Semantic Analysis of Potential *rare* in Japanese

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Potential *rare*, and tough predicates *yasui* 'easy', *nikui* 'hard' pose some important questions for most grammatical theories. They are attached to another predicate and change the number of its complements. They may turn an adverb into a *ga*-marked complement. They may delete the original subject and promote a complement into the subject position. This paper gives syntactic analysis of some typical expressions that contain potential *rare*, and formulates semantic representations of them. The syntactic analysis follows that of Muraki (1993) in the framework of phrase structure grammar (Cf Gazdar et al 1985, Gunji 1987). The semantic representations are based on Montague semantics (Cf Montague 1973, Dowty 1981) with some adjustments.

***potential *rare* *phrase structure grammar *Montague semantics**

(1) gives the major syntactic categories and the corresponding semantic types. Semantic types are put in ⟨ ⟩. For example, TVP is a syntactic category, but the corresponding semantic type is referred to by ⟨TVP⟩, ⟨NP, IVP⟩, etc.

(1)	a	S	⟨S⟩=⟨t⟩	sentence
	b	CN	⟨CN⟩=⟨e, t⟩	common noun
	c	NP	⟨NP⟩=⟨CN, t⟩=⟨⟨e, t⟩, t⟩	noun phrase
	d	IVP	⟨IVP⟩=⟨NP, t⟩=⟨⟨CN, t⟩, t⟩	intransitive VP
	e	TVP	⟨TVP⟩=⟨NP, IVP⟩=⟨NP, ⟨NP, t⟩⟩	transitive VP
	f	DTVP	⟨DTVP⟩=⟨NP, TVP⟩=⟨NP, ⟨NP, IVP⟩⟩	ditransitive VP
	g	IVP-IVP	⟨IVP-IVP⟩=⟨IVP, IVP⟩=⟨IVP, ⟨NP, t⟩⟩	
	h	TVP-TVP	⟨TVP-TVP⟩=⟨TVP, TVP⟩=⟨TVP, ⟨NP, ⟨NP, t⟩⟩⟩	

In (2), potential *rare* is an IVP-IVP, and takes IVP *Huransugo wo hanas* 'speak French' as complement and forms an IVP. Tense will be ignored below since it is ir-

relevant to the discussion. Case-marker *wo* is assigned by *hanas* 'speak'. Potential *rare* takes the form *e* after a consonant verb. What follows "⇒" is the SR (semantic representation) of the preceding syntactic unit. ⟨T⟩=⟨NP⟩ of (2b) means that the semantic type of variable "T" is the same as that of NP.[1]

(2) a Taroo ga [⟨Huransugo wo hanas⟩ e] ru. S
Taro Nom French Acc speak can Prs
'Taro can speak French.'
⇒ rare (t, hanas (t, fr)) ⟨t⟩
where: fr 'French', t 'Taroo'

b Huransugo wo hanas e 'can speak French' IVP
⇒ λT. T(λx. rare (x, hanas (x, fr)))
where: ⟨T⟩=⟨NP⟩

c Huransugo wo hanas 'speak French' IVP
⇒ λU. U (λy. hanas (y, fr))

d rare IVP-IVP
⇒ λW λT. T (λx. W(λP. rare (x, P (x)))) ⟨IVP, IVP⟩
where: ⟨W⟩=⟨IVP⟩=⟨NP, t⟩; ⟨T⟩=⟨NP⟩; ⟨P⟩=⟨e, t⟩.

e Huransugo 'French' NP
⇒ λP. P (fr)
where: ⟨Huransugo⟩=⟨NP⟩; ⟨fr⟩=⟨e⟩

In (3a), potential *rare* is a TVP-TVP, and takes a TVP as complement. TVP *hanas e* 'can speak' takes *Huransugo* 'French' as its complement, and assigns case-marker *ga* to it.

(3) a Taroo ga [Huransugo ga ⟨hanas e⟩] ru. S
Taro Nom French Nom speak can Prs
'Taro can speak French.'
⇒ rare (t, hanas (t, fr)) ⟨t⟩

b hanas e 'can speak' TVP
⇒ λU λT. U (λy. T(λx. rare (x, hanas (x, y)))) ⟨NP, ⟨NP,t⟩⟩

c hanas 'speak' TVP
⇒ λH λG. H (λh. G(λg. hanas (g, h))) ⟨NP, IVP⟩
where: ⟨H⟩=⟨G⟩=⟨NP⟩, ⟨g⟩=⟨h⟩=⟨e⟩

d rare TVP-TVP
⇒ λW λU λT. U (λy. T(λx. [W(λQ. Q(y))](λP. rare (x, P(x)))))
where: ⟨W⟩=⟨TVP⟩=⟨NP,⟨NP, t⟩⟩

Examples like (4) show that *deki* is an allomorph of potential *rare*. *Rikai deki* 'can understand' in (4b) is underlyingly *rikaisu rare*.

