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An HPSG-Styled Grammar of Cases: An Analysis of Japanese Multiple Nominative Sentences

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See talk abstract for the abstract for this paper.

1. The Syntax of Cases, i.e., Nominative, Accusative, and Genitive

Cases are the heads of special kinds of adjuncts. For example, the nominative is the head of a noun-nominative sequence, and the noun-nominative sequence is an adjunct to a finite verb. This is implemented, as in (1).

(1) The AVM of *ga* 'NOM'

ga

HEAD MAJ *k*
KFORM *nom*
MOD HEAD MAJ *v*
VFORM *finite*
SUBCAT FIRST HEAD [MAJ *n*]
QUANTIFIED *yes*
REST *end*

[HEAD | MOD | HEAD | MAJ *v*] and [HEAD | MOD | HEAD | VFORM *finite*] indicate that the nominative case can adjoin to a linguistic object of the sort [HEAD | MAJ *v*] and [HEAD | VFORM *finite*], i.e., a finite verb. The SUBCAT specification indicates that the nominative case subcategorizes for one linguistic object, the sort of which is [HEAD | MAJ *n*] and [QUANTIFIED *yes*], i.e., an explicitly-or-implicitly- quantified noun, e.g., *zyon* 'John' with the meaning of $\{X \mid \{x \mid John'(x)\} \cap X \neq \varnothing\}$. (The CONTENT value of the nominative will further be given in (6), and it will be revised in (14).)

Similarly, the accusative is the head of a noun-accusative sequence, and the noun-accusative sequence is an adjunct to a transitive verb.

(2) The AVM of *o* 'ACC'

o 'ACC'

HEAD MAJ *k*
KFORM *acc*
MOD HEAD MAJ *v*
CHECK_ACC *yes*
SUBCAT FIRST HEAD [MAJ *n*]
QUANTIFIED *yes*
REST *end*

The accusative has as feature specifications [HEAD | KFORM ***acc***] and [HEAD | MOD | **HEAD | CHECK_ACC *yes***]. The latter indicates that the accusative modifies a transitive verb constituent. Here transitive verbs, e.g., *tukuru* 'make-NONPERF', have

the feature specification of [HEAD | CHECK_ACC *yes*], whereas intransitive verbs, e.g., *neru* ‘sleep-NONPERF’, have the feature specification of [HEAD | CHECK_ACC *no*]. (The CONTENT value of accusative will be given in (7).)

See an analysis of genitive for Koga (in review).

2. The Saturation of SUBCAT Requirements by Small *pro*s is Already Done in the Lexicon

Since noun-case sequences are adjuncts, the SUBCAT requirements related to cases can be, and actually is in the grammar, saturated in the lexicon, as exemplified in (3) and (4).

(3) *neru* ‘sleeps’[1]

HEAD MAJ *v*
VFORM *finite*
CHECK_ACC *no*
MOD *no*
SUBCAT ***end***
CONTENT **sleep’(x_n)**

Small *pro*s already saturate the SUBCAT requirements of each lexical entry in the lexicon, as each co-indexed with the content of a noun of the appropriate case by the lexical entry. For example, a small *pro* already saturates the SUBCAT requirement of *ner-u* ‘sleep-NONPERF’ in the lexicon, and the lexical entry determines with the content of which case the variable is co-indexed, e.g., the content of a noun with *n*(ominative) in this example, as in the CONTENT value in (3). See the key of a CONTENT value.

Similarly, the lexical entry *tukuru* ‘make-NONPERF’ is specified as follows.

(4) *tukuru* ‘makes’[2]

HEAD MAJ *v*
VFORM *finite*
CHECK_ACC *yes*
MOD *no*
SUBCAT ***end***
CONTENT **make’(x_a) (x_n)**

The variable at the deeply embedded argument slot is co-indexed with an accusative noun, whereas the variable at the shallowly embedded argument slot is co-indexed with a nominative noun.

The analysis that small *pro*s saturate SUBCAT requirements already in the lexicon is independently motivated by the ‘*pro*-drop’ phenomenon of Japanese. For example, *neru* ‘sleeps’ is a sentence of Japanese as well as *zyon ga neru* ‘John NOM sleeps’.

3. The Semantics of Cases

The content of a case is analyzed as equivalent to the followings. **The content of the noun that the case subcategorizes for, described as a generalized quantifier, has as a member the set of individuals that can satisfy the content of the modified constituent when given as a value of the free variable indexed with a noun with that case**. This analysis is implemented as in (6) and (7) together with an interpretation of a CONTENT value with an ARG value, a REL value, and a REL_INDEX value, as in (5).

