Adjective licensers in Japanese

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Abstract

Japanese has two types of adjectives, which we refer to as *na-* and *i*-adjectives, that show different syntactic behaviour. In this paper, we argue that the *na* of *na*-adjectives is an adjective licenser, that is, it is a marker that licenses a predicative adjective to occur attributively. Attributive adjectives show certain similarities with relative clauses in Japanese, which has led to some authors analysing attributive adjectives syntactically as relative clauses. However, there are arguments against assuming a similar structure for adjectives and relative clauses. Our analysis captures the functional and semantic parallels between relative clauses and attributive adjectives without having to assume structural similarities. One issue with a relative clause analysis that has been raised in the literature is that it leads to the assumption that all adjectives are intersective. We show in some detail that this is not a problem for our analysis.

1 Introduction

Japanese has two types of adjectives, referred to here as *na-* and *i*-adjectives, that show different syntactic behaviour.[†] In this paper, following an analysis of similar elements by Börjars & Payne (2018), we argue that the *na* of *na*-adjectives is an adjective licenser, that is, it is a marker that licenses a predicative adjective to occur attributively. Attributive adjectives in Japanese are known to show certain syntactic, functional and semantic similarities with relative clauses in Japanese. In particular, both occur in pre-head position, relative clauses lack a TOPIC structure and adjectives appear to be able to carry tense. This has led some authors to analyse attributive adjectives syntactically as relative clauses. However, we show here that there are arguments against assuming such an analysis. Our LFG analysis, presented in section 3, captures the functional and semantic parallels between relative clauses and attributive adjectives by assigning them different c-structures but parallel f-structures. One issue that has been raised in the literature as a general issue with relative clause analyses of attributive adjectives is that it leads to the assumption that all attributive adjectives must be given an intersective interpretation. This issue applies equally to our analysis, but in the final section of this paper, we show in some detail how it can be resolved.

2 Japanese adjectives

There are two kinds of adjectives in Japanese: adjectives that take *-i* both attributively and predicatively; and adjectives that take *-na* atttributively and copula *da* predicatively. As the examples of both types in (1) and (2) illustrate, the distinction is not based on semantics.[1]

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[1]Indeed, there are some adjectives that may occur with either form (see Backhouse 2004: 63).

(1) a. utukusi-i   hana
       beautiful-NPST flower
       'a/the beautiful flower'

      b. Hana ga   utukusi-i.
       flower NOM beautiful-NPST
       'The flower is beautiful.'

(2) a. kirei-na   hana
       pretty-ATTR flower
       'a/the pretty flower'

      b. Hana ga   kirei da.
       flower NOM pretty COP.NPST
       'The flower is pretty.'

There is a substantial literature on Japanese adjectives, much of which focuses on the category status of the two types and what features may be used to categorise them. Terms used in the literature for the types represented in (1) versus the type in (2) include 'true adjectives' vs 'nominal adjective' (e.g. Yamakido 2005), 'adjective' vs 'adjectival noun' (e.g. Miyagawa 1987), '(canonical) adjective' vs 'nominal adjective' (e.g. Yamakido 2000; Nishiyama 1999; Morita 2010). Backhouse (2004), who refers to them as 'inflected' versus 'uninflected' adjectives, shows that the *i*-adjectives share some inflectional properties with verbs and *na*-adjectives share certain forms with nouns. However, he also points out that there are substantial differences between *i*-adjectives and verbs, on the one hand, and *na*-adjectives and nouns, on the other, in terms of syntactic distribution and derivational behaviour, but also inflectionally. For example neither class has an imperative form or can itself be modified by an adjective, and both can be modified by certain adverbials such as *totemo* 'very' or be followed by comparative expressions. We therefore follow Backhouse (2004) and many others in considering them all adjectives, and we will refer to them simply as *i*-adjectives and *na*-adjectives.

The *-i* is the original form, and in earlier stages *ki* was used attributively and *si* predicatively; the modern *-i* is a reduced form of *ki* (Frellesvig 2010, 2022). The *i*-adjectives are associated with etymologically Japanese roots, and they form a closed class. We will gloss *-i* as a non-past tense marker (following e.g. Baker 2003; Morita 2010), recognising that this is not an uncontroversial choice, an issue that we return to below.

As shown in (2-b), *da* is used when a *na*-adjective occurs predicatively, and it is glossed as a copula. This is the same copula that occurs with nominals or prepositional phrases, as shown in (3) and (4).

(3) Kare ga   sensei da.
     he   NOM teacher COP.NPST
     'He is a teacher.'

(4) Kare ga   Tookyoo de da.
     he   NOM Tokyo   in COP.NPST
     'He is in Tokyo'

The past tense of the copula is *datta*, and this is used to form a predicative construction with a *na*-adjective, as in (5).

(5) Hana ga   kirei datta.
     flower NOM pretty COP.PST
     'The flower was pretty.'

As indicated by the ungrammaticality of (6), *i*-adjectives cannot occur with the copula. Instead, *i*-adjectives are marked by *-katta* in the past tense as in (7). Note that this form preserves the historical consonant *k*. Indeed, Morita (2010) refers to these as *k*-adjectives, rather than *i*-adjectives, and both he and Nishiyama (1999) analyse *k* as an independent morpheme heading a functional projection in the syntax (a^0 and Pred, respectively).

(6) *Hana ga   utukusi-i   da.
     flower NOM beautiful-NPST COP.NPST
     Intended 'The flower is beautiful.'

(7) Hana ga   utukusi-katta.
     flower NOM beautiful-PST
     'The flower was beautiful.'

The glossing of *-i* as a non-past tense is based on the contrast with the past tense in main clauses, but is an oversimplification. From the discussion in Yamakido (2005: 68–73), we surmise that the Japanese non-past does not introduce, in Reichenbach's (1947) terms, an independent reference time contemporaneous with the speech time (RT = ST). This would be the non-past of English, which allows for instance a relative clause to indicate present time in a matrix past environment: *Taroo bought a painting which is* (*now*) *expensive*. In Japanese, non-past is rather a dependent tense which sets an event time (ET) contemporaneous either directly with ST, or with an externally etablished RT. This is illustrated in (8) (= Yamakido 2005: 72, ex (85a)).[2]

(8) Taroo wa [taka-i   e]   o   ka-tta
     Taroo TOP [expensive-NPST painting] OBJ buy-PST
     'Taroo bought an expensive painting.'

