Notes on the Asymmetry between Number and Degree: the Syntax of Type-*d* Variable Binding[*]

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1. Two Types of Attributive Numeral Modifiers

There are two types of attributive numeral expressions in Japanese: one form is "numeral+classifier" as shown in (1a), and the other form is "numeral+unit" as shown in (1b).[1]

(1) a. Hanako-wa [$_{DP}$ 5-hon-no   kasa-o]   nakusi-ta.
         Hanako-Top   5-CL-*NO*   umbrellas-Acc lose-Past
         'Hanako lost 5 umbrellas.'
     b. Hanako-wa [$_{DP}$ 70-sentimeetoru-no kasa-o]   nakusi-ta.
         Hanako-Top   70-centimetrer-*NO* umbrella-Acc lose-Past
         'Hanako lost a 70-centimeter-long umbrella.'

In (1a), the number of the entity denoted by the noun *kasa* 'umbrella' is specified by the numeral modifier *5 hon* '5-classifier(CL).' In (1b), the degree of some individual-level property of the modified noun is expressed by the numeral modifier *70 sentimeetoru* '70 centimeter,' which is the length of the umbrella. In this paper, the former numeral modifier is represented as NUM(BER)Mod, and the latter is represented as DEG(REE)Mod.[2]

In (1), the two numeral modifiers have the same surface pattern: numeral modifier + adnominal marker *-no* + noun, which is called "pseudo-partitives." Without *-no*, however, their distributions are different. NUMMods can also occur in the prenominal position, in the postnominal position following the Case-marker, and in the postnominal position in between the noun and the Case-marker, whereas DEGMods can occur in none of them. This is illustrated in the examples in (2) (cf. Kamio (1977), Watanabe (2008)).

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[1] In this paper, the form of the *rentaikei* (adnominal) ending of the numeral modifier *-no* is referred to just as "adnominal marker (Backhouse (2004))."

[2] Schwarzchild (2002, 2006) argues that the numeral expressions in pseudo-partitives are interpreted in terms of a measurement system, and the basis for this measurement is "monotonicity." For example, as for the countable noun *umbrella*, its number is considered monotonic while its length is considered non-monotonic, because a singular count noun never provides a non-trivial part-whole relation.

On this view the amount of the mass noun is also considered monotonic. The "amount modifier" behaves in much the same way as NUMMods, as shown in (i).

(i) a. Hanako-wa {1.5-rittoru(-no)/20-do*(-no)} mizu -o   non-da.
     b. Hanako-wa mizu -o   {1.5-rittoru/*20-do}   non-da.
     c. Hanako-wa mizu   {1.5-rittoru/*20-do}-o   non-da.
         Hanako-Top water   1.5-liters/20-degrees.C-Acc drink-Past

As we will discuss in (4), the contrast is also observed in English.

(ii) a.   1.5 liters of water.
      b. *20 degrees C of water (water at 20 degrees C)

(2) a.   Hanako-wa   {5-hon/*70-sentimeetoru}   kasa -o   nakusi-ta.
     b.   Hanako-wa   kasa -o   {5-hon/*70-sentimeetoru }   nakusi-ta.
     c.   Hanako-wa   kasa   {5-hon/*70-sentimeetoru } -o   nakusi-ta.
          Hanako-Top umbrellas   5-CL/70-centimeter   -Acc   lose-Past

Furthermore, although NUMMods and DEGMods can co-occur, the linear order between them is fixed within DP, as shown in (3).

(3) a.   Hanako-wa [$_{DP}$ 5-hon-no 70-sentimeetoru-no kasa-o]   nakusi-ta.
     b. * Hanako-wa [$_{DP}$ 70-sentimeetoru-no 5-hon-no kasa-o]   nakusi-ta.
            Hanako-Top   70-centimetrer-*NO* 5-CL-*NO* umbrellas lose-Past

Since Japanese is a head-final language, the word-order restriction indicates that the two modifiers in (3a), both of which precede N^0 *kasa* 'umbrellas' within DP, are considered to be merged as the specifiers of the two different functional projections within DP.

In the following discussion, I follow the general assumptions that the structural position of NUMMods and that of DEGMods are different. NUMMods occupy the specifier position of a certain functional projection in between DP and NP, namely Num(ber)P, expressing the cardinality of DP (Li (1998, 1999), Cheng and Sybesma (1999), Watanabe (2006, 2008)). As for the position of DEGMods, on the other hand, I argue that they occupy the specifier position of (attributive) Deg(ree)P, which is considered to be the maximal extended projection of A(djective) (Corver (1990), Svenonius (1994)). Consider the English examples of DEGMods shown in (4).

