ASL (Fischer 1990) and Japanese (Kuroda 1992) may be another case involving local information packaging. The closest concept to "informational prominence" found in the literature is what Fuchs (1984:137, 144) calls "(informational) relevance/newness" with respect to the question of immediate concern at the given point in discourse," which she distinguishes

3.2 Heterogeneous sources of head prominence

As reported above, prominence assigned to the non-head element in a binary syntactic projection is quite frequently detected by Japanese speakers while similar prominence shifted to the head item is relatively rare. It seems useful therefore to find out what exact semantic and/or informational properties of the involved syntactic elements are crucial in causing such prominence shift to the head item. With cursory semantic analyses, I notice that there are several distinct patterns of semantic relations holding between the head and non-head when head prominence is obtained.

The first pattern I can recognize involves a non-head element that is functioning as an appositive modifier of the head in an NP. (In this subsection, I will indicate those non-head elements I am paying attention to with Italics, while continuing to indicate 'prominence' with bold face.)

(17) a. [NP *[huyu-no* *nagai]* **kita'guni**]-de-wa
winter-GEN long northern.province-at-TOP
'the northern provinces, where winter is long'
b. [NP *natukasi'i* **huru'sato**]
nostalgic home.town
'hometown, which is nostalgic'

Second, head prominence also arises when the non-head item is rather light in its lexical content, especially compared to the head:

(18) a. [NP *na'nika* **nomi'mono**]
something beverage
'some beverage'
b. [NP *iwayu'ru* **noiro'oze**]
so-called neurosis

Third, head prominence is also observed when the semantic content of the non-head is already implied by that of the head:[12]

(19) a. [VP *a'tari-o* **haikaisuru-yo'oninatta**] tosiyori
around.there-ACC wander.around-came.to elderly
'an elderly who started to wander around there'
b. [VP *usiro-e* **saga'ru**]
rear-toward step.back
'step back toward rear'

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from factual newness.

[12] Since the semantic content of *a'tari* 'around there' in (19a) is rather light, this may also be regarded as an example of the second pattern discussed directly above.

The fourth pattern of head prominence involves a non-head element as "locational superordinate" as supplementary information:

(20) a. [NP *Nanbei-no* **Buraziru**]-de-wa
South.America-GEN Brazil-in-TOP
'Brazil, which is located in South America'
b. [NP *Minami-ha'nkyuu-no* **Merubo'run**]-de-wa
southern-hemisphere-GEN Melbourne-in-TOP
'Melbourne, which is in the southern hemisphere'

Some cases like (21a-c) below are difficult to characterize.

(21) a. < commentary on pitching in baseball >
kyoo-wa [NP booru-no **kire'**-ga] **IMA'-ITI**-desu-ne
today-TOP ball-GEN momentum-NOM less.than.perfect
'The balls (the pitcher throws) don't have enough momentum today.'
b. [NP sasimi-no **tuma'**] mitaina mono
sashimi-GEN garnish of.the.sort thing
'something like garnish of raw fish = ornamental object/foil'
c. [VP syakki'n-o **humitao'su**]
debt-ACC trample.down
'to default one's debt'

In all of (21a-c), the head item seems to represent some noteworthy property associated with the non-head but it is not easy to pinpoint in what exact way.

It is clear, however, that none of the properties mentioned above can singly characterize head prominence in a proper and exhaustive fashion. Appositive modification, for instance, is not always involved, as demonstrated by the examples in (21) above. The amount of lexical content alone is also indecisive, as can be seen in the contrast between (22a) and (22b).

(22) a. [NP *na'nika* **nomi'mono**-o] kudasai
something beverage-ACC give.me
'Please give me something to drink.'
b. Kare-wa [NP [hito-o hikituke'ru] **na'nika**-o] motteiru
he-TOP people-ACC attract something-ACC have
'He has something that attracts others.'

Note here that the identical lexical item *na'nika* 'something' may show up either as a non-prominent non-head as in (22a) or as a prominent head as in (22b). A similar contrast can be also observed at the same position between two instances of the identical non-head *natukasi'i* 'nostalgic,' as in (23a-b).

(23) a. [$_{NP}$ ***natukasi'i*** hu'ukee]
nostalgic scenery
'a nostalgic scenery'
b. [$_{NP}$ *natukasi'i* **huru'sato**]
nostalgic home.town
'hometown, which is nostalgic'

Some examples may also involve more than one factor mentioned above. The head prominence in *zairyo'o-no* ***hoore'nsoo*** 'spinach as ingredient' in (16B$_1$) above, for example, involves a non-head that is somewhat light in its lexical content compared to the head, especially in the context of cooking, and in a sense functioning as a type of an appositive modifier.

Thus, the prominence in question seems to be exercised utterance-internally, without any need to recourse to the informational notions like novelty and focus established in the discourse. It, however, is difficult to define informational prominence merely paying attention to some specific semantic relations holding between the head and the non-head items. It therefore is necessary to seek somewhat more general properties concerning the informational relations holding between head and non-head items within a phrase.

3.3 The informational characterization of local prominence shift

My observations and analyses so far have left at least the following questions to be answered: (i) How is the prominence in question established? (ii) What causes the prominence shift? What, in particular, induces head prominence? (iii) How exactly can local informational prominence and its prosodic prominence be synchronized? I will try to provide answers to the questions (i) and (ii) in this subsection, and return to the question (iii) in section 4.

As the first step to characterize the notion 'Local Informational Prominence,' I define the following semantic values and the relevant context:

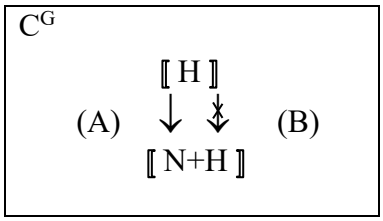
(24) Semantic values:
(i) $[\![\mathbf{H}]\!]$= meaning of the head item
(ii) $[\![\mathbf{N}]\!]$= meaning of the non-head item
(iii) $\mathbf{C}^{\mathbf{G}}$ = interlocutors' shared general cognitive context

C^G in (24iii) should be characterized as the context which is less specific than just general world knowledge but is more general than the locution-specific CG. In particular, it is to be identified as a set of worlds that the language users recognize to be *most likely* to be true at the time of interlocution.[13] I would also like to propose that the local prominence shift in question be captured by applying ∃-type shifting to the semantic values in (24). This approach has been inspired by Schwarzschild (1999:147ff). He defines givenness with an appeal to entailment supplemented by ∃-type shifting, which shifts meanings to a

[13] I am grateful to Leslie Gabriele for suggesting an approach along this line.

propositional type. This approach permits us to determine informational prominence as in (25).

(25) *Informational Prominence Determination*:
In the interlocutors' shared cognitive context C^G:
(i) If, modulo ∃-type shifting, **[** H **]** *entails* **[** N+H **]**, then the head item counts as informationally prominent.
(ii) Otherwise, the non-head item counts as informationally prominent.
(iii) Entailment relations:



As graphically illustrated in (25 iii), head prominence arises when **[** H **]** *entails* **[** N+H **]** as in (A) (supplemented by ∃-type shifting) while non-head prominence arises when this entailment does not hold as in (B). I regard (25i-ii) as a *felicity condition* imposed on the representation at the Conceptual-Intentional interface of syntax (in Minimalist's terms).

