

Dynamic Categories and Projections in a Head-final Language¹

Hiroto HOSHI
Akita University

1. Introduction

The central idea of Dynamic Syntax is: underspecified syntactic representation gets updated step by step in the course of left to right parsing of a string of words (Kempson et al. 2001, Cann et al 2005, Kempson 2016, 2017, among others; cf. Hawkins 1990, 1994, 2004, 2014, Phillips 1996, etc.; cf. Chomsky 1965, 1981, 1986, 1995, etc.). Dynamic Syntax thus predicts that some head-final languages should display a distinctive pattern where an underspecified, or fuzzy, category comes first, and then, follows a syntactic updater, i.e. a head, which determines the nature of the fuzzy category in the course of left to right sentence processing.

In this paper, I aim to argue for the core idea of Dynamic Syntax. To do so, I show that the above mentioned prediction is indeed borne out, based on Hoshi's (2014, 2019a-c) 'dynamic categorization' analysis of fuzzy categories, i.e. adjectival nouns (ANs) and verbal nouns (VNs) in Japanese.² In so doing, here, I try to clarify as much as I can how head-final languages such as Japanese form 'dynamic categories and projections' gradually in the course of left to right parsing of a string of words.³

2. Selection and Dynamic Categorization (Hoshi 2014, 2019a-c)

To account for the properties of Japanese ANs and VNs, Hoshi (2019a-c) proposes that a Japanese adjectival noun like *suki* 'fond/fondness' is fuzzy in that the category of an AN like *suki* is underspecified with respect to [+A] or [+N] in the lexicon, as shown in (1a).

- (1) a. [_{?A or ?N} *suki*]
b. [_{?V or ?N} *kenkyuu*]

Similarly, as illustrated in (1b), a verbal noun in Japanese is fuzzy, because the category of a VN like *kenkyuu* 'researching' is also not fixed regarding [+V] or [+N] in the lexicon. In other words, the AN *suki* has a disjunction of two options, [+A] or [+N]; the VN *kenkyuu* possesses a disjunction of two features, [+V] or [+N].

Furthermore, Hoshi (2019a-c) proposes the following *dynamic categorization* conditions:

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² See Aarts et al. (2004), Fanselow et al. (2006), Aarts (2007), etc. for some issues on fuzzy grammar. For various treatments of ANs and VNs, the reader is referred to Kuno (1973), Martin (1975), Miyagawa (1987), Grimshaw and Mester (1988), Murasugi (1988), Kuroda (1992), Kageyama (1993), Matsumoto (1996), Uehara (1998), Saito and Hoshi (2000), Croft (2001), Ito and Sugioka (2002), Sugioka (2009), among others.

³ See Yumoto (2011) for issues on grammar and dynamisms in the lexicon.

- (2) a. Suffixes such as case markers *select* the [+N] feature of the projection of an adjectival noun like [_{?A or ?N} *suki*] in syntax, and *dynamically turn* the fuzzy AN projection into an unambiguous [+N] projection in the syntactic component.
- b. Copulas *select* the [+A] feature of the projection of an adjectival noun like [_{?A or ?N} *suki*] in syntax, and *dynamically turn* the fuzzy AN projection into an unambiguous [+A] projection in the syntactic component.

That is, under the dynamic categorization analysis, in the course of left to right parsing of a string of words in syntax, once a syntactic updater like a case marker selects the [+N] feature of the projection of an adjectival noun, it turns the fuzzy category into an unambiguous [+N] category by means of dynamic categorization condition (2a). On the other hand, when a dynamic updater like a copula, *da* or *na*, selects the [+A] feature of the projection of an adjectival noun, it then dynamically turns the ambiguous category into an unambiguous [+A] category due to categorization condition (2b).

Furthermore, to capture the parallelism between the two types of fuzzy categories, i.e. Japanese ANs and VNs, Hoshi (2019a-c) proposes (3a-b) (cf. Hoshi 2014).

- (3) a. Suffixes such as case markers or aspectual nouns such as $-[_{\text{AspN}} \textit{tyuu}]^4$ ‘middle’ *select* the [+N] feature of a verbal noun like [_{?V or ?N} *kenkyuu*] in syntax, and *dynamically turn* the fuzzy VN projection into an unambiguous [+N] projection in the syntactic component.
- b. Verbs such as the light verb *su* ‘do’ or aspectual nouns such as [_{AspN} *tyuu*] ‘middle’ *select* the [+V] feature of the projection of a verbal noun like [_{?V or ?N} *kenkyuu*] in syntax, and *dynamically turn* the fuzzy VN projection into an unambiguous [+V] projection in the syntactic component.

Namely, in the course of left to right processing of words in syntax, once a syntactic updater like a case marker selects the [+N] feature of the projection of a verbal noun, it dynamically turns the underspecified category into an unambiguous [+N] category through condition (3a) (cf. 2a). Once, on the other hand, an updater like the light verb *su* selects the [+V] property of the projection of a VN, it turns the fuzzy category into an unambiguous [+V] category by means of dynamic categorization condition (3b) (cf. 2b).

In short, under the dynamic categorization analysis, adjectival nouns such as *suki* are not simply a [+A] category, are not just a [+N] category, or are not a mixed category of both [+A] and [+N] properties (cf. Martin 1975, Kageyama 1993, Ito and Sugioka 2002, among others). Under the dynamic syntactic analysis, [_{AN} *suki*] ‘fond/fondness’ is listed as a fuzzy category in the lexicon as in (4a).

- (4) a. [_{?A or ?N} *suki*] (= 1a)
 b. [_N *suki*]
 c. [_A *suki*] (Hoshi 2019a-c)

Hence, the AN *suki* first emerges as the fuzzy category [_{?A or ?N} *suki*] in syntax as in (4a). Then, depending on syntactic environments in the course of left to right parsing of a string of words, the fuzzy category [_{?A or ?N} *suki*] gets updated as the noun [_N *suki*] as in (4b) (see 2a), or is updated as the adjective [_A *suki*] as in (4c) (see 2b).

⁴ Sugioka (2009, p. 92, 27b-d) proposes that the aspectual noun head $-[_{\text{AspN}} \textit{tyuu}]$ ‘middle’ may nominalize any part of the projection of a verbal noun through its morphological selection. This insight by Sugioka (2009) is incorporated into dynamic categorization condition (3a).

In the same way, verbal nouns such as *kenkyuu* ‘researching’ are not simply a [+V] category, are not just a [+N] category, or are not a dual category of both [+V] and [+N] features (cf. Martin 1975, Kageyama 1993, Ito and Sugioka 2002, Sugioka 2009, among others). Under the dynamic categorization analysis, the verbal noun *kenkyuu* is listed as an underspecified category in the lexicon as in (5a).

- (5) a. [_{?V or ?N} *kenkyuu*] (= 1b)
 b. [_N *kenkyuu*]
 c. [_V *kenkyuu*] (Hoshi 2019a-c)

Thus, the VN *kenkyuu* appears as the underspecified category [_{?V or ?N} *kenkyuu*] initially in the syntactic component as in (5a). Depending on syntactic contexts, the VN *kenkyuu* is then dynamically updated as the noun [_N *kenkyuu*] as in (5b) (see 3a), or turned into the verb [_V *kenkyuu*] as in (5c) (see 3b).