(5) Interpret CONTENT
ARG	*arg*
REL	*rel*
REL_INDEX	*rel_index*

as

$\{x_{rel\_index} \mid arg\} \in rel$

(6) The AVM of *ga* 'NOM'

ga

HEAD MAJ *k*
KFORM *nom*
MOD HEAD MAJ *v* :[1]
VFORM *finite*
SUBCAT FIRST HEAD [MAJ *n*] :[2]
QUANTIFIED *yes*
REST *end*
CONTENT **ARG [1]**
REL [2]
REL_INDEX *n*

Here [1] is the content of what the case adjoins to or modifies, and [2] is the content of what the case subcategorizes for. The content of the nominative is identified with $\{x_n \mid [1]\} \in [2]$, i.e., $\{x_n \mid$ (the content of what the case adjoins to or modifies)$\} \in$ (the content of what the case subcategorizes for), e.g., $\{x_n \mid \text{sleep'}(x_n)\} \in \{X \mid \{x_q \mid \text{child'}(x_q)\} \cap X \neq \varnothing\}$ for *kodomo ga neru* 'some child sleeps'.

(7) The AVM of *o* 'ACC'

o 'ACC'

HEAD MAJ *k*
KFORM *acc*
MOD HEAD MAJ *v* :[1]
CHECK_ACC *yes*

SUBCAT FIRST HEAD [MAJ *n*] :[2]
QUANTIFIED *yes*
REST *end*
CONTENT ARG [1]
REL [2]
REL_INDEX *a*

Similarly, the content of the accusative is identified with $\{x_a \mid [1]\} \in [2]$ here, i.e., $\{x_a \mid$ (the content of what accusative adjoins to)$\} \in$ (the content of what accusative subcategorizes for), $\{x_a \mid \text{make'}(x_a)(x_n)\} \in \{X \mid \{x_q \mid \text{cake'}(x_q)\} \cap X \neq \varnothing\}$ for *keeki o tukuru* 'makes some cake'.

Note that contrary to a usual syntactic analysis, all the argument 'fillings' by, or argument co-indexations with, the contents of nouns are done in semantics, not in syntax, in this grammar.

4. The Adjunct-Head Phrase Rule, and the Complement-Head Phrase Rule

The Japanese grammar contains one adjunct-head phrase rule, and one complement-head phrase rule, and only these phrase rules.[3]

The adjunct-head phrase rule and the complement-head phrase rule share two descriptions. One is that the SUBCAT requirements of the non-head daughter, i.e., the adjunct daughter for an adjunct-head phrase or the complement daughter for a complement-head phrase, are saturated. See the key of a NON-HEAD-DAUGHTER specification. The other is that the HEAD feature specifications of the phrase are identified with those of the head daughter. See the key of a HEAD-DAUGHTER specification.

The adjunct-head phrase rule further specifies as follows. In an adjunct-head phrase, the head daughter must be a linguistic object the sort of which the adjunct daughter specifies as the MOD specification, as shown by the two occurrences of [1] in (8). Since the adjunct daughter adjoins to the head daughter, the SUBCAT value of the phrase is the same as that of the head-daughter. The content of the phrase is identified with that of the adjunct daughter, as in standard HPSG.

(8) An Adjunct-Head Phrase

HEAD [2]
SUBCAT [3]
QUANTIFIED [4]
CONTENT [5]
NON-HEAD-DAUGHTER
    HEAD MOD [1]
    SUBCAT *end*
    CONTENT [5]
HEAD-DAUGHTER
    [1] HEAD [2]
        SUBCAT [3]
        QUANTIFIED [4]

The complement-head phrase rule further specifies as follows. In a complement-head phrase, the complement daughter must be a linguistic object the sort of which the head daughter specifies as the FIRST value of the SUBCAT specifications, as shown by the two occurrences of [1] in (9). The complement daughter saturates the SUBCAT requirement of FIRST, and the SUBCAT value of the phrase is identified with the REST

value of the SUBCAT value. The content of the phrase is identified with that of the head daughter, as in standard HPSG.

(9) A Complement-Head Phrase

HEAD [2]
SUBCAT [3]
CONTENT [4]
NON-HEAD-DAUGHTER
[1] [SUBCAT *end*]
HEAD-DAUGHTER
HEAD
SUBCAT FIRST [1]
REST [3] FIRST
REST …
CONTENT [4]

Example 1

See Figure 1a for the AVM of sentence (10) and Figure 1b for the computation of the content of the sentence.