The examples in (26) below illustrate how this approach yields the semantic value of the head and the contrast between the head and non-head prominences.

(26) < The cooking show context as in (16) >
a. [$_{NP}$ ***reetoo-no*** hoore'nsoo]
freezing-GEN spinach
'frozen spinach'
b. [$_{NP}$ zairyo'o-no **hoore'nsoo**]
ingredient-GEN spinach
'spinach as ingredient'

Since spinach is most likely to be presented as an ingredient in cooking, especially in the cooking show context, the semantic value of the head in (26a-b) arises as in (27).

(27) ⟦ H ⟧ in C^G (cooking show context for (26)):
In every world in the general cognitive context of cooking show, modulo ∃-type shifting, if *hoorensoo* 'spinach' exists, **then that spinach exists as an ingredient**.

Consequently, as illustrated by the contrast between (28a) and (28b) below, the ∃-type shifted ⟦ H ⟧ entails the ∃-type shifted ⟦ N+H ⟧ in (26b) though not in (26a).

(28) a. ⟦ N+H ⟧$^{\exists}$ in (26a): 'There is spinach **and it is frozen**.'
b. ⟦ N+H ⟧$^{\exists}$ in (26b): 'There is spinach **and it is ingredient**.'

In (26a), the non-head 'frozen' is adding some determining information on the head 'spinach', whose semantic value is as in (27). In (26b), on the other hand, the non-head 'ingredient' plays a much less important role in identifying the head, whose semantic value ⟦ H ⟧ already includes such information. This contrast leads to the prominence of the non-head in (26a) but that of the head in (26b), giving rise to the shift from the default non-head prominence to the head prominence in the latter case.

The prominence shift in (29) below can also be captured based upon the semantic value of the head as described in (30).

(29) a. [$_{NP}$ ↑**uma'i** nomi'mono] (⊂ (4a))
tasty beverage-NOM
'tasty beverage'

b. [$_{NP}$ na'nika **nomi'mono**] (= (18a))
something beverage
'some beverage'

(30) ⟦ H ⟧$^{\exists}$ in C^G (in the consumption context):
'In every world in the general cognitive context of consumption, modulo ∃-type shifting, if *nomimono* 'beverage' exists, **then that beverage exists as something to drink**.

Here again, the informational weight of the non-head is heavy in (29a) while it is quite light in (29b) in characterizing the head. This contrast is the cause of the prominence shift from the non-head to the head observed between the two examples in (29).

In section 3.2 above, we observed various cases of prominence shift to the head item in examples (17)-(21), which left us with the impression that the examination of the heterogeneous semantic relations holding between the head and the non-head items in each case would not be sufficient to understand this phenomenon. In (31)-(40) below, how the various patterns of head prominence in these examples arises is illustrated with the meaning of each head item derived in the proposed approach indicated.

(31) [$_{NP}$ *[huyu-no nagai]* **kita'guni**]-de-wa (= (17a))
winter-GEN long northern.province-at-TOP
'the northern provinces, where winter is long'

— ⟦ H ⟧$^{\exists}$ in C^G (in the context of topicalizing a geographic region):
'In every world in the general cognitive context of topicalizing a geographic region, modulo ∃-type shifting, if *kitaguni* 'northern province' exists, **then that northern province exists as a region with a long winter season**.

(32) [NP *natukasi'i* **huru'sato**] (= (17b))
nostalgic home.town
'hometown, which is nostalgic'
— ⟦ H ⟧$^{\exists}$ in C^G (in the context of topicalizing a hometown):
'In every world in the general cognitive context of describing a hometown, modulo ∃-type shifting, if *hurusato* 'hometown' exists, **then that hometown exists as a place to evoke feelings of nostalgia**.

(33) [NP *iwayu'ru* **noiro'oze**] (= (18b))
so-called neurosis
— ⟦ H ⟧$^{\exists}$ in C^G (in the context of describing someone's mental disorder):
'In every world in the general cognitive context of describing someone's mental disorder, modulo ∃-type shifting, if there is a diagnosis of *noirooe* 'neurosis', **a type of mental disorder exists which is commonly designated by the name 'neurosis'**.

(34) [VP *a'tari-o* **haikaisuru-yo'oninatta**] tosiyori (= (19a))
around.there-ACC wander.around-came.to elderly
'an elderly who started to wander around (away from home)'
— ⟦ H ⟧$^{\exists}$ in C^G (in the context of describing an elderly with dementia):
'In every world in the general cognitive context of describing an elderly with dementia, modulo ∃-type shifting, if an elderly came to do *haikai* 'wandering without permission', **then that elderly came to walk around the neighborhood without permission.**

(35) [VP *usiro-e* **saga'ru**] (= (19b))
rear-toward step.back
'step back toward rear'
— ⟦ H ⟧$^{\exists}$ in C^G (in the context of describing movement):
'In every world in the general cognitive context of describing movement, modulo ∃-type shifting, if someone or something does the act of *saga-ru* 'step back', **then that action took place toward rear**.

(36) [NP *Nanbei-no* **Buraziru**]-de-wa (= (20a))
South.America-GEN Brazil-in-TOP
'In Brazil, which is located in South America'
— ⟦ H ⟧$^{\exists}$ in C^G (in the context of topicalizing a country):
'In every world in the general cognitive context of topicalizing a country, modulo ∃-type shifting, if *Buraziru* 'Brazil' exists, **then Brazil as a country in South America exists**.

(37) [$_{NP}$ *Minami-ha'nkyuu-no* **Merubo'run**]-de-wa (= (20b))
southern-hemisphere-GEN Melbourne-in-TOP
'Melbourne, which is in the southern hemisphere'
— ⟦ H ⟧$^{\exists}$ in C^{G} (in the context of topicalizing a city):
'In every world in the general cognitive context of topicalizing a city, modulo ∃-type shifting, if *Meruborun* 'Melbourne' exists, **then Melbourne as a city in the southern hemisphere exists**.

(38) < commentary on pitching in baseball >
kyoo-wa [$_{NP}$ booru-no **kire'**-ga] ima-iti-desu-ne (= (21a))
today-TOP ball-GEN sharpness-NOM less.than.perfect
'The momentum of the balls (the pitcher throws) is less than perfect today.'
— ⟦ H ⟧$^{\exists}$ in C^{G} (in the context of commentary on pitching in baseball):
'In every world in the context of commentary on pitched balls in baseball, modulo ∃-type shifting, if momentum exists, **then the momentum of balls exists**.'

(39) [$_{NP}$ sasimi-no **tuma'**] (cf. (21b))
sashimi-GEN garnish
'a garnish/foil for raw fish'
—⟦ H ⟧$^{\exists}$ in C^{G} (in the context of *sashimi* plate):
'In every world in the context of *sashimi* plate, modulo ∃-type shifting, if *tuma* 'garnish' exists**, then a garnish for raw fish exists** (where *sashimi* is the center of attention and *tuma* is only secondary).