(4) a Taroo ga [Huransugo wo rikaisu] ru. S
Taroo Nom French Acc understand Prs
'Hanako understands French.'
⇒ rikaisu (t, fr)

b Taroo ga [Huransugo ga ⟨rikaisu rare⟩] ru. S
(rikaisu rare ⇒ rikai deki)
⇒ rare (t, rikaisu (t, fr))

c rikaisu 'understand' TVP
⇒ λH λG. H (λh. G(λg. rikaisu (g, h))) ⟨NP, IVP⟩

d rare TVP-TVP ⇒ (3d)

Koko ni kuruma wo tome 'park the car here' of (5) is an IVP, and is the complement of IVP-IVP *rare*. In (6), *rare* is a TVP-TVP since *kuruma wo tome* 'park the car' is a TVP.[2] Similarly, *rare* in (7), which is attached to DTVP *tome* 'park', is a DTVP-DTVP.

(5) a Gakusei ga [⟨koko ni kuruma wo tome⟩ rare] ru. S
students Nom here at car Acc park can Prs
'Students can park their cars here.'
⇒ rare(gk, ni(koko, tome(gk, kuruma)))
where: gk 'students'

b koko ni kuruma wo tome rare 'can park the car here' IVP
⇒ λX. X (λx. rare(x, ni(koko, tome(x, kuruma))))

c koko ni kuruma wo tome 'park the car here' IVP
⇒ λU. U (λu. ni (koko, tome(u, kuruma)))
where: ⟨U⟩=⟨NP⟩, ⟨u⟩=⟨e⟩
d rare IVP-IVP = (2d)

(6) a Gakusei ga koko ga [⟨kuruma wo tome⟩ rare] ru. S
students Nom here Nom car Acc park possible Prs
'Students can park their cars here.'
⇒ (5a)
b kuruma wo tome 'park the car' TVP
⇒ λH λG. H (λh. G(λg. ni(h, tome(g, kuruma))))
where: ⟨G⟩=⟨H⟩=⟨NP⟩, ⟨g⟩=⟨h⟩=⟨e⟩
c rare TVP-TVP = (3d)

(7) a Taroo ni [koko ga ⟨kuruma ga [tome rare]⟩] ru. S
Taroo for here Nom car Nom park possible Prs
'Taro can park the car here.'
⇒ rare(t, ni(koko, tome(t, kuruma)))
b tome rare 'can park' DTVP
⇒ λZ λY λX. Z (λz. Y (λy. X(λx. rare(x, ni(z, tome(x, y))))))
where: ⟨Z⟩=⟨Y⟩=⟨X⟩=⟨NP⟩
c tome 'park' DTVP
⇒ λH λG λF. H (λh. G(λg. F(λf. ni(h, tome(f, g)))))
where: ⟨F⟩=⟨G⟩=⟨H⟩=⟨NP⟩, ⟨f⟩=⟨g⟩=⟨h⟩=⟨e⟩
d rare DTVP-DTVP
⇒ λW λZ λY λX. Z (λz. Y(λy. X(λx. [[W(λR. R(z))] (λQ. Q(y))]
(λP. rare (x, P(x))))))
where: ⟨W⟩=⟨DTVP⟩; ⟨X⟩=⟨Y⟩=⟨Z⟩=⟨NP⟩; ⟨P⟩=⟨Q⟩=⟨R⟩=⟨e, t⟩

Time adverb *asa* 'in the morning' in (8) consists of NP *asa* and phonologically empty postposition "Tm". Adverbial *asa* and potential *rare* in (2) are both IVP-IVP's. They are not claimed to belong to the same syntactic category. They only share the

same syntactic property in that they can be combined with an IVP to form an IVP.

(8) a Taroo ga [asa ⟨hayaku oki⟩] ta.
Taroo Nom in-the-morning early get-up Pst
'Taro got up early in the morning.'
⇒ Tm(asa, hayaku-oki(t)) ⟨t⟩

b asa 'in the morning' IVP-IVP
⇒ λW λT. T(λx. W(λP. Tm(asa, P(x))))
where: ⟨W⟩=⟨IVP⟩

c Tm NP-(IVP-IVP)
⇒ λU λW λT. U(λy. T(λx. W(λP. Tm(y, P(x)))))
where: ⟨U⟩=⟨T⟩=⟨NP⟩

Asa in (9) is a nominal complement of ***hayaku oki rare*** 'can get up early'. Potential *rare* in (9) is an IVP-TVP since it takes IVP ***hayaku oki*** as complement and forms TVP ***hayaku oki rare***. IVP-TVP *rare* increases the number of complements by turning a nominal adverb into a nominal complement.