(10) kodomo-ga yoku ner-u.
child-NOM well sleep-NONPERF
'A child sleeps well.'

Example 2

See Figure 2a for the AVM of sentence (11), which also consists of two more specific figures of two parts—Figure 2 for /kodomo ga/ being more specific and Figure 3 for /keeki o tukuru/ being more specific, and Figure 2b for the computation of the content of the sentence.

(11) kodomo-ga keeki-o yoku tukur-u.
child-NOM cake-ACC often make-NONPERF
'A child makes a cake.'

The analysis of noun-case sequences as kinds of adjuncts together with the above phrase rules also immediately predicts the 'scrambling' in Japanese. In Japanese, the truth conditions of sentence (11), e.g., are the same as those of the 'scrambled' counterpart *keeki o kodomo ga yoku tukur u* 'cake-ACC child-NOM make-NONPERF'. The constituent *yoku tukuru* 'often make-NONPERF' is a finite verb constituent, and *kodomo ga yoku tukuru* 'child-NOM often make-NONPERF' is a transitive verb, which has [CHECK_ACC *yes*]. A VFORM specification and a CHECK_ACC specification are both HEAD feature specifications.

5. Syntax Generating Phrases with Multiple Identical Cases, and Semantics Restricting them

In this grammar, syntax freely generates a phrase that contains more than one identical case, i.e., a phrase that contains more than one noun-nominative sequence for one finite verb, or a phrase that contains more than one noun-accusative

sequence for one transitive verb. Note that all the *ga* occurrences are analyzed as nominative.

If there is some acceptable sentence that contains more than one noun-nominative sequence for only one finite verb, and, so, it is generated by the grammar, then the grammar must at least generate any sentence that contains more than one noun-nominative sequence for only one finite verb. Sequences (12a)-(12g) are examples of sentences that contain more than one noun-nominative sequence for only one finite verb. Native speakers find sentences (12a)-(12c) acceptable. Some native speakers of Japanese hate sentences (12d)-(12g), as indicated by the mark *, and others do not like them only to some extent, as indicated by the mark ?.

(12a) zoo **ga** hana **ga** nagai.
Elephant **NOM** trunk **NOM** long-NONPERF
'The trunk of elephants is long.'

(12b) zyon **ga** ki **ga** kik-u.
John NOM mind NOM work-NONPERF
'John is considerate.'

(12c) bunmeekoku **ga** dansee **ga** heekin zyumyoo **ga** mizikai. (Kuno 1973)
civilized countries **NOM** male **NOM** average life span **NOM** shrink-PERF
'It is civilized countries that the average life span of male is short.'

(12d) ?-*zyon **ga** huku **ga** mizikai.
John **NOM** cloth **NOM** short-NONPERF
'It is John that his clothes are short.'

(12e) ?-*zyon **ga** otoosan **ga** sinda. (Kuno 1973: 69)
John **NOM** father **NOM** died
'It is John that his father died.'

(12f) ?-*zyon **ga** kodomo **ga** yoku neru.
John **NOM** child **NOM** well sleep-NONPERF
'It is John that his child sleeps well.'

(12g) ?-*tookyoo wa no sakana **ga** sisya **ga** sanmee deta.[4]
Tokyo Bay GEN fish **NOM** dead person **NOM** three persons
Come out-PERF
'It is fish at Tokyo Bay that three persons died from.'

Sequence (12h) is an example of sentences that contain more than one noun-accusative sequence for only one transitive verb. Some native speakers hate this sentence, as indicated by the mark *, and others only do not like it much, as indicated by the mark ?*.

(12h) ?*-*zyon ga sono hon **o** daisanssyoo **o** yonda.
John NOM that book **ACC** chapter 3 **ACC** read-PERF
'John read the third chapter of that book.'

Mitsune Dialect of Japanese allows multiple accusative sentences, as well as multiple nominative sentences (Kaneda 1993).[5]

If you compare (12d)-(12g) and (12h) with an utterly ungrammatical sequence (12i), native speakers find that (12d)-(12h) sound much better than (12i). The Japanese grammar does not generate sequence (12i).