(40) [$_{VP}$ syakki'n-o **humitao'su**] (= (21c))
loan-ACC trample.down
'to default on a loan'
— ⟦ H ⟧$^{\exists}$ in C^{G} (in the context of monetary loan):
'In every world in the context of monetary loan, modulo ∃-type, if there exists defaulting, **then defaulting of a debt exists**.'

To sum up so far, in order to rationalize the heterogeneous informational relations holding between the head and the non-head items in prominence shift as in (17)-(21), (25) was offered as their general semantico-pragmatic characterization. In short, when the semantic values of the head item entails those of the combination of the head and the non-head items in the interlocutors' shared general cognitive context, the native speakers of Japanese are led to sense that the information carried by the head item is more salient, weighty, or relevant in one way or another than that carried by the non-head element. In this way, head prominence is induced and prominence shift arises.

4. Prosody-information synchronization in the grammar

In this section, I propose and argue for some specific ways grammar achieves the synchronization of informational and prosodic prominence observed in numerous examples above (e.g., (3)-(4) vs. (5)). In doing so, I will adopt the Minimalist Program (Chomsky 1993, Chomsky 1995) as a general framework while clarifying and extending it with the adoption of some novel ideas and mechanisms.

First of all, syntactic derivation (or computation) is regarded as an algorithm to map lexical information (and nothing else) onto the Conceptual-Intentional (CI) and Sensori-Motor (SM) interfaces. This algorithm completely splits lexical information into PF and LF representations, respectively, in order to achieve legitimacy at each interface separately. Under this view, whatever induces prosody-information synchronization must be encoded in lexical items and realized separately at PF and LF.

Next, lexical items are introduced at the Numeration that is regarded as an interface of grammar and other cognitive systems. Just as the choice of specific lexical items like *angry* vs. *mad* vs. *pissed off* is determined based upon extra-grammatical factors like *register* and *style*, information packaging (i.e., how you convey a message, rather than what you convey) is encoded onto lexical items based upon the extra-grammatical factors like *discourse* and *pragmatics*. Under this view, the Numeration should be deemed as what has a *potential* to indicate the *utterance blueprint*, which involves much richer syntactic and semantico-pragmatic properties than mere pronunciation and denotation of words.

In syntactic derivation, when a syntactic head is merged with a non-head item and derives a new syntactic projection, its semantic content necessarily comes to be qualified/specified in one way or another by the merged non-head. In this sense, a syntactic non-head always holds a potential to redefine the informational content of the head. I assume that the grammar provides a means to reflect such an informational potential of a non-head each time a new syntactic object is generated. In particular, I propose that grammaticalization of informational prominence within a phrase starts when interpretable information-induced feature complexes, which I call "I(nformational)-Complex," are appended to every contentful lexical item at the Numeration. As illustrated in (41) below, I-Complex represents a content word's potential to acquire informational and prosodic prominence within a local syntactic projection. It consists of a pair of features [I_{PHON}] and [I_{SEM}] that induce prosodic prominence and informational prominence, respectively.

(41) I-Complex ([I_{PHON}, I_{SEM}]) (I = Informational)

a. [I_{PHON}] at PF ⇒ Prosodic Prominence at the SM interface

b. [I_{SEM}] at LF ⇒ Informational Prominence at the CI interface

As described in (41a) and (41b), I-Complex ([I_{PHON}, I_{SEM}]) comes to be split in the course of derivation so that each feature achieves legitimacy at the relevant interface separately. Prosody-Information Synchronization of local prominence is successfully established in this way.

Suppose that two nominals are introduced to the Numeration as in N_1 of (42).

(42) (i) $\mathbf{N_1}$: { *reetoo*, *hoorensoo* } (for (26a))
frozen spinach
(ii) $\mathbf{N_2}$: { *reetoo* [GEN] **[I$_{PHON}$, I$_{SEM}$]**, *hoorensoo* }

When these nominals are merged into a phrase, the non-head nominal generally acquires informational prominence. This default local information packaging arises when I-Complex, in addition to the grammatical feature genitive, is added to the non-head nominal *reetoo* 'frozen' as in N_2. In atypical cases as in (43) below, on the other hand, I-Complex is assigned in a similar way but to the head nominal, giving rise to the informational shift involving head prominence as we observed in the previous section.

(43) (i) $\mathbf{N_1}$: { *zairyoo*, *hoorensoo* } (for (26b))
ingredient spinach
(ii) $\mathbf{N_2}$: { *zairyoo* [GEN], *hoorensoo* **[I$_{PHON}$, I$_{SEM}$]** }

Here is our bird's-eye view of these phenomena. Following the Grician principle/maxims, language users seek efficient communication. To fulfill this purpose, they are constantly and locally evaluating the informational significance of each syntactic item when a new syntactic projection is derived (whether for production or perception). We consider that the introduction of I-Complex as described in (42)-(43) and their interpretations at CI and SM interfaces are the ways grammar addresses the language users' constant need to express and perceive local information packaging in their linguistic performance, which would require the correct linking of informational prominence with its appropriate prosody for efficient communication.

5. The prosodic characterization of local information packaging

In section 2, the convergence of informational and prosodic prominence in two distinct ways as in (44) and (45) below was informally discussed.

(44) [$_{NP}$**↑uma'i** nomi'mono] (⊂ (4a))
tasty beverage

(45) [$_{NP}$ na'nika **↑nomi'mono**] (= (5b))
something beverage

In this section, I will attempt to clarify how exactly the native speakers' intuition of both these types of prosodic prominence is phonetically realized by reporting and analyzing the results of the experiment I conducted. To begin with, I hypothesize that the grammar of Tokyo Japanese involves a prosodic process as in (46), which yields a prosodic signal to indicate the beginning of each word.[14]

[14] The phonetic effect of IR is what has long been recognized as Initial Lowering. See the discussion at the end of section 5.2.2 for the advantage of postulating this prosodic process over postulating boundary tones to capture the initial lowering effect.

(46) Initial Rise (henceforth *IR*):
Every word (and hence utterance) starts with a tonal rise from Low (L) to High (H).

All in all, what is measured in the experiment is the magnitude of IR in each word within a phrase.

5.1 Phonetic experiments

In this section, I describe the conducted experiment. The experiment was conducted with 10 paid speakers (8M/2F) of Tokyo Japanese. They read aloud sentences and words in a semi-randomized list 8 times, after they read each stimulus silently and understood its meanings. The target words in (47) below were uttered in five distinct contexts described in (48), and their magnitude of the Initial Rise (henceforth *IR-magnitude*) were measured and statistically analyzed (with One-way ANOVA (α=0.05); DV=IR-magnitude & IV =3 distinct properties/contexts of target word).