The external reference time is supplied by the standard past tense of the clause (RT<ST), and the painting referred to could be either one which Taroo (luckily) bought cheaply at the time but that is expensive now (ET = ST), but more likely one which was expensive when Taroo bought it (ET = RT). The reference time for a non-past attributive adjective can also be established by an NP-internal temporal adjunct, as illustrated in (9) (= Yamakido 2005: 72, ex (87)). The particle *no* here functions as a linker which most commonly indicates the modification of one nominal expression by another.

(9) a. [kinoo   no [[AP oisi-i]   cake]]
         yesterday NO   delicious-NPST cake
         'yesterday's delicious cake'
     b. *[kinoo   no [[AP oisi-katta]   cake]]
         yesterday NO   delicious-PST cake

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[2]We have adopted a single standard for the glossing of examples. This entails that examples cited from Japanese linguists may have minor adjustments to their glossing, e.g. OBJ rather than ACC for the particle *o*. We sometimes also add (labelled) brackets.

In general, then, the reference time for a NPST attributive adjective must come from outside the AP itself, a fact which suggests that attributive APs in Japanese cannot have independent tense. Despite the NPST marking of -*i* adjectives in attributive function, this leads us to suppose that attributive APs in Japanese are essentially normal APs, i.e. unable to have independent time reference.

3 Analysis

3.1 Adjective licensers

Börjars & Payne (2018) argue on the basis of a sample of languages, including Old Icelandic, Kildin Saami and Modern Persian, that attributive adjectives need to be licensed. This implies, at least for the languages they consider, that the predicative adjective is the unmarked form, *pace* Croft (1991) and Bhat (1994).[3] The analysis proposed there is based on the assumption that both predicative and attributive adjectives require a SUBJ, and the role of the licenser is to provide information relating to this. The assumption that adjectives require a SUBJ leads to an XCOMP analysis of copula constructions (e.g. Zweigenbaum 1988; Wechsler 2009) as opposed to the PREDLINK analysis put forward for instance by Butt et al. (1999) and Attia (2008).[4]

Börjars & Payne (2018), with reference to Pullum & Huddleston (2002) and Zweigenbaum (1988), show that for both English and French there is evidence that adjectives require a subject. Such evidence can be found also for Japanese. There is first of all strong evidence that attributive adjectives require a subject. In (10) the attributive adjective phrase *zibun ni tyuuzitsuna* includes the reflexive pronoun *zibun* that requires a subject antecedent.

(10)   zibun ni   tyuuzitsu-na seizika
             self   DAT true-ATTR   politician
             'a politician true to himself'

The postulation of a parallel subject argument for adjectives in a predicative function then leads to a straightforward account of examples such as (11).

(11)   Kare wa   yuuhuku ni   naru   tumorida.
             he   TOP wealthy   COP.NFIN become.NPST intend.NPST
             'He intends to become wealthy.'

In (11), the adjectival subject will enter a chain of control relations which identify it with the subject of the the control verb *tumorida*.[5]

The lexical entry for the copula *da* is as in (12), and for the adjective *kirei* as in (13).

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[3]Bhat (1994: 105–6) points out that there are languages in which predicative adjectives are more marked morphologically than attributive adjectives; such languages may need a different analysis.

[4]See also Dalrymple et al. (2004), Nordlinger & Sadler (2007) and Dalrymple et al. (2019: 32–33) for analyses of copula clauses in LFG.

[5]The Japanese equivalent of English *become* consists of two separate components, *naru* 'become' and a non-finite form *ni* of the copula. The control relationship will thus pass first between the subject of *tumorida* 'intend' and the subject of *naru*, and then between the subject of *naru* and the subject of *ni*. In the XCOMP analysis we are adopting here, this subject will in turn be identified straightforwardly with the subject of the predicative adjective.

(12)　　　*da*　V　(↑PRED) = 'be < SUBJ, XCOMP >'
　　　　　　　　　(↑SUBJ) = (↑XCOMP SUBJ)

(13)　　　*kirei*　A　(↑PRED) = 'pretty < SUBJ >'

For predicative adjectives combining with a copula, the SUBJ is then identified in the same way as a verbal predicate with a SUBJ argument through the control equation in (12). For an attributive adjective, on the other hand, the SUBJ cannot be directly accessed, and some additional mechanism is required. In our analysis, this is what the adjective licenser contributes. At c-structure the attributive adjective heads an AP adjunct. The f-structure, on the other hand, will be the same as that needed for relative clauses, albeit without such complications as long-distance dependencies. We therefore adopt for this purpose a stripped-down version of Dalrymple's (2001) analysis of relative clauses. The adjective licenser will provide a RELPRO attribute and add a pronominal PRED value to it. This RELPRO will be linked directly and uniquely to the SUBJ function of the attributive adjective rather than to an arbitrary GF through a long-distance path as in relative clauses proper.

This analysis of attributive licensers is supported by the fact that some of the elements analysed in Börjars & Payne (2018) developed diachronically from relative markers. In Japanese, there are no overt relative markers as such. However, the fact that the adjective licenser *-na* derives diachronically from a form of the copula (see section 2) suggests that attributive adjectives marked by *-na* indeed have a similar predicative origin.

We note that there is a generally held intuition that attributive adjectives in Japanese share properties with relative clauses, based for instance on the fact that a relative clause in Japanese takes the shape of a basic finite clause in prenominal position and lacks any additional structural complexity, as in (14). Relative clauses thus appear to parallel an attributive adjective in position and structural simplicity.

(14)　　ima it-ta　kuruma
　　　　now go-PST car
　　　　'the/a car which left just now'

Many of the formal analyses that aim to capture the parallels between attributive adjectives and relative clauses assume a full parallel structure for the two, for instance Nishiyama (1999) and Hoshi (2002), a structure that is motivated only theory-internally.[6] However, there are also structural differences between an attributive adjective and a relative clause that refute the idea of complete structural parallel; the former follows a demonstrative, as in (15), whereas a relative clause precedes it, as in (16) (examples from Yamakido (2005: 45, fn 5) with reference to Whitman (1981)).

