Dynamic Categorization of Adjectival Nouns and Verbal Nouns: A Study of Fuzzy Categories[1]

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1. Introduction

How to analyze the nature of adjectival nouns (ANs) and verbal nouns (VNs) in Japanese has been a much debated point (Kuno 1973, Martin 1975, Kuroda 1978, 1992, Grimshaw and Mester 1988, Kageyama 1993, Sato 1993, Matsumoto 1996, Uehara 1998, Saito and Hoshi 2000, Croft 2001, Ito and Sugioka 2002, Hoshi 2014, etc.).

In the following section, I will show some 'fuzzy' properties of ANs and VNs in Japanese. To account for the fuzziness of the two categories, in section 3, I will attempt to suggest a 'dynamic categorization' analysis, by adopting the core idea of Dynamic Syntax (Kempson et al. 2001, Cann et al. 2005; cf. Hawkins 1990, 1994, 2004, 2014, Aarts et al. 2004, Fanselow et al. 2006, Aarts 2007, among others). In section 4, I will conclude the discussion of this paper.

2. Adjectival Nouns and Verbal Nouns (Martin 1975, Kageyama 1993, etc.)

Let us consider first the nature of adjectival nouns in Japanese. Examples of a Japanese AN are given in (1).

(1) **adjectival noun (AN):** daitan 'bold/boldness,' genki 'well/wellness,' kirei 'beautiful/beauty,' simpai 'worried/worry,' sizuka 'quiet/quietness,' suki 'fond/ fondness,' etc.

As shown in (2a),

(2) a. Mary-wa **[A utukusi]-i** / **-*da.**
        Mary-Top   beautiful-Prs/-*Cop.
        'Mary is beautiful.'

    b. Mary-wa **[N gakusei]-*i** / **-da.**
        Mary-Top   student -*Prs/-Cop
        'Mary is a student.'

Japanese adjectives like *utukusi* 'beautiful' can be attached by the present tense marker –*i*. The adjectives, however, cannot be attached by the copula –*da*. On the other hand, as shown in (2b), Japanese nouns such as

gakusei 'student' can be attached by the copula -*da*, but cannot be suffixed by the tense marker –*i*.
Observe in (3)

(3)   Mary-wa **[AN kirei]   -*i** /**da.** (cf. 2b)
      Mary-Top   beautiful-*Prs/Cop
      'Mary is beautiful.'

that the adjectival noun (AN) *kirei* 'beautiful' in (3) parallels the noun (N) *gakusei* in (2b), and differs from the adjective (A) *utukusi* in (2a): both [A *kirei*] and [N *gakusei*] can be suffixed by the copula –*da*, but cannot be attached by the present tense marker –*i* (cf. 2a).

Furthermore, like nouns, adjectival nouns can be suffixed by Case markers such as the Nominative Case marker –*ga*. This is shown below:

(4) a. **[N gakusei]-ga**   ki -ta.
         Student -Nom come-Pst
         'A student came.'

    b. **[AN suki] -ga**   kooz-i-te,   John-wa
         fondness   -Nom rise - -Gerund, John-Top

         mise-made dasi -ta.
         store-even open-Pst
         '(lit.) Because his fondness rose, John even opened a store.'

In (4a), the noun *gakusei* is attached by the Nominative Case marker –*ga*. In the same way, the adjectival noun *suki* is suffixed by –*ga* in (4b).

In this respect as well, adjectival nouns differ from adjectives. Observe below:

(5) a. anata-no **[AN kirei] -o**   ooens -i-masu.[2]
         you -Gen   beauty-Acc support- -Prs
         'We will support your beauty.'

    b. *anata-no **[A utukusi] -o**   ooens -i-masu.
         you-Gen   beautiful -Acc support- -Prs
         'We will support your beauty.'

unlike adjectival nouns and nouns, Japanese adjectives

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cannot be attached by Case particles. Namely, in (5a), the adjectival noun *kirei* is attached by the Accusative Case marker -*o*, and (5a) is acceptable in Japanese. Similarly, in (5b), the adjective *utukusi* is marked by the Accusative Case marker. (5b) is, however, unacceptable.