Notice here that Hoshi’s (2014, 2019a-c) dynamic categorization analysis in (4a-c) and (5a-c) is exactly what is predicted by the very core idea of Dynamic Syntax: underspecified syntactic representation gets updated gradually in the course of left to right parsing of a string of words (Kempson et al. 2001, etc., Cann et al. 2005, Kempson 2016, 2017, among others). Furthermore, observe below that the dynamic categorization analysis explains various context-dependent properties of ANs and VNs adequately.

Consider first the acceptability of (6a-b).

- (6) a. [_{ANP} *anata-no* [_{AN} *kirei*]] -o ooens -i-masu.⁵
 you –Gen beauty-Acc support- -Pres
 ‘We will support your beauty.’
 b. [_{VNP} *John-no nihongo -no* [_{VN} *kenkyuu*]]-ga subarasi -i.
 John-Gen Japanese -Gen research -Nom fantastic-Pres
 ‘John’s research of Japanese is fantastic.’

Under the proposed analysis, syntax processes a string of words in (6a), roughly as in (7a-c).

- (7) a. ?[_{?AP or ?NP} [_{NP} *anata*]-?no [_{?A or ?N} *kirei*]]
 b. ?[_{?AP or ?NP} [_{NP} *anata*]-?no [_{?A or ?N} *kirei*]]-o
 c. [_{NP} [_{NP} *anata*]-no [_N *kirei*]]-o (dynamic categorization 2a)

At the initial point of left to right processing of a string of words, the parser constructs structure (7a). In (7a), the category of the adjectival noun *kirei* is underspecified with respect to [+A] or [+N] (cf. 1a/4a), and thus, the genitive case *-no* attached to the NP *anata* is not licensed. At the next point of left to right parsing, the accusative case marker *-o* selects the underspecified projection by [_{?A or ?N} *kirei*] (cf. Kageyama 1993, Ito and Sugioka 2002, etc.), and the parser builds the structure in (7b), where the genitive case marker *-no* is not yet licensed. As shown in (7c), the accusative case marker *-o* triggers selection again, and selects the [+N] feature of the projection of the AN *kirei*, dynamically turning the fuzzy category into the projection of an unambiguous category [+N], due to categorization condition (2a). Consequently, at the processing point of (7c), the genitive case *-no* is properly licensed within the

⁵ I thank Mayumi Hoshi for bringing examples such as (6a) to my attention.

[+N] projection (cf. Saito 1982, among others). Significantly, under the proposed analysis, dynamic categorizers or updaters such as the accusative case marker *-o* thus trigger selection twice in the course of left to right sentence processing: namely, the case marker *-o* first selects the fuzzy category [_{?A or ?N} *kirei*] as in (7b); subsequently, the same case marker selects the [+N] feature of the underspecified category for dynamic or syntactic categorization as in (7c).

Similarly, syntax parses from left to right a string of words in (6b) as follows:

- (8) a. ?_{[?VP or ?NP} [_{NP} John]-?no [_{NP} nihongo]-?no [_{?V or ?N} kenkyuu]]
 b. ?_{[?VP or ?NP} [_{NP} John]-?no [_{NP} nihongo]-?no [_{?V or ?N} kenkyuu]]-ga
 c. [_{NP} [_{NP} John]-no [_{NP} nihongo]-no [_N kenkyuu]]-ga (dynamic categorization 3a)

At the initial point of left to right parsing, syntax forms structure (8a). In (8a), both the external argument *John* and the internal argument *nihongo* are marked by the genitive case marker *-no*. The two genitive case markers are not licensed at this stage, because they are not contained within the projection of an unambiguous [+N] projection (see 1b/5a; cf. 7a). At the next point of left to right processing of a string of words, as shown in (8b), the nominative case marker *-ga* selects the fuzzy projection by [_{?V or ?N} *kenkyuu*] (cf. Kageyama 1993, Ito and Sugioka 2002, Sugioka 2009, etc.), where *-no* is not yet licensed properly. However, at the next point of left to right parsing, the nominative case marker *-ga* triggers selection once again, and selects the [+N] feature of the projection of the verbal noun *kenkyuu*, dynamically turning it into an unambiguous [+N] category as illustrated in (8c), due to categorization condition (3a) (cf. 7c). Consequently, the two genitive case markers are successfully licensed within the [+N] projection at the parsing stage of (8c). The proposed analysis thus accounts for the nominal property of both an AN and a VN by means of dynamic categorization by case markers in a uniform way (see 7c and 8c). Notice here as well that under the proposed analysis, dynamic categorizers or updaters such as case markers are supposed to trigger selection twice. That is, the nominative case marker *-ga* first selects the fuzzy projection [_{?VP or ?NP} *kenkyuu*] as in (8b); the same case marker then selects the [+N] of the underspecified category for dynamic or syntactic categorization as shown in (8c) (cf. 7b-c & 8b-c).

The syntactic categorization analysis captures uniformly the adjectival property of an AN and the verbal property of a VN as well. Consider the examples in (9a-b).

- (9) a. boku-ga gengogaku-ga [_{AN} suki] da.
 I -Nom linguistics -Nom fond Cop
 'I like linguistics.'
 b. John-ga nihongo -o [_{VN} kenkyuu] si -ta.
 John-Nom Japanese-Acc researching do-Pst
 'John studied Japanese.'

Syntax processes a string of words in (9a) from left to right, basically as shown in (10a-c).

- (10) a. ?_{[?AP or ?NP} [_{NP} boku]-?ga [_{?A' or ?N'} [_{NP} gengogaku]-?ga [_{?A or ?N} suki]]]
 b. ?_{[VP} [_{?AP or ?NP} [_{NP} boku]-?ga [_{?A' or ?N'} [_{NP} gengogaku]-?ga [_{?A or ?N} suki]]] [_V da]]
 c. [_{VP} [_{AP} [_{NP} boku]-ga [_{A'} [_{NP} gengogaku]-ga [_A suki]]]] [_V da]] (dynamic categorization 2b)

At the initial point of left to right parsing, syntax constructs structure (10a), where the two nominative case markers attached to $[_{NP} \textit{boku}]$ and $[_{NP} \textit{gengogaku}]$ are not licensed. This is because the two nominative case markers are within the projection of an ambiguous category, the adjectival noun $[_{?A \text{ or } ?N} \textit{suki}]$ (see 1a/4a). Then, the parser builds structure (10b) by means of initial selection by the copula *da* (cf. Kageyama 1993, Ito and Sugioka 2002, etc.). As illustrated in (10c), at the last stage of left to right processing, the copula $[_V \textit{da}]$ triggers selection again, and selects the [+A] feature of the projection of $[_{?A \text{ or } ?N} \textit{suki}]$, dynamically turning it into an unambiguous [+A] category, $[_{AP} \dots \textit{suki}]$ (see categorization condition 2b). As a result, the two nominative case markers are properly licensed within the unambiguous [+A] projection in (10c), as desired (cf. Fukui 1986, among others).

Similarly, syntax processes a string of words in (9b) as follows.