(4) a.   * the 70 centimeter of umbrella(s)
     b.   * the 70 centimeter umbrella
     c.   the 70-centimeter-long umbrella

In English, although DEGMods are unacceptable in both the pseudo-partitives as shown in (4a), and in the prenominal position as shown in (4b), they can occur in the compound with the attributive adjectives (Schwarzchild (2002, 2006)). Suppose the adjectives determine the dimension of the numerical value that DEGMods express, it can be considered that, while the attributive adjectives accompanying DEGMods are obligatorily overt in English, they are covert in Japanese. Watanabe (2011) argues that the attributive adjectival expressions can be overt in Japanese, as shown in (5).

(5) a.   [$_{DP}$[$_{NumP}$ [$_{AttrP}$ [$_{DegP}$ 70-centimeter-   [$_{AP}$*(long)]]   [$_{NP}$ umbrellas]]]]
     b.   [$_{DP}$[$_{NumP}$ [$_{AttrP}$ [$_{DegP}$ 70-sentimeetoru-no [$_{AP}$ (nagasa-no)]] [$_{NP}$ kasa]]]]
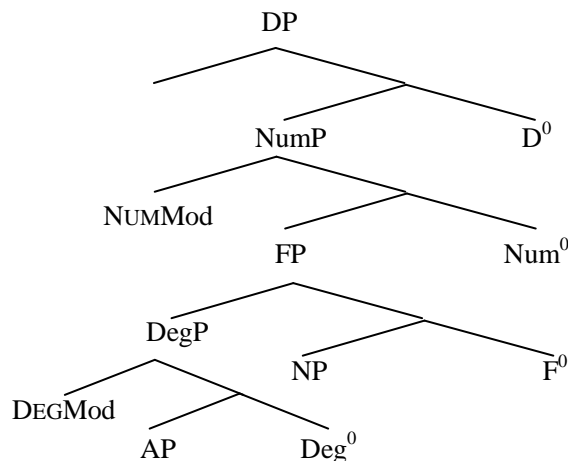   70-centimetrer-*NO*   length-*NO*   umbrellas

The structure of DP (linear order irrelevant) involving NUMMod and DEGMod is illustrated in (6). The attributive DegP is in the specifier position of the other functional layer of DP (Cinque (2010), Morita (this volume)).[3]

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[3] In Watanabe (2008), the classifier of NUMMod is considered the head of NumP, and the massive phrasal movements within DP yield the word order such as *5-hon-no kasa*. For a more elaborate structure of DP and DegP, see Watanabe (2008, 2011).
  (i) a.   [$_{DP}$ [$_{QP}$ [$_{CaseP}$ [$_{NP}$ N^0] [$_{NumP}$ [$_{MP}$] t_{NP} Num^0]Case^0]Q^0]D^0]
       b.   [$_{DimP}$ [$_{DegP}$ [$_{NumP}$ [$_{AP}$ A^0]Num^0]Deg^0]Dim^0]
The question concerning the categorial status of the numeral modifiers themselves is left open for future research.

(6)

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                                    DP
                        ┌───────────────────┐
                      NumP                  D⁰
                 ┌──────────┐
              NUMMod        FP             Num⁰
                      ┌──────────┐
                    DegP         NP        F⁰
               ┌──────────┐
            DEGMod        AP        Deg⁰
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(6)

$$
\begin{array}{c}
\text{DP} \\
\text{NumP} \quad \text{D}^0 \\
\text{N}_\text{UM}\text{Mod} \quad \text{FP} \quad \text{Num}^0 \\
\text{DegP} \quad \text{NP} \quad \text{F}^0 \\
\text{D}_\text{EG}\text{Mod} \quad \text{AP} \quad \text{Deg}^0
\end{array}
$$

In this paper, it will be shown that the various facts are accounted for by the DP structure given above. In section 2, we look at the asymmetry between "number variable" binding and "degree variable" binding, and observe that binding of the DP-internal degree variable is impossible. In section 3, I will claim that the derivation which yields degree variable binding is different from that of number variable binding. I will argue that only the former involves the illicit A'-extraction of the degree operator from within the attributive DegP, which is considered to be a syntactic island. Appendices discuss the environments for circumventing the attributive DegP island.

2. Binding of Number Variables versus Degree Variables

As observed by Bhatt and Takahashi (2008), and noted in Shimoyama (in press), while the attributive Comparative Sub-Deletion construction of the number comparison is possible as shown in (7a), that of the degree comparison is impossible as shown in (7b).