(15)　　ano ao-i　　mi
　　　　that blue-NPST berry
　　　　'that blue berry'

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[6]Smith (1961) analyses even English attributive adjectives as reduced relative clauses, an analysis that was criticised by Bolinger (1967). For Japanese, the relative-clause analysis of attributive adjectives goes back at least to Kuno (1973). Yamakido (2005) provides arguments against a structural analysis of prenominal adjectives as relative clauses, and instead argues in favour of an analysis of *-i* and *-na* as case markers.

(16) ima it-ta   ano kuruma
      now go-PST that car
      'that car which left just now'

There are also differences in the flexibility of tense-marking. We have already argued with respect to the examples in (9) that attributive APs in Japanese are best analysed as not having independent temporal reference and thus not being able to be marked with past tense. Relative clauses marked by non-past tense are temporally dependent in the same way, but as full clauses they are able to have temporal independence and to introduce a new past reference time with a past-marked form. Yamakido (2005: 73) cites examples from Hoshi (2002) which show that when *kinoo* 'yesterday' is used as a clausal adjunct, not as an NP-internal adjunct linked by *no*, past tense marking of an adjective is indeed possible (Yamakido 2005: 73, fn 32):

(17) Hanako wa [[$_{IP}$ kinoo   oisi-katta] cake] o ototoi   yai-ta.
      Hanako TOP   yesterday delicious-PST cake OBJ the day before bake-PST
      'The day before yesterday Hanako baked [the cake which was delicious yes-
      terday].'

(18) *Hanako wa [[$_{IP}$ kinoo   oisi-i]   cake] o ototoi   yai-ta.
      Hanako TOP   yesterday delicious-NPST cake OBJ the day before bake-PST
      'The day before yesterday Hanako baked [the cake which was delicious yes-
      terday].'

We therefore accept Yamakido's (2005: 73) argument that examples with past tense marking of *i*-adjectives should not be analysed as simple AP adjuncts in Japanese, but must instead structurally represent full relative clauses.[7] A *na*-adjective in the same environment must indeed be accompanied by the past form of the copula:

(19) Taroo wa [[$_{IP}$ kinoo   hen   datta] hito] o ototoi   dinner
      Taroo TOP   yesterday strange COP.PST man OBJ the day before dinner
      ni   syootai-si-ta.
      DAT invite-do-PST
      'The day before yesterday Taroo invited to dinner [the man who was strange
      yesterday].'

(20) *Taroo wa [[$_{IP}$ kinoo   hen-na]   hito] o ototoi   dinner ni
      Taroo TOP   yesterday strange-ATTR man OBJ the day before dinner DAT
      syootai-si-ta.
      invite-do-PST
      'The day before yesterday Taroo invited to dinner [the man who was strange
   yesterday].'

The advantage of our analysis is then that we capture the insight of a functional and semantic similarity between attributive adjectives and relative clauses without having to

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[7]That is, in (17), just as in (19), the adjective is not the head of an attributive AP requiring a licenser, but rather a predicative adjective within an independently tensed relative clause. For concreteness we have assigned the category label IP to the (structural) relative clauses in these examples: Japanese has no ana- logue of wh-fronting (see above) which might motivate a full CP structure, nor do Japanese relative clauses permit the topic structure of root clauses.

posit unwarranted syntactic structure for genuinely attributive cases.

We turn now to the formal analysis of the attributive adjectives. In an example of the attributive use of a *na*-adjective such as (2-a), the adjective has only the PRED feature, as in (13), *na* contributes the other required features, as in (21). The resulting tree for the noun phrase in (2-a) is (22). In both (22) and (25), we indicate the features contributed by the inflectional marking in red.

(21)   *-na*   (↑SUBJ) = (↑RELPRO)
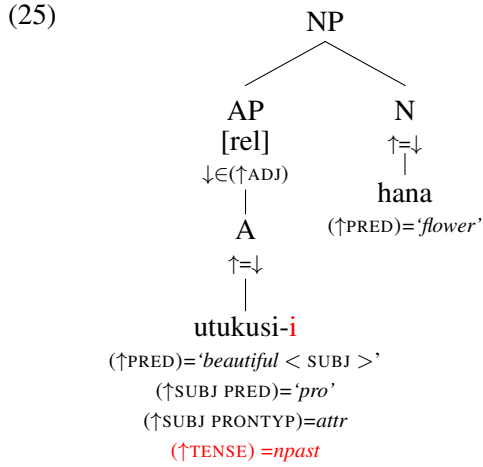   (↑RELPRO PRED) = '*pro*'

(22)
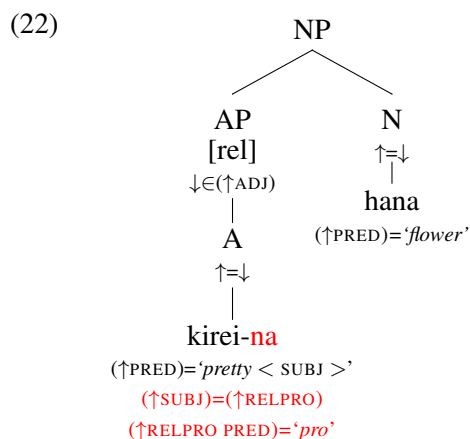
The c-structure rule for attributive APs will annotate the AP with a semantic resource [rel] which is formally identical to the [rel] which is annotated on relative CPs in Dalrymple's (2001) analysis of relative clauses proper. It is a property of the structure, rather than the individual lexical items, and has the same semantic function, i.e. allowing the adjunct, whether CP or AP, to combine with a nominal to form a new nominal with an appropriately modified semantics.
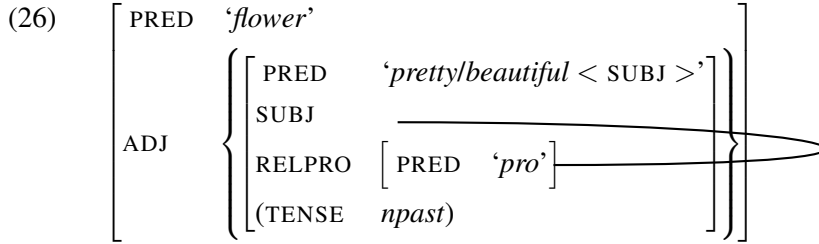
For *i*-adjectives, on the other hand, the SUBJ features are included in the lexical entry of the adjective, as in (23), with *-i* contributing only a TENSE feature, giving the tree in (25).