(9) a Taroo ni wa [asa ga ⟨[hayaku oki] rare⟩] nai. S
Taroo for Top morning Nom early get-up can not
'Taro cannot get up early in the morning.'
⇒ nai (rare (t, Tm (asa, hayaku-oki (t)))) ⟨t⟩

b hayaku oki rare 'can get up early' TVP
⇒ λU λT. U(λy. T(λx. rare (x, Tm (y, hayaku-oki (x))))) ⟨NP, IVP⟩

c hayaku oki 'get up early' IVP
⇒ λU. U (λy. hayaku-oki (y))

d rare IVP-TVP
⇒ λW λU λT. U (λy. T(λx. W(λP. rare (x, Tm (y, P (x))))))
where: ⟨W⟩=⟨IVP⟩

e asa 'morning' NP
⇒ λQ. Q (asa)
where: ⟨asa⟩=⟨e⟩

Kono kawa de 'in this river' is an adverb in (10), but *kono kawa* 'this river' of (11) is a nominal complement of *tur e* 'can catch'. While *tur* 'catch, angle' is a TVP, *tur e* 'can catch' is a DTVP that takes two objects *kono kawa* 'this river' and *sakana* 'fish', and assigns case-marker *ga* to both of them.

(10) Taroo ga [⟨kono kawa de⟩ ⟨sakana wo tut⟩] ta.
Taro Nom this river in fish Acc catch Pst
'Taro caught fish in this river.'
⇒ tur (t, de (kk, tur (t, sakana)))
where: kk 'this river'

(11) a Taroo ni wa kono kawa ga sakana ga tur e ru.
Taro for Top this river Nom fish Nom catch can Prs
'Taro can catch fish in this river.'
⇒ rare (t, de (kk, tur (t, sakana)))
where: kk 'this river'

b tur e 'can catch' DTVP
⇒ λV λU λT. V (λz. U(λy. T(λx. rare (x, de (y, tur (x, z))))))

c tur 'catch, angle' TVP
⇒ λH λG. H (λh. G(λg. tur (g, h)))
where: ⟨G⟩=⟨H⟩=⟨NP⟩

d rare TVP-DTVP
⇒ λW λV λU λT. V (λz. U(λy. T(λx. [W(λQ. Q(z))](λP. rare (x, y, P(x))))))
where: ⟨W⟩=⟨TVP⟩, ⟨V⟩=⟨U⟩=⟨T⟩=⟨NP⟩

e kono-kawa 'this river' NP
⇒ λQ. Q (kk)
where: ⟨Q⟩=⟨e,t⟩; ⟨kk⟩=⟨e⟩

Oyog 'swim' is intransitive in (12) but transitive in (13). While *kono kawa* 'this river' in (12) refers to the river where Taro's swimming took place, *kono kawa* 'this river' of (13) is the target of some specific way of swimming. It may be swimming

across the river or swimming upstream or any manner of swimming with respect to the river depending on the context.

(12) Taroo ga kono kawa de oyoi da.
Taro Nom this river at swim Pst
'Taro swam in this river.'
⇒ de (kk, oyog (t))
where: kk 'this river'

(13) Taroo ga kono kawa wo oyoi da.
Taro Nom this river Acc swim Pst
'Taro swam this river.'
⇒ oyog (t, kk)

Though (14) is clearly an incomplete sentence from which the subject is omitted, (15) is a complete sentence. It is ambiguous between (16a) and (17a), depending on which of the two readings of *oyog* 'swim' is used in it. In either of them, the subject is ***kono kawa*** 'this river', and the implied agent is generic/nonspecific. Note that the SR of IVP-IVP *rare* in (16) is different from that of IVP-IVP *rare* in (2).

(14) Kono kawa de/wo oyog u 'swim in this river'

(15) Kono kawa ga oyog e ru.
this river Nom swim possible Prs
'This river is swimmable.'