(7) a. Taroo-wa Hanako-ga [DP boorupen-o] nakusi-ta yorimo takusan-no enpitu-o
         Taroo-Top Hanako-Nom pen-Acc   lose-Past   than   many-Gen   pencil-Acc
         nakusi-ta.
         lose-Past
         '(lit.) Taroo lost more pencils than Hanako lost pens.'

    b. * Taroo-wa Hanako-ga   [DP boorupen-o] nakusi-ta yorimo {naga/omo/taka}-i
          Taroo-Top Hanako-Nom   pen-Acc   lose-Past   than   long/heavy/expensive-Att
          enpitu-o   nakusi-ta.
          pencil-Acc   lose-Past
          '(lit.)Taroo lost a {longer/heavier/more expensive} pencil than Hanako lost a pen.'

Secondly, as shown in (8), by attaching *-sugi(r)-* 'too much' to the verb, the "excessiveness" in the number of the internal argument can be expressed, but not the excessiveness of the degree determined by the attributive adjectives (Kageyama and Yumoto (1997), Nakanishi (2010)).

(8) a. Hanako-wa [DP (takusan-no) kasa-o]   nakusi-*sugi*-ta.
         Hanako-Top   many-GEN   umbrellas-Acc   lose-too.much-Past
         'Hanako has lost too many umbrellas.'

    b. Hanako-wa [DP {naga/omo/taka}-i   kasa-o]   nakusi-*sugi*-ta.
         Hanako-Top   {long/heavy/expensive}-Att umbrella-Acc   lose-too.much-Past
      * 'Hanako has lost too {long/heavy/expensive} an umbrella.'
         'Hanako has lost too many {long/heavy/expensive} umbrellas.'

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In (8b), what exceeds the expected standard must be the number of *kasa*. Thirdly, as shown in (9), the possibility of relativization of the "degree nominal (Sudo (2009))" is also sensitive to the distinction between number and degree. Such a relativization is possible only in the case of "number abstraction."[4]

(9) a. [Hanako-ga [$_{DP}$ kasa-o] nakusi-ta] kazu
      Hanako-Nom   umbrella-Acc lose-Past   number
      '(lit.) the number that Hanako lost the umbrella'

b. * [Hanako-ga [$_{DP}$ kasa-o] nakusi-ta] {nagasa/omosa/takasa}
      Hanako-Nom   umbrella-Acc lose-Past   {length/weight/expensiveness}
      '(lit.) the {length/weight/price} that Hanako lost the umbrella'

In the examples (7)-(9), the so-called type-*d* variables in Carlson (1977), represented as *d*, are involved within DP. The type-*d* variables are bound by the degree operator *Op* outside DP, yielding the degree abstraction structure (without the distinction between number and degree), as shown in (10)-(12).

(10) a. … [$_{CP}$ Op_i Hanako-ga [$_{DP}$ ~~d_i-takusan-no~~ boorupen-o] nakusi-ta] *(yorimo …)*
  b. * … [$_{CP}$ Op_i Hanako-ga [$_{DP}$ ~~d_i-naga-i~~   boorupen-o] nakusi-ta] *(yorimo …)*

(11) a. … [$_{vP}$ Op_i [$_{DP}$ d_i-takusan-no kasa-o] nakusi-*sugi*] *(-ta)*
  b. * … [$_{vP}$ Op_i [$_{DP}$ d_i-naga-i   kasa-o] nakusi-*sugi*] *(-ta)*

(12) a. … [$_{DP}$ [$_{CP}$ Op_i Hanako-ga [$_{DP}$ d_i kasa-o] nakusi-ta] kazu$_i$]
  b. * … [$_{DP}$ [$_{CP}$ Op_i Hanako-ga [$_{DP}$ d_i kasa-o] nakusi-ta] {nagasa/omosa/takasa}$_i$]

Then, a generalization can be made: a binding relation cannot be established only when the type-*d* variable is about the degree of the modified noun, as illustrated in (13).

(13) a. [$_{CP/vP}$ Op_{NUMBER} … [$_{DP}$ d_{NUMBER} *noun*]]
  b. * [$_{CP/vP}$ Op_{DEGREE} … [$_{DP}$ d_{DEGREE} *noun*]]

The question is why the degree abstraction of number is possible whereas that of degree is impossible.