Adjectival nouns, however, do not parallel nouns in Japanese completely: there are important differences between these two categories as well. As seen in (6a-b),

(6) a. [N **gakusei]-no** [N hon]
    student -Gen book
    'a student's book'

   b. [N **gakusei]-*na** [N hito]
    student -Cop person
    'a person who is a student'

when a noun like *gakusei* 'student' modifies another noun, the modifying noun must be suffixed by the Genitive Case marker –*no* in Japanese (see 6a). In (6b), the noun *gakusei* cannot be marked by –*na*, an inflected form of a copula.

In contrast, observe below

(7) a. [AN **kirei**] -**no** [N riyuu]
    beauty-Gen reason
    'beauty's reason'

   b. [AN **kirei**] -**na** [N riyuu]
    beautiful-Cop reason
    'a reason why somebody is beautiful'

that as in (7a), when an adjectival noun like *kirei* 'beautiful/beauty' modifies a noun, it can be attached by the Genitive Case marker –*no*.[3] However, as shown in (7b), [AN *kirei*] can also be marked by –*na*, an inflected form of a copula for an adjectival noun (cf. 6a-b).

Observe below that adjectival nouns are different not only from nouns, but also from adjectives in this respect:

(8) a. [A **utukusi]-*no** [N ko]
    beautiful-*Gen girl
    'a beautiful girl'

   b. [A **utukusi]-*na** [N ko]
    beautiful-*Cop girl
    'a beautiful girl'

   c. [A **utukusi]-i** [N ko]
    beautiful-Prs girl

'a beautiful girl'

when adjectives like *utukusi* 'beautiful' in Japanese modify a noun, it cannot be attached by the Genitive Case marker –*no* (see 8a) or cannot be attached by an inflected form of the copula –*na* (see 8b). Instead, such adjectives must be marked by tense markers such as [Prs *i*] (see 8c).

Moreover, adjectival nouns contrast with nouns in the following respect:

(9) a. John-ga [NP gengogaku-**no** [N **gakusei]]**-da.
    John-Nom linguistics -Gen student -Cop
    'John is a student of linguistics.'

   b. *John-ga [ANP gengogaku-**no** [AN **suki]]**
    John-Nom linguistics -Gen fond

    -da. (cf. Kuroda 1978)
    -Cop
    'John is fond of linguistics.'

(9a) is well-formed, whereas (9b) is not. The contrast shows the following: as in (9a), the argument of the noun *gakusei*, i.e. *gengogaku* 'linguistics,' is marked by the Genitive Case marker –*no*. As shown in (9b), however, the internal argument of the adjectival noun *suki*, i.e. *gengogaku*, cannot be marked by the Genitive Case –*no*.

In this respect, adjectival nouns in fact parallel adjectives: both of these two categories license an internal argument by means of the Nominative Case marker –*ga*, not with the Genitive Case marker –*no* (cf. 9a).

(10) a. boku-ga mizu -**ga** [A **hosi]**-i.
    I -Nom water-Nom want-Prs
    'I want water.'

   b. boku-ga gengogaku-**ga** [AN **suki]**-da.
    I -Nom linguistics -Nom fond -Cop
    'I like linguistics.'

(10a) and (10b) are both acceptable. Namely, in (10a), the internal argument of the adjective *hosi* 'want' is attached by the Nominative Case marker (cf. Kuno 1973, etc.), and [NP *mizu*]-*ga* in (10a) is licensed as Nominative Object. In (10b), exactly in the same way, the internal argument of the adjectival noun *suki*, i.e. *gengogaku-ga* 'linguistics-Nom,' is licensed as Nominative Object.

In short, the data from (2) to (10) show that Japanese adjectival nouns have some properties in

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[3] (7a) might sound slightly odd out of context, but the example below sounds quite acceptable.
(i) [anata-no [AN kirei]] -no riyuu] -o osie-te kudasai.
   You –Gen beauty -Gen reason -Acc tell - please
  '(Lit.) Please tell us your beauty's reason.'

common with nouns, but not with adjectives (see 2b, 3, and 4a-b; 2a and 5b); adjectival nouns have other properties in common with adjectives, but not with nouns (see 10a-b; 9a-b); and adjectival nouns have their own unique properties (6a-b vs 7a-b vs. 8a-c). Given this, it does not seem to be possible to analyze Japanese adjectival nouns uniformly as nouns (see 7a-b, 9a-b, and 10a-b); or uniformly as adjectives (see 2a, 3, 4b, 5a-b, 7a-b, and 8a-c); or uniformly as a mixed category of both [+N] and [+V] features (see 3, 7b, and 9a-b). A question thus arises as to how we should explain these apparently 'fuzzy' characteristics of adjectival nouns in Japanese in a principled manner (cf. Aarts et al. 2004, Fnaselow et al. 2006, Aarts 2007, etc.).