(16) a Kono kawa ga oyog e ru.
'One can swim in this river.'
⇒ rare (ø, de (kk, oyog (ø)))
where: ø 'nonspecific person'; kk 'this river'
b oyog e 'can swim' IVP
⇒ λT. T (λx. rare (ø, de (x oyog (ø))))

c oyog IVP ⇒ λU. U (λy. oyog (y))

d rare IVP-IVP
⇒ λW λT. T (λx. W(λQ. rare (ø, de (x, Q (ø)))))
where: ⟨W⟩=⟨IVP⟩

(17) a Kono kawa ga oyog e ru.
'We/they can swim this river.'
⇒ rare (ø, oyog (ø, kk))

b oyog e 'can swim' IVP
⇒ λT. T (λx. rare (ø, oyog (ø, x)))

c oyog 'swim' TVP
⇒ λH λG. H (λh. G(λg. oyog (g, h)))
where: ⟨H⟩=⟨G⟩=⟨NP⟩, ⟨g⟩=⟨h⟩=⟨e⟩

d rare TVP-IVP
⇒ λW λT. T (λx. [W(λQ. Q(x))](λP. rare (ø, P (ø))))
where: ⟨W⟩=⟨TVP⟩.

Suiei wo su 'swim' of (18) is an IVP. When potential *rare* is attached to *su* 'do' as in (19a), *su rare* is replaced by *deki*. In (19a), locative nominal *kono kawa* 'this river' is promoted to the subject position, but the agent is no longer an argument. TVP-TVP *rare* of (19) is distinct from TVP-TVP *rare* of (3). (20) shows that *rare* cannot take NP *wo su* 'do NP' as complement (cf Muraki 1993).

(18) Taroo ga kono kawa de suiei wo su ru.
Taroo Nom this river in swimming Acc do Prs
'Taro swims in this river.'
⇒ de (kk, su (t, suiei))

(19) a Kono kawa ga [suiei ga su rare] ru. (su rare → deki)
this river Nom swimming Nom do Prs
'This river is swimmable.'
⇒ rare (ø, kk, su (ø, suiei))

where: kk: kono kawa 'this river';
ø : generic or nonspecific person

b deki = su rare 'can do' TVP
⇒ λU λT. U (λy. T(λx. rare (ø, y, su (ø, x))))

c suiei 'swimming' NP
⇒ λP. P (suiei)
where: ⟨suiei⟩=⟨e⟩

d su 'do' TVP
⇒ λU λT. U (λy. T(λx. su (x, y)))

e rare TVP-TVP
⇒ λW λU λT. U (λy. T(λx. [W(λQ. Q(y))](λP. rare (ø, x, P (ø)))))
where: ⟨W⟩=⟨TVP⟩

(20) * Kono kawa ga [⟨suiei wo su⟩ rare] ru. (su rare → deki)
'This river is swimmable.'

Kono hude 'this writing brush' is the object of instrumental *de* in (21), but the object of *kireini kak e* 'can write beautifully' in (22). In (23), it is promoted to the subject position.

(21) Taroo ga kono hude de kana-mozi wo kireini kak u.
Taro Nom this brush with kana-letters Acc beautifully write Prs
'Taro writes kana-letters beautifully with this writing brush.'
⇒ de (kh, (kireini (kak (t, kz)))
where: kz 'kana letters', kh 'this writing brush'

(22) a Taroo ni wa kono hude ga zi ga kireini kak e ru.
Taro for Top this brush Nom letters Nom beautifully write can Prs
'This brush enables Taro to write characters/letters beautifully.'
⇒ rare (t, h, kireini (kak (t, zi)))
where: h 'this writing brush'; zi 'characters, letters'

b kireini kak 'write beautifully' TVP

⇒ λH λG. H (λh. G (λg. kireini (kak (g, h))))
where: ⟨H⟩=⟨G⟩=⟨NP⟩

c rare TVP-DTVP = (11d)

(23) a Kono hude wa kanamozi ga kiereini kak e ru.
this brush Top kana-letters Nom beautifully write can Prs
'This brush enables one to write kana-letters beautifully.'
⇒ rare (ø, hude, kireini (kak (ø, kana)))
where: hude 'this brush'; ø 'generic nonspecific agent'

b kireini kak e TVP
'enable one to write beautifully'
⇒ λU λT. U (λy. T(λx. rare (ø, x, kireini (kak (ø, y)))

c rare TVP-TVP = (19e)

Summary:

1) Phrase structural analysis does not need Equi NP Deletion nor empty PRO as subject of the complement clause. The argument structure is also a semantic structure.
2) Change of case-markers is not needed.
3) Potential *rare* can turn a nominal adverb into a complement. It can promote a complement or nominal adverb to the subject position. Theoretically there is no limit in the number of nominal adverbs that *rare* can change into complements though it may be restricted by functional factors.
4) Each syntactic unit is a semantic unit.

Notes:

1. Square brackets and angle brackets are used alternately to indicate the constituent structure. The two kinds of brackets are used only for ease of pairing left and right brackets.
2. (6a) becomes much more natural when the subject is topicalized and has *wa* instead of *ga*.

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