(47) Target words:

Accented target word (*A-targ*):	*nomi'mono*	'beverage'
	noiro'oze	'neurosis'
Unaccented target word (*U-targ*):	*nimono*	'simmered food'
	anma	'masseur/masseuse'[15]

The target words are labeled as *A-targ* and *U-targ*, respectively, in accordance with their accented status. These target words were pronounced as separate words ((48i)) and in a phrase ((48ii-iii)).[16]

(48) Pronounced as:
(i) Separate words (*WD*)
(ii) In a phrase preceded by either:
a. Accented word (*A-prec*) or
b. Unaccented word (*U-prec*)
(iii) With:
a. Non-head prominence ([I] - [ ])
or
b. Head prominence ([ ] - [I])

[15] Since at least six subjects reported that one of the unaccented target words *anma* 'masseur' was not part of their vocabulary and that they would pronounce this word as an accented word *a'nma* if they are forced to pronounce it, its measurements were not taken into consideration.

[16] When the target words were pronounced separately, one second of sinusoid was played as a prompt sound before each stimuli was visually presented, at 150 Hz for male, and 250 Hz for female participants. This was intended to guide the participants to speak in a stable and constant pitch range and prevent their sequence/list reading of words. The recordings obtained this way displayed very stable utterances.

The phrasal contexts were cross-classified in terms of the accentedness of a preceding word (*A-prec* vs. *U-prec*) as in (48iia-b) and distinct types of informational prominence (Non-head vs. head prominence) as in (48iiia-b). For the sake of brevity, I-Complex ([I_{PHON}, I_{SEM}]) will be indicated simply as [I] and its absence as [ ] in the rest of this work. The non-head prominence, therefore, is indicated as [I] - [ ], and the head prominence, i.e., prominence shift, is indicated as [ ] - [I]. Thus, the phrasal stimuli involving distinct combinations of preceding words and target words arise as exemplified in (49a-d) and (50a-d).

(49) Non-head informational prominence ([I] - [ ]):

a. A-prec + A-targ:
[**uma'i** *nomi'mono*]
tasty beverage

b. A-prec + U-targ:
[**uma'i** *nimono*]
tasty simmered.food

c. U-prec + A-targ:
[**amai** *nomi'mono*]
sweet beverage

d. U-prec + U-targ:
[**amai** *nimono*]
sweet simmered.food

(50) Head informational prominence ([ ] - [I]):

a. A-prec + A-targ:
[na'nika ***nomi'mono***]
some beverage

b. A-prec + U-targ:
[na'nika ***nimono***]
some simmered.food

c. U-prec + A-targ:
[sono ***nomi'mono***]
the beverage

d. U-prec + U-targ:
[okazu-no ***nimono***]
for.entrée simmered.food

In the experiment, these phrasal stimuli were further placed in a larger context as in (51) and (52).

(51) Watasi-wa [**uma'i** *nomi'mono*-o] **SUKOSIDAKE** nomitai. (⊃ (49a))
I-TOP tasty beverage-ACC only.little want.to.drink
'I want to drink tasty beverage ONLY A LITTLE BIT.'

(52) Watasi-wa [na'nika ***nomi'mono***-o] **SUKOSIDAKE** nomitai. (⊃ (50a))
some beverage-ACC
'I want to drink some beverage ONLY A LITTLE BIT.'

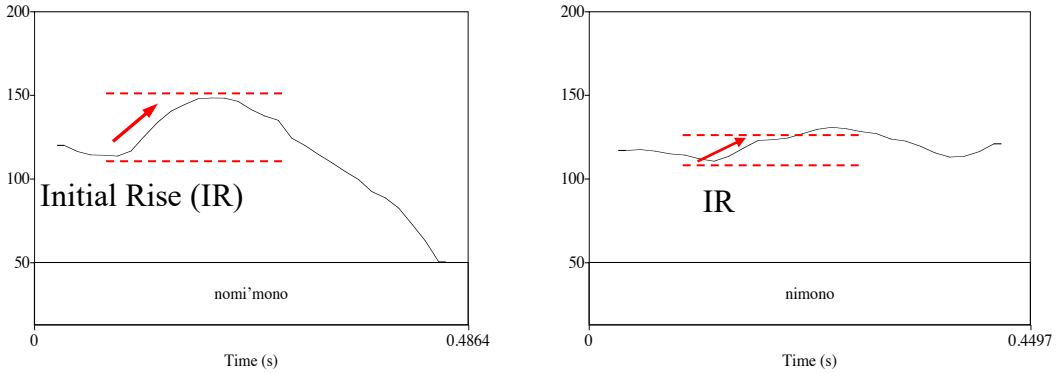
In this context, nuclear prominence (*SUKOSHI-DAKE* 'only little') was provided in its default position in Japanese, i.e., immediately before the matrix verb, so that the target word will not attract it. In these stimuli, *SUKOSHI-DAKE* was indeed realized as clear prominence in most of the acquired recordings.

5.2 Experimental results and their prosodic analyses

5.2.1 Words

When the target words were pronounced as independent words, the obtained recordings by the ten speakers displayed very stable utterances with their peaks varied within the range of 5.15 Hz in average. The pitch tracks of A-targ and U-targ are exemplified in (53).[17]

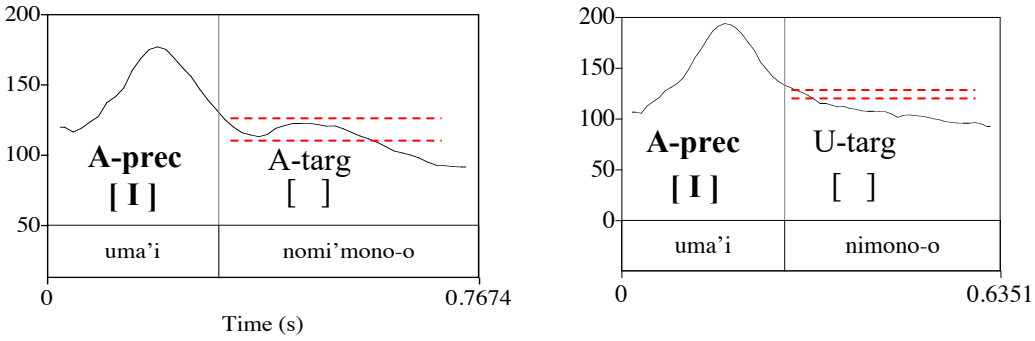
(53) a. A-targ: *Nomi'mono* 'beverage' b. U-targ: *Nimono* 'simmered food'



5.2.2 Prosody of "non-head" informational prominence

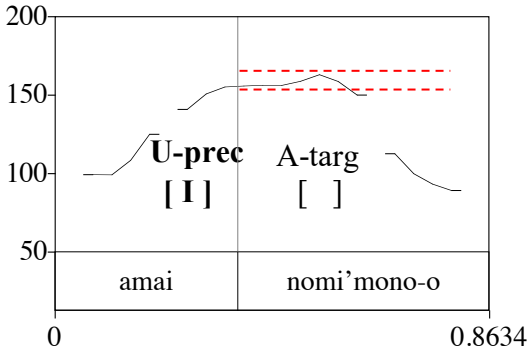
First, the same target words (both A-targ and U-targ) pronounced as head nouns as in (49a-d) were recorded and their IR-magnitudes were measured, as exemplified in (54a-d).