Making no distinction between number and degree, Beck et al. (2004) and Kennedy (2007) claim that whether

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[4] It should also be noted that there appear data which seem to involve binding of the attributive degree variable and floating of the DEGMods. Consider the examples in (i).

(i) a. ? Taroo-wa Hanako-ga [ronbun-o] kai-ta yorimo naga-i syoosetu-o kai-ta
    Taroo-Top Hanako-Nom paper-Acc write-Past than long-Att novel-Acc write-Past
    '(lit.)Taroo wrote a longer novel than Hanako wrote a paper.' (Inada (2010))

b. Hanako-wa [naga-i ronbun-o] kaki-sugi-ta.
    Hanako-Top long-Att paper-Acc write-too.much-Past
    'Hanako wrote too many long papers.'
    'Hanako wrote too-long a paper.' (Kageyama & Yumoto (1997))

c. [Hanako-ga [$_{DP}$ ronbun-o] kai-ta] naga-sa
    Hanako-Nom paper-Acc write-Past long-degree
    '(lit.) the length that Hanako wrote a paper' (Sudo (2009))

d. Hanako-wa [ronbun-o] [200-peeji] kai-ta.
    'Hanako is writing a paper, and *its length (in progress)* has become 200-page long.'

They are, however, not the potential counterexamples to the analysis presented here. They are the cases where the syntactic island is circumvented allowing the (otherwise illicit) extraction out of DP (Davies and Dubinsky (2003)). The fact that they are acceptable indicates that the movement of the degree operator in fact violates the island condition. Appendix II discusses these cases.

the language has binding of the type-d variable is parameterized as shown in (14), and argue that Japanese is a language where the degree abstraction in the syntax is impossible.

(14)   *Degree Abstraction Parameter* (Beck et al. (2004: 325)):
        A language {does, does not} have binding of degree variables in the syntax.

Given (13), it can be concluded that, for instance, there must be no clausal standard of the comparative construction in Japanese since it necessarily involves the degree abstraction structure. Beck et al. (2004) and Kennedy (2007) claim that Japanese only allows the nominal standards of type-e. However, as we have just seen in (7)-(9), type-d variable binding is possible in Japanese if it concerns the number of the noun.[5] Moreover, the asymmetry between number and degree can be seen in the English Comparative Sub-deletion construction, as shown in (15) (Kennedy and Merchant (2000), Bhatt and Takahashi (2008), Shimoyama (in press)).

(15)   a.   Michael Jordan has more scoring titles than Denis Rodman has tattoos.
        b.   * Pico wrote a more interesting novel than Brio wrote a play.
        c.   * Anna read a longer article than Roxani read a book.

(15)'   a.   … than [$_{CP}$ Op_i Denis Rodman has [$_{DP}$ d_i-many tattoos]].
        b.   * … than [$_{CP}$ Op_i Brio wrote   [$_{DP}$ a d_i-interesting play]].
        c.   * … than [$_{CP}$ Op_i Roxani read   [$_{DP}$ a d_i-long book]].

In both Japanese and English, when the abstraction is about degree, the type-d variable within DP cannot be bound by the operator outside DP.

3.   Number/Degree Variable Binding and A'-Extraction from the Attributive DegP

The number/degree variable binding is derived via A'-movement of the number/degree operator, leaving a trace which is interpreted as a type-d variable (Bresnan (1973), Carlson (1977), Chomsky (1977), and Jackendoff (1977)). As shown in (16), while A'-movement within the clausal standard is unbounded, it is sensitive to the island effect.[6]

(16)   a.   Mary has read more books than [$_{CP}$ Op_i everyone thinks [$_{CP}$ that it is said [$_{CP}$ that John read t_i]]].
        b.   * Paul has read more books than [$_{CP}$ Op_i John hit [$_{DP}$ the person [$_{CP}$ who read t_i at that table]]].
                                                                                                (Kikuchi (1987: 4))

Kikuchi (1987) observes that this is also the case in Japanese, as shown in (19).

(17)   a.   [$_{CP}$ Op_i [$_{CP}$ [$_{CP}$ John-ga t_i yonda to] iwareteiru to] minna-ga   omotteiru]] yorimo
                        John-Nom read   C be.said   C everyone-Nom think   than
                Mary-wa   takusan hon-o   yondeiru.
                Mary-Top   many   books-Acc has.read
                'Mary has read more books than everyone thinks that it is said that John read.'