(23)   *utukusi*   A   (↑PRED) = 'beautiful < SUBJ >'
                        (↑SUBJ) = (↑RELPRO)
                        (↑RELPRO PRED) = '*pro*'

(24)   *-i*   (↑TENSE) = *npast*

(25)

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                    NP
                   /    \
                 AP       N
                [rel]     ↑=↓
               ↓∈(↑ADJ)    |
                 |        hana
                 A      (↑PRED)='flower'
                ↑=↓
                 |
              utukusi-i
         (↑PRED)='beautiful < SUBJ >'
            (↑SUBJ PRED)='pro'
           (↑SUBJ PRONTYP)=attr
            (↑TENSE) =npast
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The f-structures for the two examples in (1-a) and (2-a) then differ only in the TENSE feature.[8]

(26)

$$
\begin{bmatrix}
\text{PRED} & \text{'flower'} \\
\text{ADJ} & \left\{ \begin{bmatrix}
\text{PRED} & \text{'pretty/beautiful} < \text{SUBJ} >' \\
\text{SUBJ} & \\
\text{RELPRO} & \begin{bmatrix} \text{PRED} & \text{'pro'} \end{bmatrix} \\
\text{(TENSE} & npast)
\end{bmatrix} \right\}
\end{bmatrix}
$$

The function of RELPRO will be to create a relative clause f-structure out of the ultimately predicative f-structure of the adjective, i.e., from the PRED "(is) pretty/beautiful" requiring a SUBJ it creates a relative clause f-structure "(which is) pretty/beautiful" which can then serve as an adjunct of the noun *flower*. Omitting the potential complexity of the non-past TENSE feature required for *i*-adjectives, the interpretation of the resulting f-structure can then follow Dalrymple's (2001) analysis of relative clause semantics.[9] In (27) we summarise the lambda-calculus contributions of the individual semantic resources provided by example (2-a), with a *na*-adjective:

(27)

[pretty]	$\lambda x.\text{pretty}(x)$	<e,t>
[pro]	$\lambda P.\lambda x.P(x)$	<<e,t>,<e,t>>
[rel]	$\lambda P.\lambda Q.\lambda x.P(x) \wedge Q(x)$	<<e,t>,<<e,t>,<e,t>>>
[flower]	$\lambda x.\text{flower}(x)$	<e,t>

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[8]Coordination of attributive adjectives will be permitted because governable grammatical functions are distributive features (Dalrymple 2001). The SUBJ of the f-structure set corresponding to the adjectival coordination must be the same as the SUBJ of each individual adjective. Exactly the same principle is invoked by Dalrymple (2001) for the coordination of relative clauses.

[9]We remind the reader that the TENSE feature here is a shorthand for a more complex temporal feature (see discussion in section 2).

The adjective simply provides its own <e,t> resource. Since the adjective licenser in Japanese is invariant in form, [pro] itself contributes no independent semantic information about the nature of its antecedent (unlike for example the relative pronouns *who/which* of English). It is also a type of pronoun which derives its meaning non-contextually, that is, there are no binding conditions conditions involved. The [pro] resource will combine (vacuously in this case) with the adjective resource to give an identical <e,t> resource, as in (28).

(28)   [pretty-pro] $\lambda x.pretty(x)$

This in turn combines with the [rel] resource to give

(29)   [pretty-pro-rel] $\lambda Q.\lambda x.pretty(x) \wedge Q(x)$

This is of the correct type to combine with the noun resource, giving

(30)   [pretty-pro-rel-flower] $\lambda x.pretty(x) \wedge flower(x)$

The reader will note that the end result is the same as in Dalrymple's (2001) analysis of (non-intensional) attributive adjectives. By subsuming the analysis of attributive adjectives under the analysis of relative clauses, it obviates the need for a separate treatment of the former.

4   Intersectivity

4.1   Non-subsective and non-intersective adjectives in Japanese

It is immediately apparent that the relative-clause-like analysis of attributive adjectives presented above implies that predicative adjectives used attributively should have intersective interpretations. In an Adjective-Noun construction, henceforth AN, an **intersective** adjective is one which validates the inference from AN(x) to A(x) and N(x), i.e. a 'pretty flower' should be something which is both pretty and a flower. The semantic representation of [pretty-pro-rel-flower] in the analysis above, viz. $\lambda x.pretty(x) \wedge flower(x)$, directly encodes this inference. Both philosophers, e.g. Sibley (2001), and semanticists, e.g. Asher et al. (2017), have long debated the existence of potentially non-intersective AN constructions in English, and how they might be analysed. There is also a limited discussion of a number of corresponding constructions in Japanese (see for instance Hoshi 2002: 9–12 and Yamakido 2000: 62–68). These constructions may appear to present a prima facie problem for the intersective analysis above. However, some can be discounted, we argue, as not being genuinely adjectival. For others, an enhanced analysis is indeed required, but satisfactory solutions either already exist or can be provided.

Below, we divide the constructions at issue into different types, and compare how they are rendered in Japanese with how they are rendered in English. In cases which we consider genuinely adjectival, we for the most part just refer to existing proposals in the literature. For the final type, however, we provide a detailed and in several respects novel solution.

4.1.1 Type A: Potentially non-subsective constructions

Ignoring AN constructions involving attributive-only adjectives like *mere*, which has no direct counterpart in Japanese, there are first of all AN constructions which have been argued to be non-intersective by virtue of not even being subsective. A **subsective** adjective is one which validates only the weaker inference from AN(x) to N(x). As we will show below, it is in fact not at all clear that either English or Japanese employs any genuinely non-subsective adjectives. Note that even attributive-only adjectives like *mere* in English are subsective: *He is a mere shadow of his former self* entails *He is a shadow of his former self.*

Some putative non-subsective AN constructions in English appear not to involve adjectives proper, and also have Japanese translations which do not involve adjectives. For example, the best Japanese translation of the phrase *alleged murderer* in English, supposedly non-subsective because an alleged murderer is not necessarily a murderer, involves a compound noun in Japanese (a more direct equivalent of the nominal *murder suspect* in English):

(31)   satuzin-yogisya (compound noun)
        murder-suspect
        'murder suspect'