(54) a. **uma'i** *nomi'mono* b. **uma'i** *nimono*
tasty beverage tasty simmered.food

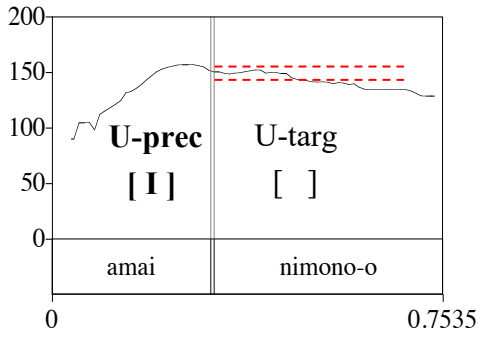


[17] As is well known, IR-magnitude generally is somewhat larger when the peak involves an accented mora than an unaccented mora. This presumably reflects the accentual boost effect reported with accented words (Kubozono 1993:90).

c. **amai** *nomi'mono*
sweet beverage



d. **amai** *nimono*
sweet simmered.food

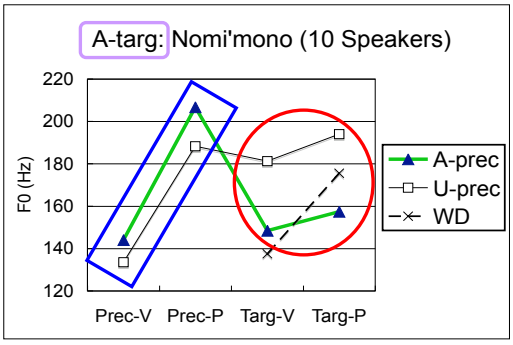


In all four cases, their preceding items (both A-prec and U-prec) are receiving "non-head" informational prominence. What can be clearly observed in (54) is that all four cases involve significant compression of IR in the target words irrespective of the accented status of both target and preceding words.

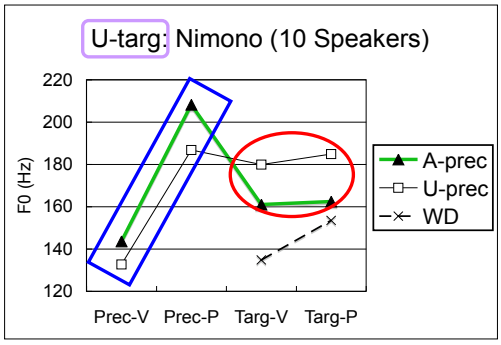
This point can be demonstrated when we measure and compare the average magnitudes of IRs uttered by the ten speakers in all the combinations of target words (A-targ and U-targ) and the pronounced environments (Word, A-prec and U-prec) involving non-head prominence, as summarized in (55).

(55) Average IR-magnitude of Prec, Targ, and WD (non-head informational prominence):
(V = valley / P = Peak ・ "V to P" = Initial Rise)

a.



b.



First, we can observe here that, with both A-targ ((55a)) and U-targ ((55b)), the IR of the target is significantly compressed when "non-head" informational prominence is involved. Note that the IR involves much less steep rise in the target (circled) than in the preceding word (boxed), confirming our visual observations on the pitch tracks in (54a-d).

Second, the IR-magnitude of target words in (55) is noticeably smaller than that in their pronunciation as independent words (WD) indicated by the dotted lines, again with both A-targ ((55a)) and U-targ ((55b)).[18]

Third and finally, the compression of IR in both accented and unaccented target words materializes in a quite similar way between A-prec and U-prec, inducing quite comparable IR-magnitude in both cases. This similarity is suggested by the two nearly parallel lines in

[18] Their contrast was significant in 56/60 cases with p= 0.000~0.022.

each oval in (55a-b).[19]

The measurements and comparisons of the average IR-magnitudes reported in (55a-b) lead us to the following conclusion. First, non-head informational prominence induces clear compression of the IR in the head item. Second and quite importantly, this compression of IR arises both with A-prec and U-prec, which suggests that it is caused by something other (or more) than downstep. Recall that downstep is defined as pitch range lowering triggered solely by a preceding accented item, i.e., by A-prec but not by U-prec in our terms.

Finding the exact source of such compression of IR (henceforth IR-compression) is not an easy task to fulfil, and it goes beyond the scope of the current work. Therefore, I will tentatively postulate a theory-neutral prosodic process as in (56).

(56) Right-Hand Reduction (henceforth RHR):

In a PF projection γ consisting of α and β in this order, the Initial Rise of β is significantly compressed, where β can be:

(i) a lexical head (= "bunsetsu")

or

(ii) a phrasal head (= derived projection)

Researchers like McCawley (1968:137-8), Selkirk (1984), Nespor and Vogel (1986), Pierrehumbert and Beckman (1988), Duanmu (1990) and Truckenbrodt (1995:216, 221), among others, adopted the view that a phonological phrase is left-prominent. The postulation of (56) reflects the intuition behind such a view but without adopting the hypothesis that prosodic prominence is associated with stress, pitch or tone at some phrase boundary. The IR-Compression induced by RHR presumably is a default prosodic signal of a syntactic projection, synchronized with and reflecting the default "non-head" informational prominence as observed in (54a-d) above.

5.2.1 Prosody of "head" informational prominence

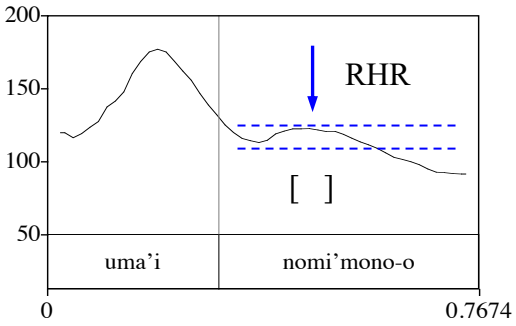
Next, the same target words in (47) were pronounced as the head with informational prominence in phrases like (57a-d).

(57)	a.	na'nika	***nomi'mono***	b.	na'nika	***nimono***
		some	beverage		some	simmered.food
	c.	sono	***nomi'mono***	d.	okazu-no	***nimono***
		that	beverage		entrée-GEN	simmered.food

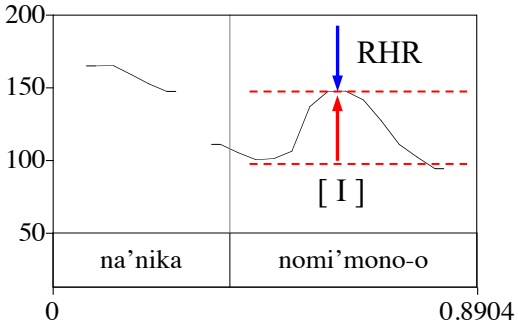
When the IR-magnitude of these head words was measured, it was found that the effect of IR-compression by Right-Hand Reduction (RHR) does not show up as substantially as expected. The comparison of the pitch track diagram of non-head prominence as in (58a) and that of head prominence as in (58b) portrays this point well.