- (11) a. $?[_{?VP \text{ or } ?NP} [_{NP} \textit{John}]-?ga [_{?V' \text{ or } ?N'} [_{NP} \textit{nihongo}]-?o [_{?V \text{ or } ?N} \textit{kenkyuu}]]]$
- b. $?[_{VP} [_{?VP \text{ or } ?NP} [_{NP} \textit{John}]-?ga [_{?V' \text{ or } ?N'} [_{NP} \textit{nihongo}]-?o [_{?V \text{ or } ?N} \textit{kenkyuu}]]] [_V \textit{si}]]]$
- c. $[_{VP} [_{VP} [_{NP} \textit{John}]-ga [_V' [_{NP} \textit{nihongo}]-o [_V \textit{kenkyuu}]]] [_V \textit{si}]]]$ (dynamic categorization 3b)

As shown in (11a), at the initial point of left to right parsing, neither the nominative case marker *-ga* nor the accusative case marker *-o* is licensed. This is so, because those case markers are contained within the projection of the fuzzy category $[_{?V \text{ or } ?N} \textit{kenkyuu}]$ (see 1b/5a). Then, the light verb $[_V \textit{si}]$ first selects the underspecified projection by $[_{?V \text{ or } ?N} \textit{kenkyuu}]$ as in (11b) (cf. Kageyama 1993, Ito and Sugioka 2002, Sugioka 2009, etc.), where neither *-ga* nor *-o* is properly licensed yet. At the subsequent point of left to right processing of words, the light verb $[_V \textit{si}]$ triggers selection once again, and selects the [+V] feature of the projection of the ambiguous category $[_{?V \text{ or } ?N} \textit{kenkyuu}]$, dynamically turning it into an unambiguous [+V] category (see categorization condition 3b). As a result, both the nominative case and the accusative case in (11c) are properly licensed within the VP (cf. Fukui 1986, among others). In this way, the proposed dynamic syntactic analysis captures uniformly the [+A] property of an adjectival noun and the [+V] property of a verbal noun, by means of the same two step selection mechanism (see 10b-c and 11b-c; cf. 7b-c and 8b-c).

Furthermore, the syntactic categorization analysis accounts for the unacceptability of (12a) and (12b) in a uniform manner.

- (12) a. *John-ga $[_{ANP} \textit{gengogaku-no} [_{AN} \textit{suki}]] \textit{da}$. (cf. Kuroda 1978)
 John-Nom linguistics -Gen fond Cop
 'John likes linguistics.'
- b. *John-ga $[_{VNP} \textit{nihongo -no} [_{VN} \textit{kenkyuu}]] \textit{si -ta}$. (cf. Kageyama 1993)
 John-Nom Japanese-Gen research do-Pst
 'John studied Japanese.'

The syntactic component necessarily fails to parse a string of words in (12a). Consider (13a-c).

- (13) a. $?[_{?AP \text{ or } ?NP} [_{NP} \textit{John}]-?ga [_{?A' \text{ or } ?N'} [_{NP} \textit{gengogaku}]-?no [_{?A \text{ or } ?N} \textit{suki}]]]$
- b. $?[_{VP} [_{?AP \text{ or } ?NP} [_{NP} \textit{John}]-?ga [_{?A' \text{ or } ?N'} [_{NP} \textit{gengogaku}]-?no [_{?A \text{ or } ?N} \textit{suki}]]] [_V \textit{da}]]]$
- c. $*[_{VP} [_{AP} [_{NP} \textit{John}]-ga [_A' [_{NP} \textit{gengogaku}]-*no [_A \textit{suki}]]] [_V \textit{da}]]]$ (dynamic categorization 2b)

At the initial point of left to right processing, the parser constructs representation (13a), where neither the nominative case *-ga* nor the genitive marker *-no* is licensed. This is because those two case particles are contained within the fuzzy, underspecified projection [_{?AP or ?NP} *suki*]. Then, the copula [_V *da*] selects initially the underspecified projection by the AN [_{?A or ?N} *suki*], and the parser builds the structure in (13b) (cf. Kageyama 1993, Ito and Sugioka 2002, etc.). As shown in (13c), at the final stage of parsing, the copula *da* triggers selection again, and selects the [+A] feature of the projection of the adjectival noun, dynamically turning it into the projection of an unambiguous [+A] category, due to categorization condition (2b). In (13c), it thus turns out that there is no possibility that the genitive case marker *-no* attached to [_{NP} *gengogaku*] is immediately dominated by an unambiguous [+N] projection, and (12b) is correctly ruled out.

Exactly in the same way, syntax necessarily fails to parse example (12b). Examine now (14a-c).

- (14) a. ?[_{?VP or ?NP} [_{NP} John]-?ga [_{?V' or ?N'} [_{NP} nihongo]-?no [_{?V or ?N} kenkyuu]]]
- b. ?[_{VP} [_{?VP or ?NP} [_{NP} John]-?ga [_{?V' or ?N'} [_{NP} nihongo]-?no [_{?V or ?N} kenkyuu]]] [_V si]]
- c. *[_{VP} [_{VP} [_{NP} John]-ga [_{V'} [_{NP} nihongo]-*no [_V kenkyuu]]] [_V si]] (dynamic categorization 3b)

Given a string of words in (12b), syntax first forms the underspecified representation in (14a), where the nominative case *-ga* and the genitive case *-no* within the fuzzy projection of the verbal noun [_{?V or ?N} *kenkyuu*] are not properly licensed. At the next point of left to right parsing, as shown in (14b), the light verb [_V *si*] first selects the fuzzy projection by the VN [_{?V or ?N} *kenkyuu*] (cf. Kageyama 1993, Ito and Sugioka 2002, Sugioka 2009, among others). Finally, the light verb *si* triggers selection again, and selects the [+V] feature of the projection of the verbal noun, dynamically turning it into the projection of an unambiguous [+V] category because of condition (3b). Here as well, there thus turns out to be no possibility that the genitive case marked NP, *nihongo-no*, is immediately dominated by the projection of a [+N] category. Hence, syntactic representation (14c) is also ruled out correctly, as desired. Note that to account for the unacceptability of (12a) and (12b), the proposed dynamic categorization analysis appeals again to the two step selection process (see 13b-c and 14b-c; cf. 7b-c and 8b-c; cf. 10b-c and 11b-c).

Importantly, the dynamic syntactic analysis also accounts for the data in (15a-c).⁶

- (15) a. [_{ANP} *kirei*] [_V *na*] *ko*
beautiful Cop girl ‘a girl who is beautiful’
- b. *[_{NP} *gakusei*] [_V *na*] *ko*
student Cop girl ‘a person who is a student’
- c. *[_{AP} *utukusi*] [_V *na*] *ko*
beautiful Cop girl ‘a girl who is beautiful’ (cf. Kageyama 1993, etc.)

As illustrated in (15b-c), one type of copula verb in Japanese, *-na*, cannot take either a noun phrase like [_{NP} *gakusei*] or an adjective phrase like [_{AP} *utukusi*]. As shown in (15a), however, the copula verb *-na* is allowed to select an adjectival noun phrase like [_{ANP} *kirei*]. The data in (15a-c) thus constitute valuable evidence that an adjectival noun like [_{AN} *kirei*], i.e. one type of fuzzy category in Japanese, is an independent, unique category which is distinct from a

⁶ I am very grateful to Yoko Sugioka, who brought to my attention the importance of data such as (15a-c) and (17a-c) for the dynamic categorization analysis proposed in Hoshi (2014, 2019a-c).

noun like [_N *gakusei*] or an adjective like [_A *utukusi*] (cf. Martin 1975, Kageyama 1993, Ito and Sugioka 2002, among others).