The pre-head modifier *alleged* in English, which has no Japanese equivalent, is arguably a passive participle rather than an adjective. It is the passive of the verb *allege* in *They are alleged to be murderers*, and cannot occur in isolation predicatively: **These murderers are alleged.*

There are also examples in which a putatively non-subsective AN construction in English involving a genuine adjective corresponds to a Japanese construction which is not adjectival. There has been much discussion of the English modifier *fake* in *fake gun*, the claim being that a fake gun is not actually a gun (however see Sibley 2001, who disputes this on the grounds that a fake gun has many of the properties that we would expect to find in a gun). The modifier *fake* is plausibly treatable as an adjective even though there is a corresponding noun (as in *a fake*), for example it is modifiable by an adverb in *an obviously fake gun*. However the Japanese equivalent is clearly nominal in nature:

(32)   nise no zyuu (noun linker noun)
        fake NO gun
        'fake gun'

(33)   *zyuu wa   nise desita
        gun   TOP fake be.PST
        intended: 'the gun was fake'

The form *nise* 'fake' lacks Japanese adjectival morphology and cannot occur predicatively with a finite copula.

Despite this general avoidance strategy, Japanese does nevertheless possess examples of AN constructions which directly correspond to putatively non-subsective AN constructions in English. The English example *potential disaster*, where (as for *alleged murderer*) it is claimed that a potential disaster is not necessarily a real disaster, has an

adjectival counterpart with a *-na* adjective in Japanese:

(34) senzaiteki-na   sagai
      potential-ATTR disaster

The way to preserve subsectivity in cases such as these is clearly to modify the semantics in such a way as to permit modal interpretations: in a possible worlds semantics of modality the nominal *senzaiteki-na sagai* 'potential disaster' will then map onto the set of disasters in worlds which have the property of being potential worlds. In one (generalised) instantiation of this idea, Asher et al. (2017) provide a modification of the standard intersective formula which places an operator on the interpretation of the noun, viz, $\lambda x(O_A(N(X) \wedge M_N(A(X))))$. In the case of example (34) the noun N in the above formula will denote a set of disasters, but whether this set is located in the real world or in other possible worlds will depend on the meaning of the adjective. The operator O_A in the formula will vary the denotation of the noun by selecting the correct, in this case potential, worlds. Such a solution could equally be applied to examples such as *fake gun*, where the meaning of *gun* would be found in worlds where deception was intended.

Note that in the proposal outlined in the previous paragraph there is also a corresponding operator M_N which allows the meaning of the adjective to vary depending on the meaning of the noun. This is designed first of all to capture the cases in which the meaning of an adjective seems to depend on a comparison set. Such examples are extremely common, and are found both in English and Japanese:

(35) omo-i   nomi
      heavy-NPST flea

Obviously a flea cannot plausibly be deemed heavy in relation to any interpretation of whatever it might mean to be heavy independently of the object being weighed, but a flea can be heavy in comparison with other fleas. The intention of the operator introduced by Asher et al. (2017) is also found in more detailed semantic proposals which spell out the precise role of comparison sets in the interpration of the adjective, (e.g. Dalrymple 2001). Whichever proposal is adopted, however, the intersectivity of the construction can be preserved.

4.1.2   Type B: Potentially non-intersective examples

Turning to more specific potential cases of non-intersectivity which depend on the interpretation of the adjective we find that, as with the putative non-subsective cases, Japanese often employs a non-adjectival strategy to convey the same meanings.

The first set of examples involves English adjectives whose meaning can be thought of as covertly representing a thematic nominal, for example a *medical student* is an x who is a student of medicine (for many subjects of study the corresponding form is nominal, as in *chemistry student*). Japanese in this case just employs nominal strategies:

(36) igaku-sei   (*igaku* = noun)
      medicine-SEI

(37)   kagaku   no gakusei (*kagaku* = noun)
        chemistry NO student

In *igaku-sei* 'medical student', the strategy is to use a derivational morpheme meaning something like 'junior', while for other subjects of study we see a full syntactic construction where the modifier noun is linked to the head noun by the linker *no*, that is (37) mirrors English *chemistry student*.

Considerably more complex and in need of a fully satisfactory analysis are however a second set of (typically ambiguous) examples where in one sense the adjective appears to be predicated of an implied nominal. We give a representative set of English examples below:

- *heavy smoker*

    → x who is a smoker and whose smoking is heavy

- *Chinese chef*

    → x who is a chef and whose food is Chinese

- *beautiful dancer*

    → x who is a dancer and whose dancing is beautiful

- *old friend*

    → x who is a friend and whose friendship is old (=long-standing)

- *complete fool*

    → x who is a fool and whose foolishness is complete

Such potentially non-intersective examples appear much rarer in Japanese. There seems to be no direct equivalent in Japanese of *heavy smoker* in the required sense, and the equivalent of *Chinese chef* in the sense *x whose food is Chinese* is a purely nominal construction which directly reflects the semantics:

(38)   tyuuka-ryori no syehu
        Chinese-food NO chef
        'Chinese chef'

The equivalent of *beautiful dancer* is an AN construction, but according to the judgment of Hoshi (2002: 15) the example in (39) can only have the meaning *x who is beautiful and who is a dancer*.

(39)   kanozyo wa utukusi-i   dansaa da.
        she   TOP beautiful-ATTR dancer COP.NPST
        'She is a dancer who is beautiful.'

That is, only the intersective reading is available.

Nevertheless, there do exist AN constructions in Japanese with the required non-intersective sense as equivalents of *old friend* and *complete fool*. Consider first the examples in (40) and (41) (examples from Yamakido 2005: 67).

(40) Peter-ga   koorei-na tomodati da.
      Peter-NOM old-ATTR friend   COP.NPST
      'Peter is a friend who is of advanced age.'

(41) Peter-ga   huru-i   tomodati da.
      Peter-NOM long-standing.NPST friend   COP.NPST
      'Peter has been a friend for a long time.'

The *-na* adjective *koorei* 'old' straightforwardly provides the intersective reading, i.e. *x who is of advanced age*. A distinct *-i* adjective *huru-i*, meaning something like *long-standing*, provides the apparently non-intersective reading where, although it is syntactically attributed to the noun *tomodati*, it applies semantically to the age of the friendship. According to both Yamakido (2005: 66–67) and Hoshi (2002: 10), it sounds awkward to use *huru-i* predicatively of a person.