[19] The difference in the average IR-magnitudes of A-prec and U-prec in (55a-b) was non-significant in 19/30 cases with p= 0.101~0.990. Even when their asymmetry was observed, the two opposite directions of asymmetry were observed almost equally mixed (A-prec > U-prec (5/30)・ U-prec > A-prec (6/30)).

(58) a. Non-head prominence



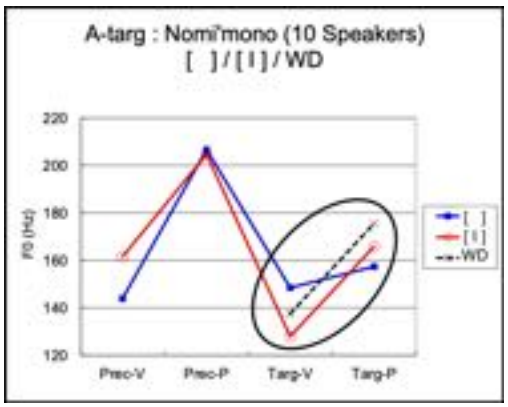
b. Head prominence



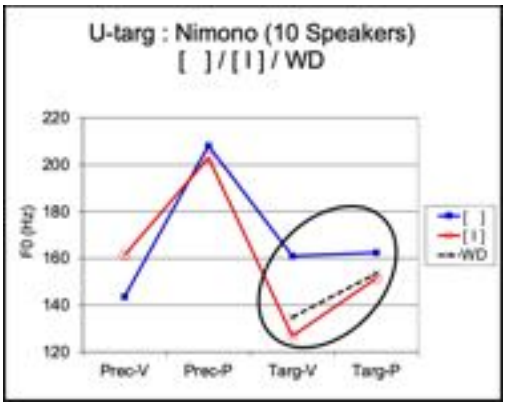
Note, however, that the head prominence in (58b) in fact does not involve more prominence than the non-head item prosodically. It just mitigates the effect of RHR expected for the right-hand side item. This point can be clearly demonstrated when we measure and compare the average IR-magnitudes of the target words (A-targ and U-targ) pronounced by the ten speakers as non-prominent heads ([ ]), prominent heads ([I]), and independent words (WD), as summarized in (59).

(59) Average IR-magnitude of [ ] targ vs. [I] targ vs. WD (with A-prec):
(V = valley / P = Peak ・ "V to P" = Initial Rise)

a.



b.



First, we can observe in both (59a-b) that IR-magnitude of prominent heads ([I]) is noticeably larger than that of non-prominent heads ([ ]).[20] Second, the IR-magnitude of non-prominent heads ([ ]) is noticeably smaller than that of independent words (WD) while prominent heads ([I]) and words exhibit quite similar IR-magnitudes.[21]

Thus, the measurements and comparisons of the average IR-magnitudes reported in (59a-b) lead us to the observation that the effect of Right-Hand Reduction in a phrase containing a prominent non-head comes to be noticeably weakened when the head item is prominent. In other words, informational prominence shift from non-head prominence to head prominence accompanies prosodic shift by modifying the effect of RHR in the default

[20] Their contrast was significant in 23/30 cases with p= .000~.032.

[21] The difference in the average IR-magnitude of [I] head and WD was non-significant in 12/30 cases with p= .188~1.000. Again, even when their asymmetry was observed, the two opposite directions of asymmetry were observed almost equally mixed (WD > [I] (10/30) ・ [I] > WD (8/30)).

prosodic pattern.[22]

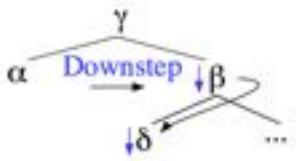
I propose to capture this prosodic shift by postulating a prosodic process I call 'Informational Boost' as described in (60).

(60) Informational Boost (IB):
The effect of Right-Hand Reduction in a phrase is significantly attenuated if the right-hand item is informational prominent ([I]).

The application of Informational Boost (henceforth IB) guarantees the PF effect synchronized with the LF involving marked "micro" information packaging of a phrase involving head prominence.

5.2.2 Prosody of non-head prominence in non-terminal projections

In discussing register scaling in hierarchical prosodic structure, Féry and Truckenbrodt (2005:235) proposed "First Sister" in (61a) below as a prosodic principle.

(61) First Sister: (Féry and Truckenbrodt 2005:235)
a. The leftmost daughter of a node shares the register properties of its mother.
b. 

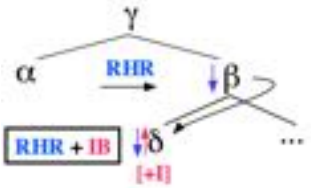
They claim that due to First Sister, the effect of downstep, for instance, is inherited by the leftmost daughter δ of a phrase β in (61b). Recall here that Right-Hand Reduction in (56) was formulated as a prosodic process that applies to β in the construction [$_{\gamma}$ α β], whether β is a lexical head or a derived projection. Suppose now that RHR applies to β as such a phrasal head. If First Sister is sustainable, it may not be out of the question for us to take a free ride and consider that the application of RHR to β in the structure like (61b) induces the same effect in δ. At worst, (61a) can be reformulated as in (62). (Recall that RHR applies even when α in (61b) is unaccented (= our U-prec in (55a-b)).

(62) Extended First Sister:
The left(most) daughter of a node inherits the effects of Right-Hand Reduction applied to its mother.

Suppose further that the syntactic non-head δ within β appears as an informationally prominent item ([I]). We then should expect that δ is subject to receive the effects of both RHR and IB, as illustrated in (63).

[22] This seems to be quite similar to the phenomenon Fuchs (1984:144) calls "integration," in which even a factually given item (in English and German) may be accented "to establish them as a point of relevance/newness with respect to the question of immediate concern at that point."

(63)



We predict, in other words, that very similar prosodic patterns arise in (64a) and (64b).

(64) a. Head prominence b. Non-head prominence

In (64a), both RHR and IB apply to the prominent head β within the terminal phrase, which is expected to exhibit significantly attenuated IR-compression. In (64b), RHR applies to the phrase β at the non-terminal level, the effect of which is to be reflected by the left-most daughter δ of β in accordance with (62). Since δ is a prominent non-head ([I]) within β, however, IB attenuates the IR-compression it inherits from its mother β as the item located on the right-hand side in the application of the non-terminal RHR. (δ itself may be located in a terminal or a non-terminal phrase.)

In order to verify this prediction, prosody of the stimulus sets embedded in the contexts as in (65)-(67) below was measured and analyzed.

(65) Terminal RHR (target word = T [ ]):

Watasi-wa	[	↑**uma'i**	*nomi'mono*-o]	SUKOSIDAKE	nomitai.
I-TOP		**tasty**	beverage-ACC	only.little	want.to.drink
			T [ ]		

'I would like to have only a little bit of tasty drink.'