Let us examine next the properties of verbal nouns (VNs) in Japanese. (11) shows examples of a Japanese VN.

(11) **verbal noun (VN)**: benkyoo 'studying,' handan 'judging,' keikoku 'warning,' kenkyuu 'research,' ryakudatu 'stealing,' syokuzi 'eating,' syutyoo 'claiming,' zyooto 'giving,' etc.

Observe first that verbal nouns are similar to nouns in Japanese. This is shown below:

(12)a. **[N gakusei]-o** hometatae-ta.
    student -Acc praise -Pst
    'We praised students.'

  b. **[VN kenkyuu] -o** si -ta.
     researching-Acc do-Pst
    'We carried out research.'

in (12a), the noun *gakusei* 'student' is attached by the Accusative Case marker *–o*. Similarly, in (12b), the verbal noun *kenkyuu* 'researching' is marked by the Accusative Case marker.

Japanese VNs have further similarities with Ns, as illustrated in (13a-b).

(13)a. [NP gengogaku**-no** [N **gakusei**]]-ga ki -ta.
    linguistics -Gen student -Nom come-Pst
    'A student of Japanese came.'

  b. [VNP John**-no** nihongo **-no** [VN **kenkyuu**]]
    John-Gen Japanese-Gen researching

    -ga subarasi-i.
    -Nom fantastic-Prs
    'John's research of Japanese is fantastic.'

In (13a), the argument of the noun *gakusei*, i.e. *gengogaku* 'linguistics,' is attached by the Genitive Case marker *–no*. In (13b), both the external argument and the internal argument of the verbal noun *kenkyuu*, i.e. *John* and *nihongo*, are also attached by the Genitive

Case *-no*. Japanese verbal nouns in (12b) and (13b) thus appear to have nominal properties.

Interestingly, however, the Japanese verbal noun *kenkyuu* in (14b) displays verbal properties.

(14)a. John**-ga** nihongo **-o** [V **manan**]-da (koto)
    John-Nom Japanese-Acc **study** -Pst (fact)
    'John studied Japanese.'

  b. John**-ga** nihongo **-o** [VN **kenkyuu**] -s -i-ta.
    John-Nom Japanese-Acc researching-do- -Pst
    'John researched Japanese.'

As shown in (14a), in Japanese, the external argument of a transitive verb is normally marked by the Nominative Case *–ga*; the internal argument of a transitive verb is usually attached by the Accusative Case marker *–o*. Observe in (14b) that exactly in the same way, the external argument of the verbal noun *kenkyuu*, i.e. *John*, is attached by the Nominative Case *–ga*; the internal argument of [VN *kenkyuu*] is marked by the Accusative Case particle *–o*.

Significantly, the following data indicate that the VN *kenkyuu* in (13b) has [+N] properties, and lacks [+V] properties; and the VN *kenkyuu* in (14b) has verbal properties, crucially lacking nominal properties.

(15)a. *[VNP John**-ga** nihongo **-o** [VN **kenkyuu**]]
      John-Nom Japanese-Acc researching

    -ga subarasi-i. (cf. 13b)
    -Nom fantastic-Prs
    'John's research of Japanese is fantastic.'

  b. *John-ga [VNP nihongo **-no** [VN **kenkyuu**]]
     John-Nom Japanese-Gen researching

    -si -ta. (cf. 14b)
    -do-Pst
    'John studied Japanese.'

Namely, in (15a), the external argument of [VN *kenkyuu*] is attached by the Nominative Case marker *–ga*; the internal argument of the verbal noun is marked by the Accusative Case *–o*; and example (15a) results in unacceptability (cf. 13b). In (15b), in contrast, the internal argument of [VN *kenkyuu*] is attached by the Genitive Case marker *–no*, and (15b) turns out to be ill-formed (cf. 14b). Consequently, the contrast between (13a) and (15a) seems to show that the verbal noun *kenkyuu* in these examples has only [+N] features, lacking [+V] features; and the difference between (13b) and (15b) appears to indicate that [VN *kenkyuu*] in these examples have [+V] properties, lacking [+N] properties.