To our knowledge, there is just **one** potential example with a non-intersective interpretation of a *na*-adjective in Japanese, namely the equivalent of *complete fool* (Yamakido 2005: 68).[10]

(42) a. Max ga   kanzen-na   baka da
          Max NOM complete-ATTR fool COP.NPST
          'Max is a complete fool'
      b. #Max ga   kanzen   da
          Max NOM complete COP.NPST
          #'Max is complete'

Note that the predicative construction can only have the (very weird) intersective reading in which Max is somehow "whole". In the non-intersective reading, *kanzen* 'complete' appears to apply semantically to the foolishness attributable to Max.

4.2 Semantic analysis of non-intersectivity

Clearly the examples with both *huru-i* and *kanzen* represent prima facie counterexamples to the analysis of attributive adjectives as intersective, as do the similar (more extensive) examples found in English. In this section we propose a detailed semantic analysis of *kanzen-na baka* 'complete fool' which preserves intersectivity. This is intended as a template for the analysis of similar examples, although some detailed adaptations will be necessary, e.g. the introduction of temporal semantics into the analysis of *huru-i tomodati* 'old friend'.

The solution we propose involves a type-shifted semantic analysis in which an attributive adjective is predicated of an appropriate implied nominal. In particular, in the case of *kanzen-na baka* 'complete fool', *kanzen* 'complete' is predicated of "foolishness", the characteristic property of fools. This analysis has affinities with the generative lexicon proposals of Pustejovsky (1995), although the characteristic property of a noun is not one of the original "qualia" proposed in that framework.

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[10]Hoshi (2002: 12) may be the first to note the issues with this example, using the expression 'a fool the degree of which is complete as a fool' as an attempted paraphrase.

Essentially, the meaning of *baka* 'fool' will be optionally type-shifted from a set denotation to a relational denotation by adding an extra argument for "foolishness". This kind of operation is well-established in the analysis of genitive dependents (e.g. Vikner & Jensen 2002; Payne et al. 2013), although the type-shifting we propose is one level of complexity greater.[11] The basic idea of using such a relational denotation for "gradable" nouns such as *fool* is in itself not new: it can be found in Constantinescu (2013), and is subsequently used by Rutland (2022). Nevertheless, the analysis provided here differs from these previous ones in its typing, and in the provision of a full new account of the compositionality involved. The type-shifting of *baka* 'fool' entails that the attributive marker too must be correspondingly shifted to take a relational noun rather than a set-denoting noun as argument. The result is then that the adjective *kanzen* 'complete' is predicated of "foolishness" rather than "fool", and the resulting meaning is therefore available only attributively. We presume that the type-shifting process is initially driven by the noun, since the choice of nouns that permit it is language specific. This language specificity also suggests that the process is a semantic one rather than one driven by general pragmatic inferencing.

Nouns like "foolishness" are (at the individual level) variously treated in the formal semantics literature as

(a) as "tropes" (instances of properties) (Constantinescu 2013)

(b) as states (instances of state types) (Rutland 2022)

(c) as "portions" of a mass (Francez & Koontz-Garboden 2015)

All these types, and certainly others too, may well be required in a wider analysis of non-intersectivity. For example, "friendship" will be best treated as a state for which a temporal duration can be specified. Nouns such as "smoker" (in English, but not Japanese) will need a semantics appropriate for agentive nouns. However, the notion of "portion" seems to fit well with the concept of "completeness", and we adopt it here. In the treatment of property concepts by Francez & Koontz-Garboden (2015), "portions" of a property are entities, i.e. of type <e>. In the formula below corresponding to *complete fool*, "d" should therefore be interpreted as a variable over portions (this is their choice of variable, and should not be confused with "d" representing "degree"). For clarity, we use English rather than Japanese for the semantic primitives involved:

(43)   *complete fool*:
       $\lambda x.\text{fool}(x) \wedge \exists d[\text{foolishness}(d) \wedge \text{POSS}(x,d) \wedge \text{complete}(d)]$

Simply, this formula denotes the set of x such that x is a fool and there exists a portion "d" of foolishness such that x possesses d and d is complete.

An immediate issue that arises here is compositionality. How do we get from the individual meanings of *fool*, *complete* and the attributive marker *-na* to the final representation of *complete fool* above? The first stage looks deceptively simple; we could take the type-shifted formula corresponding to *fool* to be as follows:

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[11] The type shifting required for nouns taking genitive dependents takes a basic noun meaning of type <e,t> and adds an extra argument of type <e>, resulting in a shifted type <e,<e,t>>. The type shifting required for nouns like *fool* will add an extra argument of type <e,t>, resulting in a shifted type of <<e,t>,<e,t>>.

(44)   *fool* (type-shifted)
         $\lambda x.\text{fool}(x) \wedge \exists d[\text{foolishness}(d) \wedge \text{POSS}(x,d)]$

But then to capture the required modification by *complete* we have the difficulty of introducing into this formula a new clause involving the variable "d", which is already bound by the existential quantifier. One possible solution might be to introduce the existential quantifier at a later stage, after the introduction of *complete*. This however has its own issues, not least the arbitrariness of deciding non-arbitrarily when existential closure should apply.

  Similar issues arise in event semantics, where it is necessary sometimes to introduce adverbial modification of a verb inside a quantified event structure. In the nominal realm, we suggest a solution analogous to that of Champollion (2015), who proposes that verbs denote sets of events. The denotation of type-shifted nouns like *fool* will then be a relation between sets of individuals and sets of properties, viz.