(66) Terminal RHR + IB (target word = T [I]):

Watasi-wa	[	na'nika	↑***nomi'mono***-o]	SUKOSIDAKE	nomitai.
		some	**beverage**-ACC		
			T [I]		

'I would like to have only a little bit of some drink.'

(67) Non-terminal RHR + Terminal IB (target word = NT [I]):

watasi-wa	sorekara	[*nomi'ya-de*	[β ↑***nomi'mono***-o	[SUKOSI-DAKE	nonda]]]
I-TOP	after.that	pub-at	**beverage**-ACC	little-only	drank
			NT [I]		

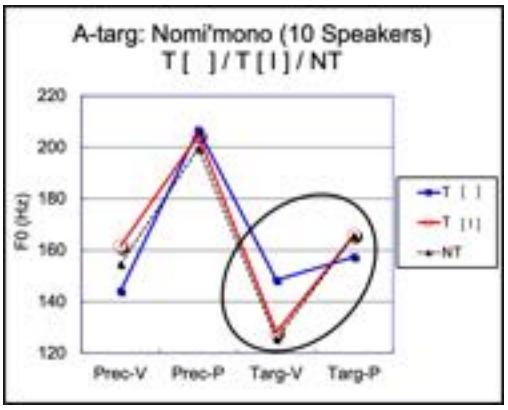
'After that, I had only a little bit of drink at a pub.'

In (65), RHR applies to a non-prominent target at the terminal level. In (66), both RHR and IB apply to the prominent target at the terminal level. In (67), RHR applies to a phrase (β) at the non-terminal level and the prominent non-head of β as the target word undergoes IB at the lower level.

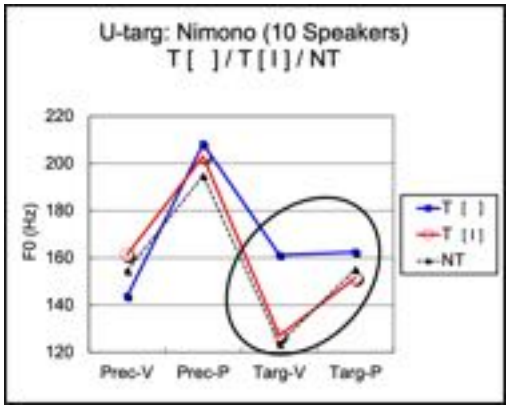
The prosodic activities within these stimulus phrases pronounced by the ten speakers were recorded and the average IR-magnitude of each target word (T [ ] in (65), T [I] in (66), and NT [I] in (67)) was measured, as summarized in (68).

(68) Average Magnitude of IR — T [ ] vs. T [I] vs. NT [I]: (A-prec)

a.



b.



When the IR-compression effects of the target words in (65) and (67) are compared, a clear contrast is observed — the IR-magnitude is noticeably larger with NT [I] in (67) than that with T [ ] in (65). That is, the clear IR-compression induced by RHR in (65) is attenuated by the application of IB in (67).[23] When the IR-compression effects of T [I] in (66) and NT [I] in (67) are compared, on the other hand, the difference is minimal, suggesting that IR-compression induced by RHR is attenuated by IB in both cases, as predicted under the assumption that Extended First Sister in (62) assimilates the prosodic activities in the two constructions.[24]

One interesting theoretical implication arises from the results in (68). To begin with, what is observed in (67) with NT [I] is more or less identical to what has been reported as the effects of Metrical Boost observed in (3) above (Kubozono 1993). Next, the effect of RHR+IB in (67) is virtually identical to that in (66) with T [I]. Finally, despite the similarity of the two cases, the observation in (66) follows from the postulation of Informational Boost but not from Metrical Boost, the latter of which is structurally conditioned to apply only to the item on the left-branch. A possibility arises then that Metrical Boost may be reducible to Informational Boost, both of which can apply cyclically as observed in (3) as well as in (67). That is, it may be possible to regard Metrical Boost as only part of the prosodic effects induced by informational prominence.

Another interesting theoretical implication arises under this approach. When Initial Rise (46) is placed in the RHR-cum-IB analysis just described, it can be seen that

[23] Their contrast was significant in 22 out of 30 cases with p= 0.001~0.004.

[24] The difference was non-significant in 21 out of 30 cases with p= 0.115~0.975. Again, when their asymmetry was observed, the two opposite directions of asymmetry were observed (NT [I] > T [I] (3/30) ・ T [I] > NT [I] (6/30)).

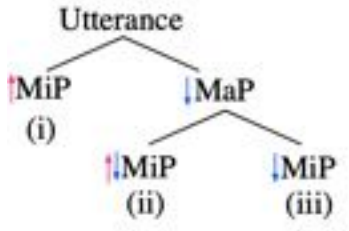
postulating this prosodic process is advantageous to postulating boundary tones when an attempt is made to capture the phonetic effect of 'initial lowering.'

It has been reported in the literature that IR-magnitude of the initial lowering effect in MiP is quite large when it is utterance-initial, somewhat smaller when it is MaP-initial in an utterance-internal position, and the smallest when it is MaP-internal, as illustrated in (69). (Kubozono 1988b, Selkirk, Shinya and Sugahara 2003, Kawahara and Shinya 2008)

(69) IR-magnitude of initial lowering effect — (i) > (ii) > (iii):
- (i) Utterance-initial MiP
- (ii) MaP-initial MiP
- (iii) MaP-internal MiP

Such variation is often captured by postulating more than one boundary tone like Utterance-initial L% and MiP-final L% (Pierrehumbert and Beckman 1988). Under the analysis incorporating RHR and IB with IR, the hierarchy in (69) follows without any extra assumption. First, the utterance-initial IR is the largest because it is not preceded by any item inducing RHR and hence it is free from any IR-compression. Second, the Map-initial IR inside an utterance is somewhat (and only somewhat) smaller because it is subject to RHR applying at the non-terminal level but is also subject to IB, which attenuates IR-compression. Third and finally, the Map-internal IR is the smallest because it is subject to RHR and remains fully compressed (unless it is informationally prominent and undergoes IB), as illustrated in (70).

(70) IR-magnitude of initial lowering effect — (i) > (ii) > (iii):
- (i) Utterance-initial IR: No RHR → IR free from any IR-compression
- (ii) MaP-initial IR: Non-Terminal RHR+IB → Attenuated IR-compression
- (iii) MaP-internal IR: Terminal RHR → IR-compression only (when no [I] head)



Thus, the hierarchy in (69) follows without need for an appeal to heterogeneous sources of boundary tones for the initial lowering effect. (See also Kori (2004) for relevant discussion.)