The syntactic categorization analysis explains the well-formedness of (15a) by appealing to the two step selection mechanism as follows:

(16) a. ?[_{VP} [_{?AP or ?NP} *kirei*] [_V *na*]]

b. [_{VP} [_{AP} *kirei*] [_V *na*]] (*dynamic categorization 2b*)

As in (16a), at the initial point of processing of a string of words in (15a), the copula *-na* first selects the underspecified category, i.e. the adjectival noun phrase [_{?AP or ?NP} *kirei*] (cf. Kageyama 1993, Ito and Sugioka 2002, etc.), and constructs its own [+V] projection. At the subsequent point of parsing, as shown in (16b), the copula verb *-na* triggers selection again, and does select the [+A] feature of the AN, dynamically turning the fuzzy category into the unambiguous [+A] projection, i.e. [_{AP} *kirei*], due to categorization condition (2b).

Here, the representation in (16b) might appear problematic for the dynamic categorization analysis, because the representation in (15c) and that in (16b) are identical in that the copula *-na* selects a [+A] projection in both of those two structures. In (15c), the copula *-na* selects the adjective phrase [_{AP} *utukusi*]. In (16b) for (15a), the same copula *-na* selects the adjective phrase [_{AP} *kirei*]. Recall that (15c) is unacceptable, whereas (15a) is acceptable.

The contrast between (15a) and (15c) is captured adequately, however, under the dynamic categorization analysis, because there is a crucial difference between (15a) and (15c). That is, for (15a), there is a parsing stage, i.e. (16a), where the copula *-na* can select successfully the underspecified, fuzzy category [_{?AP or ?NP} *kirei*], satisfying its initial selectional requirement. For (15c), on the other hand, there is no such processing stage where *-na* can select an adjectival noun, i.e. an AN. To repeat, under the dynamic syntactic analysis, the AN, [_{AN} *kirei*], is an underspecified, [+A] or [+N] category, initially (see 16a; see also 4a), and then gets updated as an unambiguous [+A] category by dynamic categorization condition (2b) (see 16b; see also 4c). The adjective [_A *utukusi*], on the other hand, can never be a fuzzy category, i.e. an adjectival noun, at any parsing stage (see 15c). This way, the contrast between (15a) and (15c) is successfully accounted for.

Exactly in the same way, the dynamic categorization analysis accounts for the acceptability of the data in (17a-c).

(17) a. [_{VNP} *kenkyuu*] [_V *si*]-ta.
researching do-Pst ‘Somebody studied something.’

b. *_{[NP} *tyoosyoku*] [_V *si*]-ta.
breakfast do -Pst ‘Somebody had breakfast.’

c. *_{[VP} *tabe*] [_V *si*]-ta.
eat do -Pst ‘Somebody ate.’ (cf. Kageyama 1993, etc.)

As in (17a), the light verb [_V *si*] can select a fuzzy [+V] or [+N] projection like [_{?VP or ?NP} *kenkyuu*]. As shown in (17b-c), however, the light verb cannot select an NP like [_{NP} *tyoosyoku*] or a VP like [_{VP} *tabe*]. The data in (17a-c) thus show that a verbal noun like [_{VN} *benkyoo*] is also a distinctive category which is different from either a noun like [_N *tyoosyoku*] or a verb like [_V *tabe*] (cf. Martin 1975, Kageyama 1993, Ito and Sugioka 2002, Sugioka 2009, among others).

Under the dynamic categorization analysis, the parser processes a string of words in (17a) as follows:

(18) a. $[_{VP} [_{VP \text{ or } ?NP} \textit{kenkyuu}] [_V \textit{si}]]$

b. $[_{VP} [_{VP} \textit{kenkyuu}] [_V \textit{si}]]$

(dynamic categorization 3b)

As in (18a), at the initial point of processing, the light verb $[_V \textit{si}]$ first selects the underspecified [+V] or [+N] projection, i.e. $[_{VP \text{ or } ?NP} \textit{kenkyuu}]$, satisfying its initial selectional requirement (cf. Kageyama 1993, Ito and Sugioka 2002, Sugioka 2009, etc.). As shown in (18b), at the next stage of parsing, the light verb $[_V \textit{si}]$ triggers selection once again, and does select the [+V] feature of the verbal noun, dynamically turning it into the unambiguous projection $[_{VP} \textit{kenkyuu}]$ by means of syntactic categorization condition (3b). As for (17b) and (17c), on the other hand, it is impossible for the light verb $[_V \textit{si}]$ to satisfy its initial selectional requirement by selecting a VN, a $[_{?V \text{ or } ?N} \dots]$ fuzzy category, at any stage of sentence processing. Hence, the contrast between (17a) and (17b-c) is also accounted for.

In this section, I have argued that in the lexicon, an adjectival noun like $[_{AN} \textit{suki}]$ has a disjunction of two options, [+A] or [+N], as in (19a); a verbal noun like $[_{VN} \textit{kenkyuu}]$ possesses a disjunction of two features, [+V] or [+N], as in (19b).

(19) a. $[_{?A \text{ or } ?N} \textit{suki}]$

b. $[_{?V \text{ or } ?N} \textit{kenkyuu}]$

The AN *suki* and the VN *kenkyuu* thus appear in the syntactic component initially as the fuzzy categories, $[_{?A \text{ or } ?N} \textit{suki}]$ and $[_{?V \text{ or } ?N} \textit{kenkyuu}]$.

Under the dynamics of language processing, categorization condition (2a) may turn the fuzzy category $[_{?A \text{ or } ?N} \textit{suki}]$ into the unambiguous noun $[_N \textit{suki}]$ as in (20a); condition (3a) may turn $[_{?V \text{ or } ?N} \textit{kenkyuu}]$ into the unambiguous noun $[_N \textit{kenkyuu}]$ as in (20b).

(20) a. $[_N \textit{suki}]$

b. $[_N \textit{kenkyuu}]$

On the other hand, depending on dynamic, syntactic environments, categorization condition (2b) may turn the underspecified category $[_{?A \text{ or } ?N} \textit{suki}]$ into the adjective $[_A \textit{suki}]$ as in (21a); condition (3b) may turn the fuzzy category $[_{?V \text{ or } ?N} \textit{kenkyuu}]$ into the verb $[_V \textit{kenkyuu}]$ as in (21b).

(21) a. $[_A \textit{suki}]$

b. $[_V \textit{kenkyuu}]$

Here, I have also attempted to clarify the nature of two step selection triggered by dynamic categorizers or updaters. That is, I have tried to show that dynamic categorizers such as Japanese case markers or the light verb $[_V \textit{si}]$ initially select an underspecified category like an AN or a VN (see 7b, 8b, 10b, 11b, 13b, 14b, 16a, and 18a), and then, select an unambiguous feature like [+N], [+A] or [+V] for dynamic categorization (see 7c, 8c, 10c, 11c, 13c, 14c, 16b and 18b). Such syntactic categorizers thus trigger selection twice dynamically in the course of left to right processing of a string of words; and the result of earlier selection vanishes at a later stage of sentence processing. The mind, therefore, checks the whole parsing process, not just the final structure, to compute the nature of each linguistic expression (see 15a vs 15c; see 17a vs 17c; Kempson et al. 2001, Cann et al. 2005, Kempson 2016, 2017, among others).