(12i) *ga neru.
NOM sleep-NONPERF

Furthermore, in this grammar, semantics together with a pragmatic assumption restricts a phrase that contains more than one identical case. For example, the semantics predicts the marginality of sequence (12h) by a vacuous quantification. There is no free variable remaining that is co-indexed with a noun with accusative in the content of the constituent modified by *sono hon o* 'that book ACC', i.e., $\{x_a \mid \text{read}'(x_a)(x_n)\} \in \{X \mid \{x_q \mid \text{chapter-3}'(x_q)\} \cap X \neq \varnothing\}$. The occurrence of x_a is already bound, i.e., is not free.

See Green and Morgan (1996) for distinguishing facts that syntax predicts from the facts extra-grammatical factors predict.

6. Even Semantics not Restricting Multiple Nominative Sentences in Japanese

If we want Japanese to allow only multiple nominative sentences, we can propose to revise only the content of nominative in the Japanese grammar, as in (13), and to add a pragmatic assumption, as in (14).

(13) The content of nominative is identified with the followings. The content of the noun that the nominative subcategorizes for, described as a generalized quantifier, has as one member the set of individuals that can satisfy the content of the modified constituent when given as a value of the free variable **indexed with a noun with <u>any</u> case.**

That is, the REL_INDEX value of nominative is either constant *n* or arbitrary. The AVM of nominative *ga* is revised from (6) to (14):

(14) The AVM of *ga* 'NOM'

ga

HEAD	MAJ *k*		
	KFORM *nom*		
	MOD	HEAD MAJ *v*	:[1]
		VFORM *finite*	
SUBCAT	FIRST	HEAD [MAJ *n*]	:[2]
		QUANTIFIED *yes*	
	REST *end*		
CONTENT	ARG [1]		
	REL [2]		
	REL_INDEX *n* or *x*		

And, at pragmatics, a vacuous quantification is avoided, as in (15).

(15) Avoid vacuous quantification, as in '*As for x, 2 + 3 = 5.' (Heycock 1993)

Example 3
See Figure 3a for the AVM of sentence (16) and Figure 3b for the computation of the content of the sentence.

(16) zyon ga kodomo ga (yoku) neru.
John NOMchild NOM (well) sleep-NONPERF
'John's child sleeps well.'

7. Arguments for the Proposed Analysis

When the content of a noun-nominative sequence and the content of a noun-genitive sequence compete in 'filling' an argument slot of a noun that immediately follows the noun-genitive sequence, the content of the genitive one wins, not vice versa, as shown below.

(17) tomodati ga musume no kodomo ga (yoku) ner-u.
friend NOM daughter GEN child NOM (well) sleep-NONPERF
'A friend's daughter's son sleeps well.'
* 'Someone's daughter's friend's child sleeps well.'

This is explained by assuming that the argument 'filling' by the nominative with the REL_INDEX arbitrary is done at pragmatics, whereas the argument 'fillings' by genitive, accusative, and nominative with the REL_INDEX constant are done at semantics. The former is done where vacuous quantification is avoided, i.e., at pragmatics. See Koga (in review) for other arguments.

See key features for the descriptions of the features.

References:

Koga, Hiroki. (in review). A grammar of multiple nominative sentences in Japanese. *Studies in the Linguistic Sciences* 28: 2.

[1] If we exactly follow standard HPSG, we would have such a lexical entry as (i).

(i) *neru* 'sleeps'

HEAD MAJ *v*
VFORM *finite*
MOD *no*
SUBCAT **FIRST HEAD MAJ *k***
KFORM *nom*
REST *end*
QUANTIFIED –

[2] If we exactly follow standard HPSG, we would have such a lexical entry as (i).

(i) *tukuru* 'makes'

HEAD MAJ *v*
VFORM *finite*
MOD *no*
SUBCAT **FIRST HEAD MAJ *k***
KFORM *nom*
REST FIRST HEAD MAJ *k*
KFORM *acc*
REST *end*
QUANTIFIED –

[3] This is simpler than standard HPSG. If we had followed standard HPSG, we would have three rules, i.e., *hd-comp ph, hd-subj ph, and hd-adj ph* assuming that SUBCAT requirements are separated into COMPS and SUBJ, etc. See Sag 1997 for these three rules.

[4] See Kuroda (1986) for a complicated example that has adverbs added to this example.

[5] Kaneda (1993) gives such an example as below.

sasm-yo-wa	katuu-yo	kamara.
raw fish-ACC-TOP	tuna-ACC	ate

'Someone ate tuna raw.'

Some Korean linguists claim that Korean allows multiple noun-accusative sentences, as well as multiple noun-nominative sentences.