Finally, let us see that Japanese verbal nouns have unique morphological properties, which neither nouns nor verbs have. As illustrated in (16a),

(16)a. **[ᵥₙ kenkyuu]] -si** -ta
　　　researching-do-Pst
　　　'Somebody studied something'

　b. *[ₙ **tyoosyoku]]-si** -ta
　　　breakfast　　-do-Pst
　　　'Somebody had breakfast.'

　c. *[ᵥ **tabe]]-si** -ta
　　　eat　　-do-Pst
　　　'Somebody ate.'

the VN *kenkyuu* is attached by the light verb *su* 'do.' In contrast, as in (16b-c), neither the noun *tyoosyoku* 'breakfast' nor the verb *tabe* 'eat' can be suffixed by the light verb *su*.

　　Similarly, as shown in (17a-c),

(17)a. **[ᵥₙ kenkyuu]]-deki**-ru
　　　research　-can -Prs
　　　'be able to research'

　b. *[ₙ **tyoosyoku]]-deki**-ru
　　　breakfast　　-can -Prs

　c. *[ᵥ **tabe]]-deki**-ru
　　　eat　　-can -Prs

the verbal suffix *-deki* 'be able to' can attach to verbal nouns such as *kenkyuu*, but cannot attach either to a noun like *tyoosyoku* or to a verb like *tabe*.

　　In conclusion, Japanese verbal nouns have special properties very similar to those of Japanese adjectival nouns. That is, verbal nouns in Japanese display nominal properties, not verbal properties, in some grammatical contexts (see 12a-b, 13a-b, and 15a); in some other contexts, Japanese verbal nouns show verbal properties, not nominal properties (see 14a-b and 15b); furthermore, Japanese verbal nouns display their own unique properties in other contexts (see 16a-c and 17a-c). Importantly, as in the case of Japanese adjectival nouns, it does not appear to be possible to analyze Japanese verbal nouns uniformly as nouns (see 14a-b, 15b, 16a vs. 16b, and 17a vs. 17b); or uniformly as verbs (see 12a-b, 13a-b, 15a, 16a vs. 16c and 17a vs. 17c); or uniformly as a dual category of both [+V] and [+N] features (see 15a-b, 16a-c, and 17a-c).

　　The apparent parallelism between adjectival nouns and verbal nouns in Japanese does not seem to be accidental, and a question thus arises as to how we should capture the apparent 'fuzziness' of both adjectival nouns and verbal nouns in Japanese in a principled and consistent manner (cf. Aarts et al. 2004, Fanselow et al. 2006, Aarts 2007, etc.). By attempting to answer this question, we might be able to deepen our understanding of the nature of Japanese, and at the same time, the deep nature of language in general. In the

following section, I would like to suggest a 'dynamic categorization' analysis to capture the nature of Japanese ANs and VNs, by heavily relying on the insight provided by Dynamic Syntax proposed by Kempson et al. (2001), Cann et al. (2005), among others (cf. Hawkins 1990, 1994, 2004, 2014; cf. Aarts et al. 2004, Fanselow et al. 2006, Aarts 2007, etc.).

3. Dynamic Categorization of ANs and VNs (cf. Hoshi 2014)

　　Here, I would like to suggest that the dynamics of left to right parsing of a string of words might provide an adequate way to account for the nature of Japanese ANs and VNs (cf. Hoshi 2014, etc.). To be more precise, first, I would like to suggest the following:

(18)　Morphology and syntax parse a string of words from left to right separately.