(45)   [fool] (type-shifted):
         $\lambda P.[\lambda x.\text{fool}(x) \wedge \exists d[\text{foolishness}(d) \wedge \text{POSS}(x. d) \wedge P(d)]]$

In the relative clause semantics we have adopted, [*complete*] will first be combined with [*pro*] in the usual manner, and the corresponding type-shifting of [*complete-pro*] will be introduced by a type-shifted variant of [*rel*], where P and Q are both of type <e,t>, and **Q** is of type <<e,t>,<e,t>>. Let us call this [*rel**]:

(46)   [rel*]:
         $\lambda Q.\lambda \mathbf{Q}.\lambda P.\mathbf{Q}(\lambda d.Q(d) \wedge P(d))$

The denotation of [*complete-pro-rel**] will correspondingly be:

(47)   [complete-pro-rel*]:
         $\lambda \mathbf{Q}.\lambda P.\mathbf{Q}(\lambda d.\text{complete}(d) \wedge P(d))$

And when this is applied to the type-shifted *fool*, we derive:

(48)   [complete-pro-rel*-fool]:
         $\lambda \mathbf{Q}.\lambda P.\mathbf{Q}(\lambda d.\text{complete}(d) \wedge P(d))[\lambda P'.[\lambda x.\text{fool}(x) \wedge \exists d[\text{foolishness}(d) \wedge \text{POSS}(x. d) \wedge P'(d)]]]$

This simplifies to:

(49)   [complete-pro-rel*-fool]:
         $\lambda P.[\lambda x.\text{fool}(x) \wedge \exists d[\text{foolishness}(d) \wedge \text{POSS}(x. d) \wedge \text{complete}(d) \wedge P(d)]]$

Each (enhanced) attributive adjective meaning thus brings with itself the possibility of further modification of the same kind.

  In order to achieve CLOSURE (in this case getting back to a standard noun denotation of type <e,t>), we apply the denotation of *complete-pro-rel*-fool* to the universal set of entities, denoted by U:

(50)   [complete-pro-rel*-fool] (closed):
         $\lambda P.[\lambda x.\text{fool}(x) \wedge \exists d[\text{foolishness}(d) \wedge \text{POSS}(x. d) \wedge \text{complete}(d) \wedge P(d)]](U)$

This in turn simplifies to:

(51)　[complete-pro-rel*-fool] (closed):
　　　λx.fool(x) $\wedge$ $\exists$d[foolishness(d) $\wedge$ POSS(x. d) $\wedge$ complete(d) $\wedge$ U(d)]

This effectively says that the expression $\exists$d[foolishness(d) $\wedge$ POSS(x. d) $\wedge$ complete(d)] is true of all entities in U as long as one of them is a portion of foolishness possessed by x which is complete. In other words, since U(d) is necessarily true, the final expression denoting [*complete-pro-rel*-fool*] is logically equivalent to:

(52)　[complete-pro-rel*-fool] (closed):
　　　λx.fool(x) $\wedge$ $\exists$d[foolishness(d) $\wedge$ POSS(x,d) $\wedge$ complete(d)]

In the basic analysis of non-intersective *complete fool* above, the initial type-shifting of the noun *fool* of type <e,t> to the higher type <<e,t>,<e,t>> was applied to the lexical item *fool*. In a generalised analysis, this operation may need to be applied to already modified nominals of type <e,t>. This would allow for a standard (intersective) modifier to intervene between *complete* and *fool* as in (for English) *complete argumentative fool*. Similarly the CLOSURE operation which brings expressions of the higher type <<e,t>,<e,t>> back down to the standard nominal type <e,t> will necessarily have to apply before any determiner can be added. However, in a generalised analysis it may need to apply earlier in order to allow a standard (intersective) modifier to apply to the higher level nominal *complete fool*, as in (for English) *argumentative complete fool*. The basic analysis already straightforwardly allows iteration of non-intersective mofifiers, as in English *complete total fool*.

5　Conclusion

In this paper we have followed many others in assuming that *i*- and *na*-adjectives in Japanese all belong to one class. We have also taken on board the common intuition that attributive adjectives share some functional properties with relative clauses. However, our analysis captures these parallels without having to assume structural similarity. It is based rather on the assumption that both predicative and attributive adjectives require a subject, and for attributives it is the licenser that provides the SUBJ feature and assigns a value to it. The distributional differences between *i*- and *na*-adjectives are accounted for by *na*-adjectives requiring a licenser, whereas for *i* adjectives, the required features are part of the lexical entry for the adjective, and -*i* contributes only a TENSE feature.

　　An issue that has been raised in relation to relative-clause analyses of attributive adjectives in Japanese is the fact that relative clauses are associated with an intersective reading, whereas attributive adjectives need not involve intersectivity. We show that many, possibly most, of the examples of non-intersectivity that have been discussed for English do not exist in Japanese, and for the examples that can be identified, we provide a semantic analysis that resolves the issue. This analysis involves the type-shifting of non-intersectively modified nouns from the basic type <e,t> to the higher type <<e,t>,<e,t>>, together with a corresponding shift of non-intersective attributes to the type <<<e,t>,<e,t>>, <<e,t><e,t>>>. We note that this type-shifting operation shifts nouns and their modifiers to a level higher than that required either for

basic nouns or for relational nouns. This appropriately reflects the comparative rarity of non-intersective adjectival constructions in languages like Japanese.

References

Asher, Nicholas, Tim Van de Cruys, Antoine Bride & Márta Abrusán. 2017. Integrating type theory and distributional semantics: A case study on adjective-noun composi-tions. *Computational Linguistics* 42(4). 703–725. https://doi.org/10.1162/COLI_a_00264.

Attia, Mohammed. 2008. A unified analysis of copula constructions in LFG. In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of the LFG'08 Conference*, 89–108. Stanford, CA: CSLI Publications. https://typo.uni-konstanz.de/lfg-proceedings/LFGprocCSLI/LFG2008/papers/lfg08attia.pdf.

Backhouse, Anthony E. 2004. Inflected and uninflected adjectives in Japanese. In R M W Dixon & Alexandra Y Aikhenvald (eds.), *Adjective classes: a cross-linguistic typology*, 50–73. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780199270934.001.0001.

Baker, Mark. 2003. Verbal adjectives as adjectives without phi-features. In Yukio Otsi (ed.), *Proceedings of the fourth Tokyo conference on psycholinguistics*, 1–22. Tokyo: Hituzi Syobo Publishers. https://www.hituzi.co.jp/hituzibooks/ISBN4-89476-209-9.htm.

Bhat, D N S. 1994. *The adjectival category: criteria for differentiation and identifica-tion*. Amsterdam: John Benjamins.

Bolinger, Dwight. 1967. Adjectives in English: attribution and predication. *Lingua* 18. 1–34.

Butt, Miriam, Tracy Holloway King, María Eugenia Niño & Fédérique Segond. 1999. *A grammar writer's cookbook*. Stanford, CA: CSLI Publications.