In the following section, I will attempt to show that the proposed dynamic categorization analysis is directly applicable to the Japanese light verb construction, based on Hoshi (2014, 2019b). At the same time, I will try to

clarify further how head-final languages such as Japanese construct dynamic categories and projections step by step in the course of left to right processing of a string of words.

3. Japanese Light Verb Construction (Hoshi 2014, 2019b)

(22a-b) are two instances of the light verb construction in Japanese⁷; (22a-b) are considered to be semantically identical.

(22) a. John-ga Mary-kara hooseki-no [_{VN} ryakudatu]-o [_V si]-ta.
 John-Nom Mary-from jewelry-Gen stealing -Acc do-Pst
 ‘John stole jewelry from Mary.’

b. ?John-ga Mary-kara hooseki-o [_{VN} ryakudatu]-o [_V si]-ta.
 John-Nom Mary-from jewelry-Acc stealing -Acc do-Pst

Notice that (22a-b) are similar in two significant respects: namely, i) (22a-b) involve the verbal noun [_{VN} *ryakudatu*], one type of fuzzy category in Japanese; ii) both (22a-b) involve two dynamic categorizers, i.e. the accusative case marker *-o* attached to the VN and the light verb [_V *si*] (see 3a-b). The difference between (22a-b) is: in (22a), the theme argument, *hooseki*, is marked by the genitive case marker *-no*; in (22b), on the other hand, none of the arguments taken by [_{VN} *ryakudatu*] is marked by the genitive case.

Given the important similarities between (22a-b), in this section, I present a dynamic categorization analysis of the Japanese light verb construction based on Hoshi (2014, 2019b). To highlight the significance of the dynamic syntactic analysis, however, I wish to review first Saito and Hoshi’s (2000) LF incorporation analysis of the light verb construction, and point out potential problems for their style of bottom-up structure building account.

Developing Grimshaw and Mester’s (1988) Argument Transfer analysis, Saito and Hoshi (2000) propose an LF incorporation analysis of the Japanese light verb construction, and assign the following derivation to (22a):

(23) a. [_{TP} [_{VP} John-ga [_V Mary-kara [_{NP} hooseki-no [_N ryakudatu]]-o [_V si]]] ta].
 b. [_{TP} [_{VP} John-ga [_V Mary-kara [_{NP} hooseki-no *t*_N]-o [_V [_N ryakudatu] [_V si]]]]] ta].
 |_____↑

At the initial point of the derivation in (23a), the nominal theta marker [_N *ryakudatu*] assigns its theme theta role to *hooseki* within its own [+N] projection in its base position. Assuming crucially that a predicate can assign a theta role at any point of the derivation even after movement (cf. Chomsky 1995), Saito and Hoshi (2000) propose that as illustrated in (23b), the nominal theta marker [_N *ryakudatu*] undergoes head movement, adjoins to the light verb [_V *si*], and then, assigns a source role to *Mary-kara* and an agent role to *John-ga* within the [+V] projection of the light verb in LF.

Similarly, Saito and Hoshi (2000) assign derivation (24a-b) to light verb construction (22b).

(24) a. [_{TP} [_{VP} John-ga [_V Mary-kara hooseki-o [_{NP} [_N ryakudatu]]-o [_V si]]] ta].

⁷ For various analyses of the Japanese light verb construction, see Grimshaw and Mester (1988), Kageyama (1993), Sato (1993), Dubinsky (1994, 1997), Matsumoto (1996), Saito and Hoshi (2000), among others. Example (22b) is slightly awkward, probably because of a violation of the ‘surface double-*o*’ constraint (see Harada 1973, Shibatani 1973, Kuroda 1978, Saito 1985, among others). In this paper, I put aside this minor complication.

- b. [_{TP} [_{VP} John-ga [_V Mary-kara hooseki-o [_{NP} *t*_N]-o [_V [_N ryakudatu] [_V si]]]]] ta].
 |_____↑

At the initial point of the derivation in (24a), the nominal theta marker [_N *ryakudatu*] does not assign any theta role to any of its arguments within its own [+N] projection in its base position. As illustrated in (24b), only after the LF head-adjunction to the light verb [_V *si*], the nominal theta marker [_N *ryakudatu*] discharges a theme role to *hooseki-o*, a source role to *Mary-kara*, and an agent role to *John-ga* within the [+V] projection of the light verb. Hence, for Saito and Hoshi (2000), the Japanese light verb construction is a construction which shows rather clearly that a predicate can assign a theta role freely at any point of the derivation (cf. Chomsky's 1981 Move α ; Saito 1985).

Though simple and clear, Saito and Hoshi's (2000) LF incorporation analysis does not seem to be free from problems. First and probably most importantly, there does not seem to be much independent evidence yet for Saito and Hoshi's (2000) main claim that a predicate can assign a theta role freely in the course of the derivation even after movement (cf. Frege's principle of compositionality; Chomsky 1965, 1981, 1986, 1995, etc.). Second, it is not entirely clear how Saito and Hoshi (2000) explain that (22a-b) are semantically the same. Their LF representation for (22a) is (23b), and the LF for (22b) is (24b). Apparently, (23b) and (24b) are quite different. A question thus arises as to what kind of meaning-calculation mechanism we need besides those two distinct LF representations to capture the semantic identity of (22a-b).

Third, like Grimshaw and Mester (1988), Saito and Hoshi (2000) consider the nominal theta marker like *ryakudatu* to be just a [+N] category (see structures 23a-b and 24a-b). That is, Saito and Hoshi (2000) do not recognize a VN as a unique category in Japanese, and overlook the fuzziness of a VN.⁸ Hence, example (12b), repeated here as (25), could pose a potential problem for Saito and Hoshi (2000).

- (25) *John-ga [_{VNP} nihongo -no [_{VN} kenkyuu]] si -ta. (cf. Kageyama 1993)
 John-Nom Japanese-Gen research do-Pst
 'John studied Japanese.' (= 12b)

Consider below the derivation in (26a-b) which Saito and Hoshi (2000) are likely to suggest for (25).

- (26) a. [_{TP} [_{VP} John-ga [_{NP} nihongo-no [_N kenkyuu]] [_V si] ta]
 b. [_{TP} [_{VP} John-ga [_{NP} nihongo-no *t*_N] [_V [_N kenkyuu] [_V si]]] ta]
 |_____↑

As in (26a), the nominal theta marker [_N *kenkyuu*] first assigns a theme role to *nihongo-no* within its own [+N] projection. As shown in (26b), after adjoining to the light verb [_V *si*], [_N *kenkyuu*] then assigns an agent role to *John-ga* within the [+V] projection of the light verb. Given that the genitive case marked theme argument *hooseki-no* is well-formed in structure (23b) on Saito and Hoshi's (2000) account, there does not seem to be any obvious reason why the genitive case marked theme *nihongo-no* is disallowed in (26b).

Fourth, it is not clear, either, how Saito and Hoshi (2000) type bottom-up structure building analysis accounts for the following predicate fronting data:

⁸ Following Martin (1975), Kageyama (1993), Ito and Sugioka (2002) and Sugioka (2009) do consider a verbal noun as a distinctive category in Japanese, and maintain that a verbal noun has a conjunction of two features, both [+V] and [+N]. In this paper, I, however, argue that a VN has a disjunction, not a conjunction, of two options, i.e. [+V] or [+N].