In other words, morphology and syntax are two independent components, and these two components do not interfere with each other's left to right processing of a string of words (cf. Jackendoff 1997, Culicover and Jackendoff 2005, Yumoto 2005, among others).
　　Second, I wish to suggest that as in (19a-b),

(19)a.　[ₐ ₒᵣ ₙ *suki*]
　b.　[ᵥ ₒᵣ ₙ *kenkyuu*]

the adjectival noun like *suki* 'fond/fondness' is stored in the lexicon as a categorially underspecified category with respect to [+A] or [+N] as in (19a); the verbal noun like *kenkyuu* 'researching' is listed in the lexicon as another fuzzy category regarding [+V] or [+V] as in (19b).
　　Furthermore, I would like to suggest that these two types of categorially underspecified categories, ANs and VNs, turn to an unambiguous category like [+A], [+V] or [+N] in the course of left to right processing of a string of words in syntax as follows:

(20)a.　When a Case marker *selects*/attaches to the projection of an adjectival noun like [ₐ ₒᵣ ₙ *suki*] in syntax, the Case marker turns the AN projection into an unambiguous N projection in the syntactic component.
　b.　When a copula *selects* the projection of an adjectival noun like [ₐ ₒᵣ ₙ *suki*] in syntax, the copula turns the AN projection into an unambiguous A projection in the syntactic component.

That is, as in (20a), a Case marker turns an underspecified AN projection into a nominal projection by its *selection* in syntax; and as in (20b), a copula turns an ambiguous AN projection into an adjectival

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projection by its *selection* in the dynamics of left to right parsing in the syntactic component.

Likewise,

(21)a. When a Case marker *selects*/attaches to the projection of a verbal noun like [$_{V \text{ or } N}$ *kenkyuu*] in syntax, the Case marker turns the VN projection into an unambiguous N projection in the syntactic component.

b. When a verb like the light verb *su* 'do' *selects* the projection of a verbal noun like [$_{V \text{ or } N}$ *kenkyuu*] in syntax, the verb turns the VN projection into a unambiguous V projection in the syntactic component.

Namely, as in (21a), a Case marker turns a fuzzy VN projection into a nominal projection by its *selection* in syntax (cf. 20a); and as in (21b), verbs such as the light verb *su* turns an underspecified VN projection into a verbal projection by its *selection* in the course of left to right processing in syntax (cf. 20b).

To illustrate how the proposed 'dynamic categorization' analysis accounts for the nature of Japanese ANs and VNs in a uniform way, let us consider first (5a) and (13b). (5a) and (13b) are repeated here as (22a) and (22b).

(22)a. [$_{ANP}$ anata-**no** [$_{AN}$ **kirei**]]-**o** ooens
    you -Gen   beauty -Acc support

    -i-masu. (= 5a)
    - -Prs
    'We will support your beauty.'

b. [$_{VNP}$ John-**no** nihongo **-no** [$_{VN}$ **kenkyuu**]]
    John-Gen Japanese-Gen   researching

    -ga subarasi -i. (= 13b)
    -Nom fantastic-Prs
    'John's research of Japanese is fantastic.'

Given the strings of words in (22a-b), morphology analyzes each word from left to right independently of syntax, roughly as follows:

(23)a. [$_N$ anata]-no [$_{A \text{ or } N}$ kirei]-o [$_V$ ooses]-i-masu. (for 22a)

b. [$_N$ John]-no [$_N$ nihongo]-no [$_{V \text{ or } N}$ kenkyuu]-ga [$_A$ subarasi]-i. (for 22b)

in (23a), from left to right, [$_N$ *anata*] is attached by the Genitive Case maker -*no*, the adjectival noun [$_{A \text{ or } N}$ *kirei*] by the Accusative Case marker -*o*, and [$_V$ *oosens*] by the tense marker (see 19a). In (23b), from left to right, both [$_N$ *John*] and [$_N$ *nihongo*] are attached by the Genitive Case marker, and the verbal noun [$_{V \text{ or } N}$

kenkyuu] by the Nominative Case marker -*ga*, and [$_A$ *subarasi*] by the present tense marker [$_T$ *i*] (see 19b). Consequently, morphology judges (23a) and (23b) are both well-formed.