5.2.3 Informational boost with U-prec

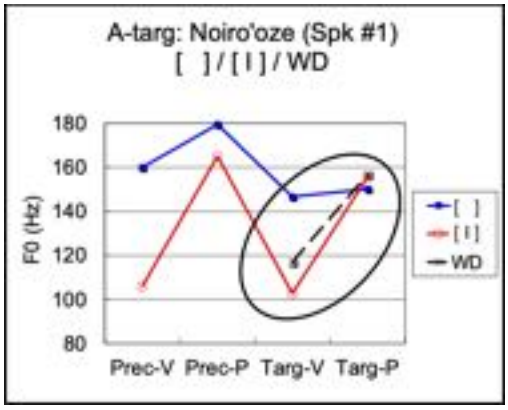
In the examination of Informational Boost effect, the experiment involving accented preceding words (A-prec) provided reasonably clear supporting data, but only limited support was available when the involved preceding words were unaccented (U-prec). When the stimuli involving U-prec as in (71) were adopted in the experiment, only

limited IB effects were observed.

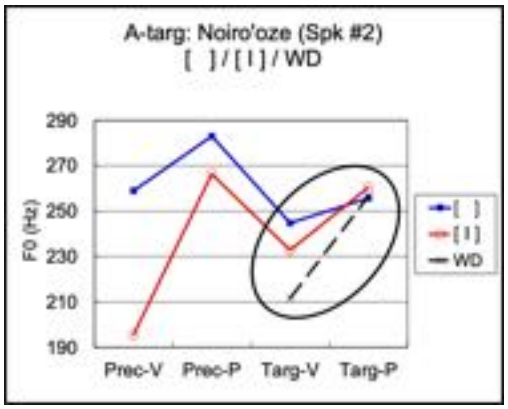
(71) a. *zokuni-yuu* **noiro'oze**
commonly-called neurosis
b. *sono* **nomi'mono**
that/the beverage
b. *okazu-no* **nimono**
entrée-GEN simmered.food

Four speakers did show the IB effect similar to that observed with A-prec as in (59) in section 5.2.1 — the R-magnitude of prominent heads ([I]) is larger than that of non-prominent heads ([ ]), as illustrated in (72) and (73).[25]

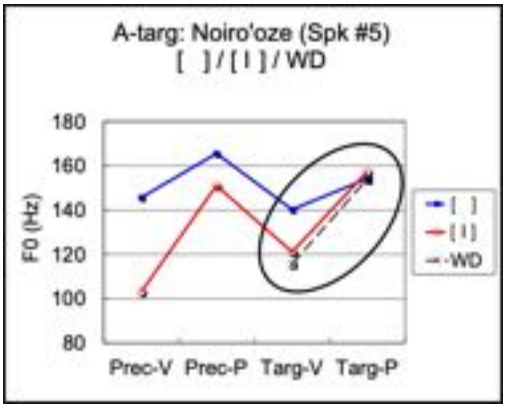
(72) a.



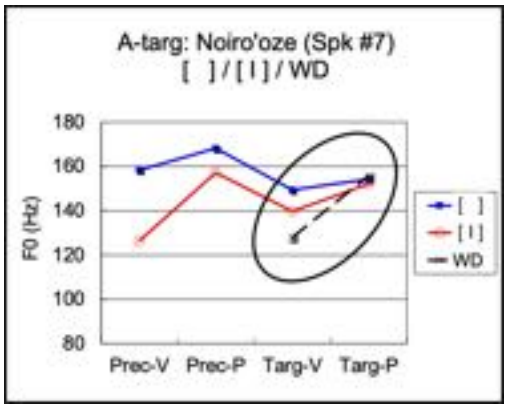
b.



c.

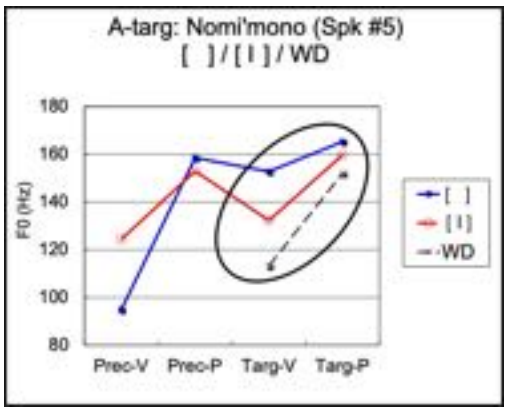


d.

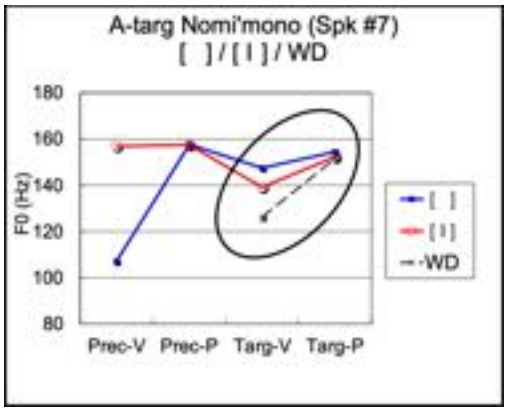


[25] Their contrast in (71a) was significant with 4 out of 10 speakers with p= 0.000 ~ 0.005, and that in (71b) was significant with 2 out of 10 speakers with p= 0.000 ~ 0.008. No similar IB effect was detected in (71c) in 10 speakers' recordings.

(73) a.



b.



Other speakers, however, did not exhibit this pattern. It is not entirely clear why and how these results followed, but one possibility is that inappropriate lexical choices were made. The non-head words in (71a-c) may have been regarded as informationally more prominent than expected in the experiment — *zokuni-yuu* 'commonly-called' by some participants, *sono* 'that/the' by most of them, and apparently *okazu-no* 'entrée-GEN' by all of them. A new round of experiments involving U-prec as a non-prominent non-head is obviously desired.

6. Summary and conclusions

I hope to have demonstrated in this work that 'Informational Prominence' is ubiquitously established locally within each syntactic phrase, and that such "micro" information packaging takes place independent of discourse-based notions in "macro" information packaging such as focus-background and topic-comment, or new/given information.

It was proposed that such local informational prominence is encoded into syntactic representations with the addition of I(nformational)-Complex of the form [I_{PHON}, I_{SEM}] (abbreviated as [I] throughout this work) into the relevant lexical items. Each component of I-Complex, [I_{PHON}] and [I_{SEM}], then is split and inputted to PF and LF and induces prosodic prominence in the SM interface and informational prominence in the CI interface, respectively.

While a syntactic non-head item NH (located on the left in Japanese) is introduced with [I] in default information packaging, a head item H may occasionally be introduced with [I] in marked cases. This causes what I called 'informational prominence shift,' which I analyze to be licensed when the ∃-type shifted **[**H**]** entails the ∃-type shifted **[**N+H**]** in the interlocutors' shared cognitive context C^G.

The Initial Rise (IR) associated with every word is subject to Right-Hand Reduction (RHR), a prosodic process which applies in every binary projection at PF unless the word is informationally prominent and specified as [I]. When a word is [I], it undergoes a prosodic process of Informational Boost (IB), which attenuates the compression of IR induced by RHR. When it is assumed that IB applies to not only a lexical head but also a phrasal head, what can be identified as the cyclic effect of Metrical Boost arises. This suggests that Metrical Boost may be subsumed under Informational Boost.

In short, the informational prominence established locally within each phrase induces

the synchronization of semantico-pragmatic prominence and prosodic prominence.

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