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[5] Beck et al's (2004) analysis of Internally-Headed Relative structure for the Comparative Sub-Deletion construction fails to account for the asymmetry between number and degree in (7), because the "internal head" to be relativized is the same noun *boorupen*, 'pen(s),' both in the acceptable example (7a) and the unacceptable example (7b).
[6] The nominal standard does not involve syntactic binding of the type-d variables because there is not any A'-movement of the degree operator involved.

b.　* [$_{CP}$ *Op*$_i$ [$_{DP}$ [$_{CP}$ sono　tukue-de　t_i　yondeita]　　　hito]-o　John-ga　　nagutta] yorimo
　　　　　　　　that　table-at　　be.reading.Past　person-Acc John-Nom　hit　　　than
　Paul-wa　takusan　hon-o　　　yondeita.
　Paul-Top　many　　books-Acc　has.read
　'(Lit.) Paul has read more books than John hit the person who read at that table.'

<div align="right">(Kikuchi (1987: 4))</div>

Notice that the DP structure given in section 1 involves the two different types of attributive numeral modifiers: N$_{UM}$Mods and D$_{EG}$Mods. I argue that in the case of number abstraction, the variables occupy the specifier position of NumP, whereas in the case of degree abstraction the variables occupy the specifier position of the attributive DegP, which is a more embedded position within the DP structure.

(6)''
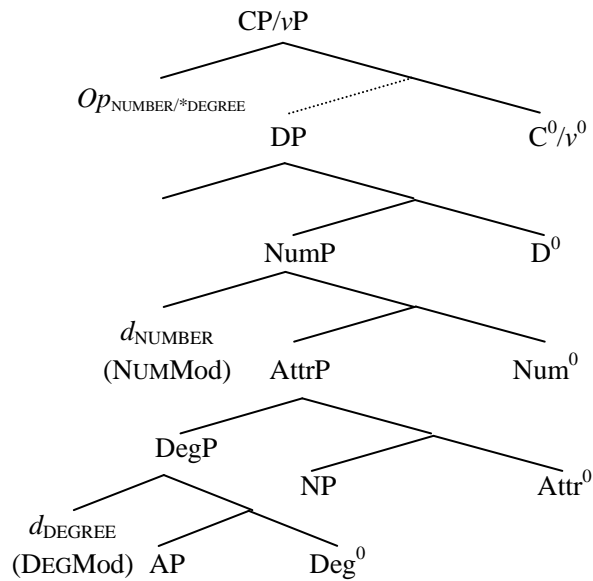
Then, the impossibility of the degree abstraction is accounted for, because the attributive DegP, which dominates the degree variable d_{DEGREE}, constitutes an island for A'-extraction out of the DP that dominates it, as shown in (18) (Corver (1990), Merchant (2001)).

(18)　a.　* How easily did he take [$_{DP}$ [$_{DegP}$ *t* obtainable] drugs]?
　　　　cf. ^{ok} [$_{DP}$ How easily obtainable drugs] did he take *t* ?
　　　b.　* How well have you examined [$_{DP}$ a [$_{DegP}$ *t* prepared] student]?
　　　　cf. ^{ok} [$_{DP}$ How well prepared student] have you examined *t* ?

Note that the sentences will be acceptable if the entire DP undergoes A'-movement to the operator position, accompanying the *wh*-phrase involved within the attributive DegP. In Japanese the sentence with the in-situ *wh*-phrase seems to be marginally acceptable, as shown in (19a). The in-situ "*wh*-phrase" in (19a) can be the entire DP *dorekurai youini nyuusyukanou-na yakuzai-o* 'how easily obtainable drugs,' and hence the sentence can be considered as not involving the illicit covert extraction from within DegP. However, acceptability of the sentence deteriorates if it involves the overt extraction of the specifier of DegP, as shown in (19b).

(19)　a.　?? Taroo-wa　[$_{DP}$ [$_{DegP}$　<u>dorekurai　youini</u>　nyuusyukanou-na] yakuzai-o] hukuyousi-ta　no?
　　　　　Taroo-Top　　　　　how　　　easily　obtainable-Att　　　drugs-Acc　take-Past　　Q
　　　b.　* Dorekurai youini Taroo-wa　[$_{DP}$ [$_{DegP}$ *t*　nyuusyukanou-na] yakuzai-o] hukuyousi-ta　no?
　　　　　how　　　easily Taroo-Top　　　　　obtainable-Att　　　drugs-Acc　take-Past　　Q

Since binding of the degree variable can be established only via the illicit A'-movement of the degree operator which is base-generated within the attributive DegP island, it is impossible both in English and Japanese.