Syntax, on the other hand, parses the string of words in (22a) from left to right independently of morphology, as follows:

(24)a. ?[$_{AP \text{ or } NP}$ [$_{NP}$ anata]-**?no** [$_{A \text{ or } N}$ kirei]]

b. [^{NP} [$_{NP}$ anata]-**no** [$_N$ kirei]]-**o** …..

as in (24a), at the initial point of the left to right parsing, the adjectival noun [$_{A \text{ or } N}$ *kirei*] projects an underspecified phrase with respect to [+A] or [+N] (see 19a). Hence, the Genitive Case marker –*no* attached to [$_{NP}$ *anata*] cannot be contained within any N projection in (24a), and thus, the Genitive Case feature is not licensed properly in (24a) (cf. Saito 1982). As shown in (24b), however, the Accusative Case marker –*o* then *selects* and attaches to the projection of the adjectival noun phrase, and turns the fuzzy category to the unambiguous [+N] projection (see 20a). Due to this dynamic category change in syntax, the Genitive Case marker –*no* attached to [$_{NP}$ *anata*] is now properly licensed within the N projection in (24b), and subsequently, the entire string of words in (23a) is successfully parsed in the syntactic component.

Similarly, syntax processes the string of words in (22b) from left to right dynamically as in (25a-b).

(25)a. ?[$_{VP \text{ or } NP}$ [$_{V' \text{ or } N'}$ [$_{NP}$ John]-**?no** [$_{V' \text{ or } N'}$ [$_{NP}$ nihongo]-**?no** [$_{V \text{ or } N}$ kenkyuu]]]]

b. [^{NP} [$_{NP}$ John]-**no** [$_{N'}$ [$_{NP}$ nihongo]-**no** [$_N$ kenkyuu]]]-**ga** …..

At first, syntax parses the string of words in (22b) as in (25a), where the verbal noun [$_{V \text{ or } N}$ *kenkyuu*] projects an underspecified projection regarding [+V] or [+N] (see 19b). Due to the categorial fuzziness of the verbal noun, the Genitive Case maker –*no* attached to both [$_{NP}$ *John*] and [$_{NP}$ *nihongo*] cannot be properly licensed within an N projection in (25a). At the next point of the left to right processing of the st]ring of words, however, the Nominative Case marker –*ga selects* and attaches to the projection of the verbal noun [$_{V \text{ or } N}$ *kenkyuu*] and turns the ambiguous projection to the unambiguous [+N] projection as illustrated in (25b) (see 21a). As a result, thanks to the dynamic category change triggered by the Nominative Case marker –*ga*, the two Genitive Case markers in (25b) are properly licensed within the unambiguous [+N] projection of *kenkyuu* in the syntactic component.

Let us consider next (10b) and (14b) under the dynamic categorization analysis of ANs and VNs in Japanese. (10b) and (14b) are repeated below as (26a)

and (26b).

(26)a. boku**-ga** gengogaku**-ga** [AN **suki**]
    I -Nom linguistics -Nom fond

    -da. (= 10b)
    -Cop
    'I like linguistics.'

b. John**-ga** nihongo **-o** [VN **kenkyuu**]
    John-Nom Japanese-Acc researching

    -s -i-ta. (= 14b)
    -do- -Pst
    'John studied Japanese.'

The morphological component analyzes each word in (26a-b) left to right independently of syntax, as follows:

(27)a. [N boku]-ga [N gengogaku]-ga [A or N suki]-[V da] (for 26a)

b. [N John]-ga [N nihongo] -o [V or N kenkyuu]-[V s]-i-[T ta] (for 26b)

in (27a), both [N *boku*] and [N *gengogaku*] are attached by the Nominative Case particle –*ga*, and the adjectival noun [A or N *suki*] by the copula [V *da*] (see 19a). In (27b), [N *John*] is attached by the Nominative Case marker, [N *nihongo*] by the Accusative Case marker, and [V or N *kenkyuu*] by the light verb [V *s*], etc. (see 19b). Hence, the morphological component judges both (27a) and (27b) to be morphologically well-formed.

The syntactic component, on the other hand, parses the strings of words in (26a-b) separately. More specifically, syntax processes the string of words in (26a) as in (28a-b).

(28)a. ?[AP or NP [NP boku]**-?ga** [A' or N' [NP gengogaku]-**?ga** [A or N suki]]]

b. [VP [AP [NP boku]**-ga** [A' [NP gengogaku]**-ga** [A suki]]] **[V da]**]

Initially, syntax processes the words in (27a) from left to right as in (28a), where the Nominative Case marker –*ga* is attached to both [NP *boku*] and [NP *gengogaku*]. Because the category of the adjectival noun like *suki* is undetermined with respect to [+A] or [+N] in the lexicon (see 19a), the two Nominative Case markers are not yet licensed in (28a). As in (28b), however, at the next point of the parsing, the copula [V *da*] *selects* the categorially underspecified projection of [A or N *suki*] and turns it into the fully specified [+A] projection (see 20b). Due to this category change in syntax, the two Nominative Case markers are properly licensed in a

usual manner at a later point of the left to right parsing (cf. Fukui 1986, etc.).