(27) a. [Mary-kara hooseki-no ryakudatu-o]_i John-ga t_i si -ta. (cf. 23a)
 Mary-from jewelry-Gen stealing -Acc John-Nom do-Pst

b. ?[Mary-kara hooseki-o ryakudatu-o]_i John-ga t_i si -ta.
 Mary-from jewelry -Acc stealing -Acc John-Nom do-Pst (cf. Kageyama 1993, Sato 1993)

In Saito and Hoshi's (2000) structure (23a) for (22a), crucially, [*Mary-kara hooseki-no ryakudatu-o*] is not a constituent; but [*Mary-kara hooseki-no ryakudatu-o*] is displaced as a constituent to the sentence-initial position in (27a). In their structure (24a) for (22b), crucially again, [*Mary-kara hooseki-o ryakudatu-o*] does not form a constituent, either; but it is placed as a constituent at the sentence-initial position in (27b). Hence, [*Mary-kara hooseki-no ryakudatu-o*] in (22a/27a) and [*Mary-kara hooseki-o ryakudatu-o*] in (22b/27b) are truly 'surprising' constituents for Saito and Hoshi (2000) (cf. Koizumi 1995, Takano 2002, etc.). A question thus arises as to if Saito and Hoshi (2000) can account for the nature of these preposed constituents adequately. The well-formedness of (27a-b) could be rather serious for Saito and Hoshi (2000), because if it turns out that these displaced constituents are not at all surprising, but standard constituents, it in turn implies that there is nothing peculiar about theta marking by the VN *ryakudatu* in Japanese light verb constructions (22a-b) and (27a-b), denying the very core of Saito and Hoshi's (2000) proposal (cf. Kageyama 1993, Sugioka 2009, etc.).

Fifth, only head-final languages such as Japanese and Korean with a fuzzy category, i.e. a VN, seem to have the type of light verb construction like (22a-b) and (27a-b). Saito and Hoshi (2000) do not comment on this observation, and thus, it is not clear how their type of bottom-up structure building analysis explains it.

There is certainly a possibility that these five potential problems indicate that we should revise and improve Saito and Hoshi (2000) style bottom-up structure building analysis of the light verb construction in some way. There is also a possibility, however, that the five problems mentioned above imply that it is indeed Saito and Hoshi's (2000) central claim about theta marking that is really problematic⁹ (cf. Grimshaw and Mester 1988, etc.), and thus, we need a fundamentally different approach to the Japanese light verb construction.

Below, based on Hoshi (2014, 2019b), I explore the latter possibility from the dynamic syntactic perspective, by paying special attention to i) one type of fuzzy category in Japanese, i.e. a verbal noun (VN), and ii) two dynamic categorizers, i.e. a case marker and the light verb [_v *su*] (see 22a-b and 27a-b). First, observe again Japanese light verb constructions (22a-b), repeated below as (28a-b).

(28) a. John-ga Mary-kara hooseki-no [_{VN} ryakudatu]-o [_v si]-ta. (= 22a)
 John-Nom Mary-from jewelry-Gen stealing -Acc do-Pst
 'John stole jewelry from Mary.'

b. ?John-ga Mary-kara hooseki-o [_{VN} ryakudatu]-o [_v si]-ta. (= 22b)
 John-Nom Mary-from jewelry-Acc stealing -Acc do-Pst

And recall again the similarities between (28a-b): i) both (28a-b) involve a fuzzy, or dynamic, category, [_{VN} *ryakudatu*]; ii) (28a-b) also involve two dynamic categorizers or updaters, i.e. the accusative case marker *-o* attached to the VN and the light verb [_v *si*]. The difference between (28a-b) is: in (28a), the theme argument of [_{VN} *ryakudatu*] is attached by the genitive case marker *-no*; in (28b), none of the arguments of the VN is marked by the genitive

⁹ Hoshi (1994) is based on the central proposal by Saito and Hoshi (2000), and I, therefore, encounter various, tough problems like the ones pointed out in the text. The reader is referred to Yumoto (2005) for more criticisms of Saito and Hoshi's (2000) analysis.

case.

Given dynamic categorization conditions (3a-b), the proposed analysis assigns roughly the following parsing process to Japanese light verb construction (28a):

- (29) a. $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{?V' \text{ or } ?N'} \text{hoooseki-?no } [_{?V \text{ or } ?N} \text{ryakudatu}]]]]]$
- b. $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{?V' \text{ or } ?N'} \text{hoooseki-?no } [_{?V \text{ or } ?N} \text{ryakudatu}]]-o]]]$
- c. $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{NP} \text{hoooseki-no } [_{N} \text{ryakudatu}]]-o]]$ (dynamic categorization 3a)
- d. $[_{VP} [_{VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{NP} \text{hoooseki-no } [_{N} \text{ryakudatu}]]-o]]$ $[_{V} \text{si}]]$
- e. $[_{VP} [_{VP} \text{John-ga } [_{V'} \text{Mary-kara } [_{N} \text{hoooseki-no } [_{N} \text{ryakudatu}]]-o]]$ $[_{V} \text{si}]]$ (dynamic categorization 3b)

At the first stage of left to right sentence processing, syntax processes a string of words, and builds the fuzzy projection in (29a), the head of which is a fuzzy category, $[_{?V \text{ or } ?N} \text{ryakudatu}]$. Here, neither the nominative case $-ga$, the postposition $-kara$, nor the genitive case $-no$ is licensed, because they are within the projection underspecified with respect to $[+V]$ or $[+N]$ (see 1b/5a). As shown in (29b), at the next processing stage, the accusative case marker $-o$, a dynamic categorizer, comes, and attaches to the second lowest projection, selecting initially the fuzzy $[_{?V' \text{ or } ?N'} \dots]$ projection. As in (29c), the accusative case marker then selects the $[+N]$ feature of the VN projection, turning it into an unambiguous $[+N]$ projection by means of dynamic categorization condition (3a). At this stage, the genitive case marker $-no$ turns out to be within the projection of $[+N]$ category, and is successfully licensed. After that, as in (29d), the light verb $[_{V} \text{si}]$, another syntactic updater, comes, and selects first the whole fuzzy projection by the VN *ryakudatu*, satisfying its initial selectional requirement. Then, as illustrated in (29e), the light verb $[_{V} \text{si}]$ triggers selection again, and selects $[+V]$ feature of the whole fuzzy projection, dynamically turning the underspecified projection into an unambiguous $[+V]$ projection through syntactic categorization condition (3b). Consequently, the nominative case marker $-ga$ and the postposition $-kara$ are properly licensed within the $[+V]$ projection, and the acceptability of (28a) is accounted for (cf. Saito and Hoshi's (2000) LF representation (23b) for (22a)).