Note also that, as with CPs of the Complex-NP island, DegPs *per se* is not counted as an island. As shown in (20) and (21), the predicative DegPs do not constitute an island in English (Corver (1990), Merchant (2001)) or in Japanese.

(20) a. How easily are these drugs [$_{DegP}$ *t* obtainable]?
      b. How well was she [$_{DegP}$ *t* prepared]?

(21) a. Sono yakuzai-wa [$_{DegP}$ <u>dorekurai youini</u> nyuusyukanou] na   no?
          that drugs-Top   how   easily   obtainable   Cop Q
      b. Dorekurai youini sono yakuzai-wa [$_{DegP}$ *t* nyuusyukanou] na   no?
          how   easily   that drugs-Top   obtainable   Cop Q

DegPs are counted as an island when they modify nouns. This islandhood of the attributive DegPs is accounted for if we assume that they are relative clauses. The idea that the attributive DegPs are equivalent to the relative clauses has been proposed for English and other languages (Smith (1961, 1964), Ross (1967), Sproat and Shih (1991), Kayne (1994), Alexiadou (2001) Cinque (2010)). The prenominal and postnominal adjectival modifiers could be derived from the underlying structure (22), by way of *WHIZ deletion* (Ross (1967)) and movement of the reduced relative clause (Cinque (2010))).

(22)   The [~~which are~~ visible] stars ~~[which are visible]~~ include Capella.

Japanese fits into the group of languages that lack direct adjectival modification, and this is in fact a widely accepted view on Japanese adjectival modification (Kuno (1973), Shibatani (1978), Whitman (1981), Dixon (1982), Miyagawa (1984), Urushibara (1993), Nishiyama (1999, 2005), Baker (2003), cf. Yamakido (2000)).[7]

4. Concluding Remarks

This paper observes the contrast between the syntactic behaviors of NUMMods versus those of DEGMods, and argues that NUMMods and DEGMods originate from different syntactic positions within DP. This paper also observes the contrast between binding of the DP-internal number variable from outside DP and that of the degree variable from outside DP. That is, binding is allowed only when it comes to the number of the entity denoted by the noun, both in Japanese and English. Given that the position which DEGMods occupy is inside the syntactic island, namely the attributive DegP, this paper claims that syntactic binding of the degree variable is impossible both in English and Japanese because the degree operator, which would otherwise bind the trace that is interpreted as the degree variable, is also base-generated within the island. Under the analysis presented in this paper, binding of the number/degree variable is established in the same way in Japanese and English: A'-movement of the number/degree operator, which is blocked by the syntactic island.

Appendix I.   Island (Non-)Repair: Comparative Deletion in English and Japanese

In the following Appendices, I discuss the various environments for circumventing the attributive DegP island, where degree abstraction with respect to the degree of the attributive adjective is possible. Look at the

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[7] So far, this paper only focuses on the class of Relative Adjectives (Sproat and Shih (1991)) because the other classes of adjectives are not compatible with the Excessiveness construction or Comparative (Sub-)deletion construction in principle. The question of whether or not the attributive adjectival phrase of each of the class constitutes the (reduced) relative clause (hence an island) is left open.

Comparative Deletion constructions shown in the example (AI-1).

(AI-1) a. Taroo bought a longer umbrella than Hanako did/bought.
b. Taroo bought more umbrellas than Hanako did/bought.

(AI-1)' a. Taroo bought a longer umbrella than [Op Hanako did <buy [~~a d-long umbrella~~]>]
b. Taroo bought more umbrellas than [Op Hanako did <buy [~~d-many umbrellas~~]>]

Comparative Deletion is also considered to be derived via A'-movement of the operator which binds the type-d variable (Bresnan (1973), Carlson (1977), Chomsky (1977), and Jackendoff (1977)). DP containing the type-d variable deletes under identity condition.

In Japanese, the acceptability of the Comparative Deletion seems to vary among speakers when degrees are compared, as originally observed in Ishii (1991) and discussed further in Beck et al. (2004) and Kennedy (2007).

(AI-2) ?/??/?*Taroo-wa   [Hanako-ga   katta]   yori   nagai kasa-o   katta.
            Taroo-Top   Hanako-Nom bought YORI long umbrella-Acc bought
            'Taroo bought a longer umbrella than Hanako bought.'   (Beck et al. (2004: 290, 302))

As we have discussed in section 2, they claim that this is because Japanese lacks "syntactic" binding of type-d variables. However, there is no problem when the numbers are compared.