Likewise, syntax parses the string of words in (26b) as illustrated in (29a-b).

(29)a. ?[VP or NP [NP John]**-?ga** [V' or N' [NP nihongo]**-?o** [V or N kenkyuu]]]

b. [VP [VP [NP John]**-ga** [V' [NP nihongo]**-o** [V kenkyuu]]]**-[V s]**] …..

As in (29a), at the initial point of the parsing, neither the Nominative Case marker –*ga* nor the Accusative Case marker –*o* is properly licensed. This is because the categorial feature of the verbal noun *kenkyuua* is not fixed with respect to [+V] or [+N] (see 19b). As shown in (29b), however, at the later point of the left to right processing of words, the light verb *su* 'do' *selects* the projection of [V or N *kenkyuu*], and turns the projection of the fuzzy category VN to an unambiguous [+V] projection (see 21b). Thanks to the dynamic categorization, both the Nominative and Accusative Case markers are successfully licensed as usual at a later point of the parsing.

Let us consider now the ill-formedness of (9b) and (15b). (9b) and (15b) are repeated below as (30a) and (30b).

(30)a. *John-ga [ANP gengogaku**-no** [AN **suki**]]
    John-Nom linguistics -Gen fond

    -da. (= 9b) (cf. Kuroda 1978)
    -Cop
    'John is fond of linguistics.'

b. *John-ga [VNP nihongo **-no** [VN **kenkyuu**]]
    John-Nom Japanese-Gen researching

    -si -ta. (= 15b)
    -do-Pst
    'John studied Japanese.'

Given the strings of words in (31a-b) for (30a-b), morphology judges (31a-b) to be both well-formed in the morphological component.

(31)a. [N John]-ga [N gengogaku]-no [A or N suki]-[V da].

b. [N John]-ga [N nihongo]-no [V or N kenkyuu]-[V si]-[T ta].

In (31a), the Nominative Case marker –*ga* is attached to the noun *John*, the Genitive Case maker to the noun *gengogaku*, and the copula *da* to the adjectival noun [A or N *suki*] (see 19a). In (31b), the Nominative Case is attached to [N *John*], the Genitive Case to [N *nihongo*],

and the light verb *su* to the verbal noun [$_{V \text{ or } N}$ *kenkyuu*], etc. (see 19b). All the words in (31a-b) are thus well-formed.

The syntactic parser, however, encounters exactly the same problem for (30a) and (30b), which accounts for the ill-formedness of (30a-b) in a uniform way. Examine first (32a-b) for (30a).

(32)a. ?[$_{AP \text{ or } NP}$ [$_{NP}$ John]-**?ga** [$_{A' \text{ or } N'}$ [$_{NP}$ gengogaku] -**?no** [$_{A \text{ or } N}$ **suki**]]]

b. *[[$_{AP}$ [$_{NP}$ John]-**ga** [$_{A'}$ [$_{NP}$ gengogaku]-***no** [$_{A}$ **suki**]]] [$_{V}$ **da**]]

At the initial point of the parsing in (32a), [$_{NP}$ *John*] and [$_{NP}$ *gengogaku*], i.e. the two arguments taken by the adjectival noun [$_{A \text{ or } N}$ *suki*], are marked by the Nominative Case and the Genitive Case, respectively. Because the adjectival noun is underspecified with respect to [+A] or [+N] (see 19a), both of these Case features are not licensed yet in (32a). As illustrated in (32b), however, at the next point of the left to right processing, the copula [$_{V}$ *da*] *selects* the projection of [$_{A \text{ or } N}$ *suki*], and turns the fuzzy category into the unambiguous [+A] projection (see 20b). In the configuration in (32b), there is no [+N] projection constructed which directly contains [$_{NP}$ *gengogaku*]. It is thus impossible for the Genitive Case to be successfully licensed. Hence, (30a) necessarily results in unacceptability.