The dynamic categorization analysis assigns the following parsing process to the Japanese light verb construction in (28b):

- (30) a. $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{?V' \text{ or } ?N'} \text{hoooseki-?o } [_{?V \text{ or } ?N} \text{ryakudatu}]]]]]$
- b. $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{?V' \text{ or } ?N'} \text{hoooseki-?o } [_{?V \text{ or } ?N} \text{ryakudatu}]]-o]]$
- c. $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{?V' \text{ or } ?N'} \text{hoooseki-?o } [_{N} \text{ryakudatu}]]-o]]$ (dynamic categorization 3a)
- d. $[_{VP} [_{VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{?V' \text{ or } ?N'} \text{hoooseki-?o } [_{N} \text{ryakudatu}]]-o]]$ $[_{V} \text{si}]]$
- e. $[_{VP} [_{VP} \text{John-ga } [_{V'} \text{Mary-kara } [_{V'} \text{hoooseki-o } [_{N} \text{ryakudatu}]]-o]]$ $[_{V} \text{si}]]$ (dynamic categorization 3b)

First, syntax parses a string of words as in (30a), and constructs the fuzzy projection whose head is the verbal noun $[_{?V \text{ or } ?N} \text{ryakudatu}]$. At this stage, neither the nominative case $-ga$, the postposition $-kara$, nor the accusative case $-o$ is licensed, because they are within the projection of the underspecified category. As shown in (30b), at the next stage, the accusative case marker $-o$ comes, and then, attaches to the lowest fuzzy projection, satisfying its initial

selectional requirement. As illustrated in (30c), the same accusative case marker triggers selection once again, and does select the [+N] feature of the VN *ryakudatu* as a dynamic categorizer. Because of this two step selection, the lowest fuzzy category is turned into an unambiguous [+N] category, [_N *ryakudatu*] (see categorization condition 3a). As in (30d), then, another dynamic categorizer, the light verb [_V *si*], comes, and selects the whole fuzzy category of the verbal noun *ryakudatu*, satisfying its first selectional requirement. Last, as in (30e), the light verb then selects the [+V] feature of the underspecified projection by [_{VN} *ryakudatu*]. At this final stage, the nominative case *-ga*, the postposition *-kara*, and the accusative case *-o* attached to the theme argument, *hooseki*, are all successfully licensed within the unambiguous [+V] projection. The well-formedness of light verb construction (28b) is thus also accounted for (cf. Saito and Hoshi's (2000) LF representation in (24b) for (22b)).

Notice here that under the dynamic categorization analysis, there is nothing special about theta marking by a VN like [_{?V or ?N} *ryakudatu*] (contra. Grimshaw and Mester 1988, Saito and Hoshi 2000, etc.). That is, under the proposed analysis, a predicate projects its semantic representation in its 'base' position (Frege's principle of compositionality; Chomsky 1995, etc.); thus, a predicate does not move to take any of its arguments. Consequently, we can obtain the same representation like the one in (31a) for Japanese light verb constructions (28a-b), (putting aside irrelevant details).

(31) a. [*John* ... [*Mary-kara* ... [*hooseki* ... [*ryakudatu*]]]] (cf. 29e and 30e)

In the simplified representation in (31a) for both (28a) and (28b), a predicate and its arguments are structurally arranged in a usual manner: structurally, the theme *hooseki* is the closest to the predicate *ryakudatu*; the source *Mary-kara* is the second closest to the predicate; the agent *John* is the least closest to *ryakudatu*.

For this very reason, the displaced constituents [*Mary-kara hooseki-no ryakudatu*]-*o* in (27a) and [*Mary-kara hooseki-o ryakudatu*]-*o* in (27b) are both 'single' constituents naturally formed under the dynamic syntactic analysis, as illustrated in (29a-e) and (30a-e); and those preposed constituents in (27a) and (27b) are assigned 'mixed category projections' (31b) and (31c), respectively.

(31) b. [_V *Mary-kara* [_N *hooseki-no* [_N *ryakudatu*]-*o*]]] (cf. 29e)

c. [_V *Mary-kara* [_V *hooseki-o* [_N *ryakudatu*]-*o*]]]] (cf. 30e)

In both (31b-c), the lower part of the projection is a [+N] projection, whereas the upper part is a [+V] projection (cf. Sugioka's (2009, p. 92, 27b-d) mixed category projection analysis of a related construction). Thus, under the proposed syntactic categorization analysis, these two constituents turn out to be not at all surprising, but just standard constituents. The acceptability of (27a-b) is thus expected by the dynamic categorization analysis. On the other hand, as I point out above, for Saito and Hoshi (2000) type bottom-up structure building analysis, the displaced constituents in (27a-b) are truly surprising. Furthermore, it does not seem to be possible for Saito and Hoshi (2000) to assign structures like the ones in (31b-c) to the preposed constituents in (27a-b). This is because representations in (31b-c) clearly violate X' Theory (Chomsky 1981, 1986, etc.), which is the basis of their bottom-up structure building analysis. In summary, unlike Saito and Hoshi's (2000) LF incorporation analysis (cf. Grimshaw and Mester 1988, etc.), the dynamic syntactic analysis of the Japanese light verb construction, therefore, does not suffer from any drawback in relation to theta marking or semantic interpretation/representation.

As a pleasing consequence, here, I would also like to show that the nature of the following related construction can also be accounted for rather naturally under the dynamic syntactic analysis (cf. Iida 1987, Miyagawa 1991, Kageyama 1993, Sugioka 2009, etc.; Grimshaw and Mester 1988, Hoshi 1994, Saito and Hoshi 2000, among others):

- (32) a. John-ga Mary-kara hooseki-no [_{VN} ryakudatu]-[_{AspN} tyuu],
 John-Nom Mary-from jewelry-Gen stealing - middle,
 ‘While John is/was stealing jewelry from Mary,’
- b. John-ga Mary-kara hooseki-o [_{VN} ryakudatu]-[_{AspN} tyuu],
 John-Nom Mary-from jewelry-Acc stealing - middle,

As in light verb constructions (28a-b), the fuzzy category [_{VN} *ryakudatu*] is used in (32a-b). Exactly like (28a-b), the difference between (32a-b) is: only the theme argument of the VN *ryakudatu* is marked by the genitive case *–no* in (32a); none of the arguments of [_{VN} *ryakudatu*] is marked by the genitive case in (32b). In (32a-b), however, the aspectual noun head *–[tyuu]* is used instead of the accusative case maker *–o* and the light verb [_V *su*] (cf. 28a-b).

To capture the parallels and the contrasts between (28a-b) and (32a-b), here, I suggest that the aspectual noun head *–[tyuu]* may update underspecified syntactic structure twice, not just once, as a dynamic categorizer in the course of left to right parsing of a string of words. That is, I propose that the morpheme *–[_{AspN} tyuu]*, as a dynamic categorizer, can first select [+N] feature of a verbal noun like a case marker (see morphological categorization condition 3a; cf. Sugioka 2009, p. 92, 27b-d), and then, as another type of dynamic categorizer, select [+V] feature of a verbal noun like the light verb [_V *su*] (see syntactic categorization condition 3b; cf. Kageyama 1993, p. 37, Sugioka 2009, p. 90).