(AI-3)   Taroo-wa [Hanako-ga   katta]   yori   takusan-no kasa-o   katta.
            Taroo-Top Hanako-Nom bought YORI many   umbrellas-Acc   bought
            'Taroo bought more umbrellas than Hanako bought.'   (Beck et al. (2004: 290, 302))

Notice that the analysis presented in this paper can account for the "contrast" since the type-d variable in (AI-2) is located in the attributive DegP island, whereas it is not in (AI-3). The question would rather be why Comparative Deletion of degree such as in (AI-1a) is possible in English.

As argued in Kennedy and Merchant (2000) and Merchant (2001), Comparative Deletion in English, which deletes an entire DP, circumvents the island violation. On the other hand, in Japanese, it can be said that whether the deletion of DP can circumvent the violation depends on the speaker.

(AI-4)   John bought [$_{DP}$ a [longer] umbrella] [than [Op_i [Mary bought ~~[$_{DP}$ a [d_i-long] umbrella]~~]]].
                 (*Antecedent DP*)   (*Elided DP*)
(AI-5) $^{?/??/?*}$ Taroo-wa [Op_i [Hanako-ga ~~[$_{DP}$ [d_i-no] kasa-o]~~   katta] yori] [$_{DP}$ [nagai] kasa-o]   katta.
                      (*Elided DP*)   (*Antecedent DP*)

Why does such a contrast emerge between English and Japanese? One possible line to pursue is that, as argued in Shimoyama (in press), it is only in Japanese that an ellipsis site precedes its antecedent in surface syntax, which causes some processing difficulty. It can be considered that there is difficulty for the parser to recover the elided DP in (AI-5).

Appendix II. Predicate Union: Incremental THEME Objects and "Pseudo-Adverbial" Numeral Modifiers

It is worth pointing out that some nominals belong to more than one class, physical or metaphysical. I argue that it is this ambiguity that accounts for why extraction out of the attributive DegP island is sometimes permitted. Kennedy (2007) incidentally points out that the full acceptability of the example (AII-2) can be accounted for in terms of the contribution of the incremental THEME verb *write*.

(AII-2)   Taroo-wa   [[Hanako-ga   kaita] (no) yori] naga-i ronbun-o   kaita.
           Taroo-Top   Hanako-Nom   wrote NO YORI long   paper-Acc   wrote
           'Taroo wrote a longer paper than Hanako did.'   (Beck et al. (2004: 301-302))

Incremental THEMEs are "applied to the argument of certain predicates involved in defining a homomorphism from its own spatial extent to the temporal progress of the event it participates in (Dowty (1991))." When the compared degree is of the incremental THEME object of creation verbs, Comparative Sub-deletion and Long-distance Excessiveness become possible, as shown in (AII-3) and (AII-4), respectively.

(AII-3) a.   Taroo-wa Hanako-ga   [syoosetu-o] {kai/*toukousi}-ta yorimo   naga-i   si-o
              Taroo-Top Hanako-Nom   novel-Acc   write/submit -Past than   long-Att poem-Acc
              kai-ta.
              write-Past
              '(lit.) Taroo wrote a longer poem than Hanako {wrote/*submitted} a novel.'
        b.   Taroo-wa Hanako-ga   [ido-o]   {hor/*mituke}-ta yorimo   fuka-i   otosiana-o
              Taroo-Top Hanako-Nom   well-Acc dig/find-Past   that   deep-Acc   pit-Acc
              hor-ta.
              dig-Past
              '(lit.) Taroo dug a deeper pit than Hanako {dug/*found} a water well.'

(AII-4) a.   Hanako-wa   [naga-i   ronbun-o] {kaki/*toukousi}-sugi-ta.
              Hanako-Top   long-Att   paper-Acc   write/submit-too-Past
              'Hanako {wrote/submitted} too many long papers.'
              '(lit.) Hanako {wrote/*submitted} too-long a paper.'
        b.   Hanako-wa   [fuka-i   ido-o]   {hori/*mituke}-sugi-ta.
              Hanako-Top   deep-Att   well-Acc dig/*find-too-Past
              'Hanako {dug/found} too many water wells.'
              '(lit.) Hanako {dug/*found} too-deep a water well.'

Furthermore, with creation verbs, DEGMods can undergo floating, as shown in (AII-5).

(AII-5) a.   Hanako-wa [ronbun-o] [20-peeji] {kai/*toukousi}-ta.
              # 'Hanako wrote a 20-page-long paper.'
                'Hanako wrote the 20 pages of the paper.'
        b.   Hanako-wa [ido-o]   [3-meetoru]   {hot/*mituke}-ta.
              # 'Hanako dug a 3-meter-deep well.'
                'Hanako dug 3 meters of the well.'