Exactly in the same way, (30b) turns out to be unacceptable. Consider (33a-b) for another unacceptable example (30b).

(33)a. ?[$_{VP \text{ or } NP}$ [$_{NP}$ John]-**?ga** [$_{V' \text{ or } N'}$ [$_{NP}$ nihongo] -**?no** [$_{V \text{ or } N}$ **kenkyuu**]]]

b. *[[$_{VP}$ [$_{NP}$ John]-**ga** [$_{V'}$ [$_{NP}$ nihongo]-***no** [$_{V}$ **kenkyuu**]]] [$_{V}$ **s**]] …..

As in (33a), at the initial point of the left to right parsing for (30b), the external argument of the verbal noun [$_{V \text{ or } N}$ *kenkyuu*] is attached by the Nominative Case marker, and the internal argument [$_{NP}$ *nihongo*] by the Genitive Case marker. Neither of these two Case markers is licensed properly within the projection of the fuzzy category [$_{V \text{ or } N}$ *kenkyuu*] (see 19b). As shown in (33b), at the subsequent point of the processing, the light verb [$_{V}$ *su*] *selects* the projection of the verbal noun [$_{V \text{ or } N}$ *kenkyuu*], and turns it into the unambiguous [+V] projection (see 21b). In representation (33b), it turns out that there is no [+N] projection which immediately dominates [$_{NP}$ *nihongo*]. Thus, there is no way for the Genitive Case feature attached to [$_{NP}$ *nihongo*] to be

licensed properly in (33b) (cf. Saito 1982, etc.), and example (30b) is unacceptable.

Under the proposed analysis, the data in (34a-c) and (35a-c) are accounted for in the morphological component, not in the syntactic component (see 18).[4] As shown in (34a-c),

(34)a. [$_{A \text{ or } N}$ kirei] -na ko (cf. 7b)
　　　beautiful-Cop girl
　　　'a girl who is beautiful'

b. *[$_{N}$ gakusei]-na ko (= 6b)
　　　student -Cop hito
　　　'a person who is a student'

c. *[$_{A}$ utukusi] -na ko (= 8b)
　　　beautiful-Cop girl
　　　'a girl who is beautiful'

the inflected form of the copula *na* morphologically selects only adjectival nouns such as [$_{A \text{ or } N}$ *kirei*] (see 19a), and does not morphologically select either a noun or an adjective

As shown in (35a-c), on the other hand,

(35)a. [$_{V \text{ or } N}$ kenkyuu] -si -ta. (= 16a)
　　　researching-do-Pst
　　　'Somebody studied something.'

b. *[$_{N}$ tyoosyoku]-si -ta. (= 16b)
　　　breakfast -do-Pst
　　　'Somebody had breakfast.'

c. *[$_{V}$ tabe]-si -ta. (= 16c)
　　　eat -do-Pst 'Somebody ate.'

verbal nouns such as [$_{V \text{ or } N}$ *kenkyuu*] can be morphologically selected only by the light verb *su*, the potential suffix *–deki* 'be able to,' etc. (see 19b).

Consequently, the proposed dynamic categorization analysis captures uniformly the parallelism between adjectival nouns and verbal nouns in (22a-b), (26a-b), (30a-b), (34a-c) and (35a-c), as desired.

4. Conclusion

In this paper, to explain the nature of fuzzy categories such as adjectival nouns and verbal nouns, I have suggested a dynamic categorization analysis by heavily relying on the core idea of Dynamic Syntax (Kempson et al. 2001, Cann et al. 2005; cf. Hawkins 1990, 1994, 2004, 2014, etc.). If successful at all, the proposal here could imply 1) that given fuzzy categories such as ANs and VNs together with Case markers, verbal suffixes, etc., the Japanese language might

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[4] I am very grateful to Yoko Sugioka, who brought to my attention the importance of data such as (35a-c) for the proposed dynamic categorization analysis.

process a string of words from left to right in a very efficient way; 2) that grammars might have been profoundly shaped by performance like language processing (See Performance-Grammar Correspondence Hypothesis by Hawkins (2004, 2014, etc.); cf. Chomsky 1965). I wish to explore further consequences of the proposed dynamic categorization analysis in Hoshi (in progress).

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