Börjars, Kersti & John Payne. 2018. Licensing attributive adjective marking. Paper presented at *The LFG'18 Conference*, Vienna.

Champollion, Lucas. 2015. The interaction of compositional semantics and event se-mantics. *Linguistics and Philosophy* 38(1). 31–66. https://doi.org/10.1007/s10988-014-9162-8.

Constantinescu, Camelia. 2013. Big eaters and real idiots: evidence for adnominal degree modification? In Emmanuel Chemla, Vincent Homer & Grégoire Winterstein (eds.), *Proceedings of Sinn und Bedeutung 17*, 183–200. https://ojs.ub.uni-konstanz.de/sub/index.php/sub/article/view/340.

Croft, William. 1991. *Syntactic categories and grammatical relations*. Chicago, IL: University of Chicago Press.

Dalrymple, Mary. 2001. *Lexical Functional Grammar* (Syntax and Semantics 34). New York: Academic Press. https://doi.org/10.1163/9781849500104.

Dalrymple, Mary, Helge Dyvik & Tracy Holloway King. 2004. Copular complements: closed or open? In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of the LFG'04 Conference*, 188–198. Stanford, CA: CSLI Publications. https://typo.uni-konstanz.de/lfg-proceedings/LFGprocCSLI/LFG2004/pdfs/lfg04ddk.pdf.

Dalrymple, Mary, John Lowe & Louise Mycock. 2019. *The Oxford reference guide to Lexical Functional Grammar*. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780198733300.001.0001.

Francez, Itamar & Andrew Koontz-Garboden. 2015. Semantic variation and the grammar of property concepts. *Language* 91(3). 533–63. https://doi.org/10.1353/lan.2015.0047.

Frellesvig, Bjarke. 2010. *A history of the Japanese language*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511778322.

Frellesvig, Bjarke. 2022. On the reconstruction of Pre-Old Japanese morphology: OJ grammatical morphemes reflecting Pre-OJ *k- *s-. In Kaoru Horie, Kimi Akita, Yusuke Kubota, David Y. Oshima & Akira Utsugi (eds.), *Japanese/Korean Linguistics 29*, 25–49. Stanford, CA: CSLI Publications. https://web.stanford.edu/group/cslipublications/cslipublications/site/JK29Abstract.shtml.

Hoshi, Koji. 2002. The Kaynean analysis of nominal modification and its parametric implication. *Language, Culture and Communication* 29. 1–25.

Kuno, Susumu. 1973. *The structure of the Japanese language*. Cambridge MA: MIT Press.

Miyagawa, Shigeru. 1987. Lexical categories in Japanese. *Lingua* 73(1–2). 29–51.

Morita, Chigusa. 2010. The internal structure of adjectives in Japanese. *Linguistic Research* 26. 105–117.

Nishiyama, Kunio. 1999. Adjectives and the copulas in Japanese. *Journal of East Asian Linguistics* 8(3). 183–222.

Nordlinger, Rachel & Louisa Sadler. 2007. Verbless clauses: revealing the structure within. In Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling, Chris Manning, Jane Simpson & Annie Zaenan (eds.), *Architectures, rules, and preferences: a Festschrift for Joan Bresnan*, 139–60. Stanford, CA: CSLI Publications.

Payne, John, Geoffrey K Pullum, Barbara Scholz & Eva Berlage. 2013. Anaphoric *one* and its implications. *Language* 89(4). 794–829. https://doi.org/10.1353/lan.2013.0071.

Pullum, Geoffrey K & Rodney Huddleston. 2002. Prepositions and preposition phrases. In Rodney Huddleston & Geoffrey K Pullum (eds.), *The Cambridge grammar of the English language*, 597–662. Cambridge: Cambridge University Press.

Pustejovsky, James. 1995. *The generative lexicon*. Cambridge, MA: MIT Press.

Reichenbach, Hans. 1947. *Elements of symbolic logic*. New York: The Free Press.

Rutland, Colin. 2022. *The lexical semantics of gradable nouns in English*. Ph.D. thesis, The University of Manchester. https://www.proquest.com/openview/0190bc8dee0e860684d8589eb819b619/1?pq-origsite=gscholar&cbl=2026366&diss=y.

Sibley, Frank. 2001. Adjectives, predicative and attributive. In Frank Sibley, John Benson, Betty Redfern & Jeremy Roxbee Cox (eds.), *Approach to aesthetics: collected papers on philosophical aesthetics*, 154–175. Oxford: Oxford University Press. https://doi.org/10.1093/0198238991.001.0001.

Smith, Carlota S. 1961. A class of complex modifiers in English. *Language* 37(3). 342–365.

Vikner, Carl & Per Anker Jensen. 2002. A semantic anaysis of the English genitive. Interaction of lexical and formal semantics. *Studia Linguistica* 56(2). 191–226. https://doi.org/10.1111/1467-9582.00092.

Wechsler, Stephen. 2009. Attributive and predicative adjectives (summary and proposal). *Linguistlist* August 21, 2009. https://listserv.linguistlist.org/pipermail/lfg/2009-August/001605.html.

Whitman, John. 1981. The internal structure of NP in verb final languages. In Robert A Hendrick, Carrie S Masek & Mary Frances Miller (eds.), *Papers from the seventeenth regional meeting of the Chicago Linguistic Society*, 411–418. Chicago: Chicago Linguistics Society.

Yamakido, Hiroko. 2000. Japanese attributive adjectives are not (all) relative clauses. In Roger Billerey & Brook Danielle Lillehaugen (eds.), *WCCFL 19: Proceedings of the 19th West Coast Conference on Formal Linguistics*, 588–602. Somerville, MA: Cascadilla Press. https://www.cascadilla.com/wccfl19.html.

Yamakido, Hiroko. 2005. *The nature of adjectival inflection in Japanese*. Ph.D. thesis, Stony Brook University. https://linguistics.stonybrook.edu/_pdf/dissertation/Yamakido_2005_dissertation.pdf.

Zweigenbaum, Pierre. 1988. Attributive adjectives, adjuncts, and cyclic f-structures in Lexical-Functional Grammar. Tech. rep. Paris: Département Intelligence Artificielle et Médecine, Paris 6. https://perso.lisn.upsaclay.fr/pz/FTPapiers/ZweigenbaumLFG1988.pdf.