It is also worth noticing that the numerals in (AII-5) do not express, for instance, the length of the *paper* or the depth of the *hole*; they express how many pages the paper was written and how many meters the well was dug, respectively. Furthermore, as shown in (AII-6), the nouns with the postposed DEGMods are number defective.

(AII-6) a.   ?* Hanako-wa [$_{DP}$ 5-hon-no   ronbun-o] [20-peeji] kai-ta.
                            5-CL-*NO*
        b.   ?* Hanako-wa [$_{DP}$ 5-tu-no   ido-o] [3-meetoru]   hot-ta.
                            5-CL-*NO*

We can therefore conclude that the incremental THEME object of creation verbs only denotes properties, and thus

only project NP. Such "bare nominals" have to describe an object which is typically a participant in the event described by the verb, as argued in Dayal (2003), and so do the incremental THEMEs in Japanese.

As observed in Ross (1967) and discussed in Davies and Dubinsky (2003), the incremental THEME object of a creation verb does not constitute an island in English, as shown in (AII-7) and (AII-8).

(AII-7) a.　　* What did Sharon sell/copy-edit [her article about t]?
　　　　b.　　What did Sharon *write* [her *article* about t]?

(AII-8) a.　　* Who did Kerry hear [the rumor [that Kelsey is fond of t]]?
　　　　b.　　Who did Kerry *start* [the *rumor* [that Kelsey is fond of t]]?

In (AII-7b), the definiteness effect disappears, and in (AII-8b) the A'-extraction is allowed even from within the Complex-NP. Following Davies and Dubinsky (2003), I argue that the seemingly attributive DEGMods modifying the incremental THEME objects in Japanese function as verbal modifiers through an abstract N-incorporation at LF, as illustrated in (AII-9).[8,9]

(AII-9)
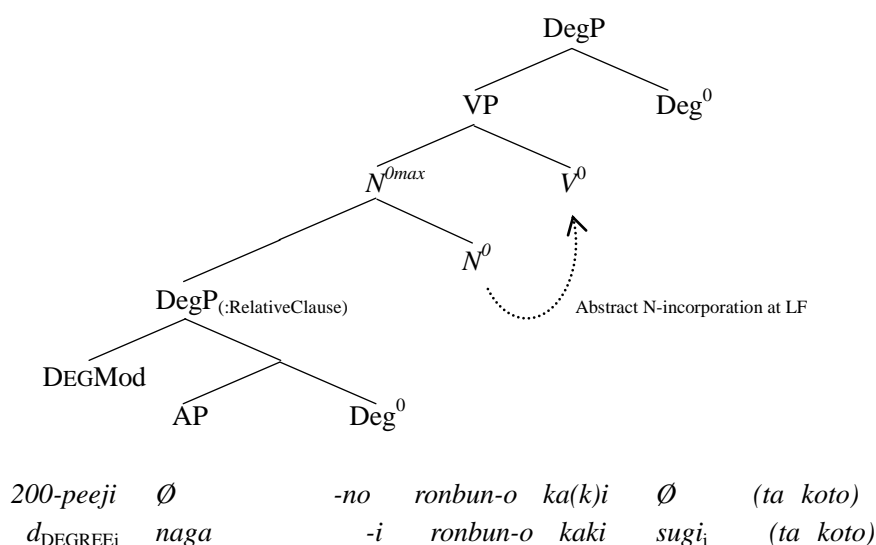
Because DegP is not dominated by DP, the DEGMod and the degree variable can be considered to be no longer inside the island in (AII-9), and the extraction out of DegP turns out to be possible.

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[8] Baker (1988) claims that a lexical category which has an item incorporated into it governs everything which the incorporated item governed in its original structure position (Government Transparency Corollary in Baker (1988: 64)). My analysis does not crucially depend on the specific implementation of abstract incorporation. It is compatible with any theory that can account for this kind of "predicate union" successfully.

[9] Davies and Dubinsky (2003) observe that the abstract incorporation also offsets the so-called Specificity Effect.
　(i)　a.　* Which neighbor did Shelly chain [**some** dogs of t] to a tree?　　*indefinite
　　　b.　Who were the Phillies hoping for [{**a/*the**} *victory* over t]?　　ok indefinite/*definite
　　　c.　Who did you {***write/??read***} [**those** *essays* about t]?　　ok definite

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