The dynamic syntactic analysis thus suggests the following parsing process for (32a):

- (33) a. ?[_{?VP or ?NP} John-?ga [_{?V' or ?N'} Mary-?kara [_{?V' or ?N'} hooseki-?no [_{?V or ?N} ryakudatu]]]]
- b. ?[_{?VP or ?NP} John-?ga [_{?V' or ?N'} Mary-?kara [_{?V' or ?N'} hooseki-?no [_{?V or ?N} ryakudatu]]]-[_{AspN} tyuu]]]
- c. ?[_{?VP or ?NP} John-?ga [_{?V' or ?N'} Mary-?kara [_{NP} hooseki-no [_N ryakudatu]]]-[_{AspN} tyuu]]]
 (dynamic categorization 3a)
- d. ?[_{AspNP} [_{?VP or ?NP} John-?ga [_{?V' or ?N'} Mary-?kara [_{NP} hooseki-no [_N ryakudatu]]]] [_{AspN} tyuu]]
- e. [_{AspNP} [_{VP} John-ga [_{V'} Mary-kara [_N hooseki-no [_N ryakudatu]]]] [_{AspN} tyuu]] (dynamic categorization 3b)

At the initial stage of sentence processing, syntax builds the fuzzy projection in (33a) whose head is the verbal noun [_{?V or ?N} *ryakudatu*]. At this point, neither the nominative case *–ga*, the postposition *–kara*, nor the genitive case marker *–no* is licensed, because they are within the fuzzy projection. At the next stage, as in (33b), the aspectual noun head *–[tyuu]* comes, and selects the second lowest fuzzy projection, satisfying its initial selectional requirement. As shown in (33c), the aspectual noun head *–[tyuu]* then selects the [+N] feature of the underspecified projection exactly like a case marker, and turns it into an unambiguous [+N] projection due to dynamic categorization condition (3a) (cf. Sugioka 2009, p. 92, 27b-d). At this point, the genitive case *–no* is properly licensed within the unambiguous [+N] projection (see *12b/*25 vs. 22a/28a). As illustrated in (33d), in order to take a proper semantic scope, the aspectual noun head *–[tyuu]* then raises and selects the whole fuzzy projection by [_{VN} *ryakudatu*]. Then, as shown in (33e), the aspectual noun head triggers selection once again, and does select the [+V] feature of the fuzzy projection like the light verb [_V *su*], dynamically turning it into a [+V] projection due to condition (3b) (cf. Kageyama 1993, p. 37, Sugioka 2009, p. 90). Consequently, the nominative case marker *–ga* and the postposition *–kara* are properly licensed within the [+V] projection at this final stage. Under the proposed analysis, the well-formedness of example (32b) is accounted for exactly in the same manner.

Finally, let me summarize the core of the proposed dynamic categorization analysis in this section, based on (28a) and (32a). Syntax parses a string of words, and first constructs the following fuzzy projection for both (28a) and (32a):

(34) $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_{?V' \text{ or } ?N'} \text{hooseki-?no } [_{?V \text{ or } ?N} \text{ryakudatu}]]]]]$ (= 29a/33a)

Here, a predicate and its arguments are arranged in a usual way for a proper semantic interpretation: the theme *hooseki* is the closest to the VN predicate *ryakudatu*; the source *Mary-kara* is the second closest to the predicate; and the agent *John* is the least closest to *ryakudatu* (cf. Grimshaw and Mester 1988, Saito and Hoshi 2000, etc.). Presumably, at this early stage, the ‘basic’ semantic interpretation is guessed by a hearer.

Given the radically underspecified structure in (35), syntax is then forced to update or annotate the fuzzy representation step by step in the course of left to right processing of a string of words for (28a). As illustrated in (35), in (28a), the accusative case marker *-o* comes next, and selects the second lowest fuzzy projection, turning it into an unambiguous [+N] projection due to categorization condition (3a).

(35) $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_N \text{hooseki-no } [_N \text{ryakudatu}]]-o]]$ (= 29c)
(dynamic categorization 3a)

As shown in (36), at the next parsing stage, the light verb [_V *si*] comes, and selects the entire underspecified representation, turning the fuzzy projection into the [+V] projection due to condition (3b). As a consequence, at this stage, all the fuzzy categories successfully disappear.

(36) $[_{VP} [_{VP} \text{John-ga } [_V \text{Mary-kara } [_N \text{hooseki-no } [_N \text{ryakudatu}]]-o]]$ [_V *si*] (= 29e) (dynamic categorization 3b)

Exactly in the same way, given the fuzzy projection in (34), syntax is driven to update the underspecified structure gradually in the course of left to right parsing of a string of words for (32a). As shown in (37), in (32a), the aspectual noun head *-[tyuu]* then comes, and selects the second lowest fuzzy projection as a suffix like a case marker, turning it into an unambiguous [+N] projection due to morphological categorization condition (3a) (cf. Sugioka 2009, p. 92, 27b-d).

(37) $[_{?VP \text{ or } ?NP} \text{John-?ga } [_{?V' \text{ or } ?N'} \text{Mary-?kara } [_N \text{hooseki-no } [_N \text{ryakudatu}]]-[_{AspN} \text{tyuu}]]]$
(dynamic categorization 3a) (= 33c)

As illustrated in (38), in order to take a proper semantic scope, the aspectual noun [_{tyuu}] ‘middle/while’ then raises and selects the whole fuzzy projection by the VN *ryakudatu* like the light verb [_V *su*], dynamically turning it into an unambiguous [+V] projection due to syntactic categorization condition (3b) (cf. Kageyama 1993, p. 37, Sugioka 2009, p. 90). Consequently, at the processing stage in (38), all the underspecified categories vanish, as desired.

(38) $[_{AspNP} [_{VP} \text{John-ga } [_V \text{Mary-kara } [_N \text{hooseki-no } [_N \text{ryakudatu}]]]]] [_{AspN} \text{tyuu}]]]$
(dynamic categorization 3b) (= 33e)

As above, the similarities and the differences between light verb construction (28a) and *-[AspN tyuu]* construction (32a) are captured naturally by the dynamic categorization analysis. What plays significant roles under the proposed analysis is: i) the fuzziness of a VN, and ii) the dynamics of the left to right structural updates based on dynamic categorization conditions (3a-b) (cf. Kempson et al. 2001, Cann et al. 2005, Kempson 2016, 2017, etc.).

5. Conclusion

In this paper, based on Hoshi (2014, 2019a-c), I have proposed that adjectival nouns (ANs) and verbal nouns (VNs) in Japanese are fuzzy categories. That is, an AN has a disjunction of two features: [+A] or [+N]; a VN has a disjunction of two options: [+V] or [+N]. Furthermore, I have attempted to argue that Japanese, as a head-final language, displays a unique pattern where such a fuzzy category comes first and then, follows a syntactic updater, i.e. a head, which determines the nature of the fuzzy category by means of its two step selection, i.e. dynamic categorization (see 2a-b and 3a-b), step by step in the course of left to right processing of a string of words.

I have also proposed a dynamic categorization analysis for one of the well-known constructions in Japanese, i.e. the light verb construction, by paying special attention to one type of fuzzy category, i.e. a VN, and two dynamic categorizers involved, i.e. the accusative case marker *-o* and the light verb [_v *su*]. By doing so, I have tried to overcome the apparently serious problems that Saito and Hoshi (2000) type bottom-up structure building analysis cannot avoid having (cf. Grimshaw and Mester 1988, Hoshi 1994, etc.). Here, I have also attempted to show how the mind forms dynamically, categories and projections for head-final languages such as Japanese gradually in the course of left to right sentence processing.

If correct, the proposed analysis supports the foundational idea of Dynamic Syntax: underspecified, or fuzzy, syntactic representation gets updated step by step in the course of left to right parsing of a string of words (Kempson et al. 2001, Cann et al. 2005, Kempson 2016, 2017, among others).

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