

# Japanese Honorifics and Situation Semantics

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## ABSTRACT

A model of Japanese honorific expressions in situation semantics is proposed. Situation semantics provides considerable power for analyzing the complicated structure of Japanese honorific expressions. The main feature of this model is a set of basic rules for context switching in honorific sentences. Mizutani's theory of Japanese honorifics is presented and incorporated in the model which has been used to develop an experimental system capable of analyzing honorific context. Some features of this system are described.

## 1. Introduction

The Japanese language, like Korean and many non-European languages, contains a grammaticalized system of honorific forms. It is well known that the use of honorifics is closely connected to context, including aspects like relative social standing. No effective mechanisms have been developed to deal with this problem. Situation Semantics (SS) [Barwise 1982, 1984a, 1984b, 1985a, 1985b, 1985c, 1985d, 1985e] [Barwise & Perry 1983] [I-experance] [Pollard 1985] [Creary & Pollard] is a theory of context used here to construct a model of honorific sentences to analyze the relationship between sentence and context.

About Japanese, we can make use of Mizutani's theory of honorifics [Mizutani 1983a, 1983b]. This theory does tackle the relation between context and sentence, but it seems that SS can describe context move usefully than Mizutani's theory. In this paper, SS is used to reconstruct the context given by Mizutani's theory. Honorific forms are analyzed and basic rules for context switching are established.

Table 1 gives the relation between Mizutani's theory of honorifics and the model. This model can be divided into two parts. The first part describes basic context features and the second describes lexical rules based on Mizutani's Japanese grammar, along with some basic mechanisms of "context switching."

Table 1

	Mizutani's Theory	Our Model	
Context of honorifics	Social status as vector element	Binary relation as event type in SS	1st
Discourse formalism	none	SS	part
Grammar	Japanese grammar in CFG Form	Japanese grammar in DCG form	2nd
Context switch in honorific sentence	none	In complex sentence	part
Implement	none	In CIL	

It is very easy to represent some context features in discourse in SS, but context involves some very difficult problems like "focusing." We want to analyze this in future research. In this paper only enough elements for context required in Mizutani's theory are set up.

The main concern here is the second part of the model which deals with the relationship between contextual elements and lexical elements, and especially the mechanism of "context switching" on honorifics.

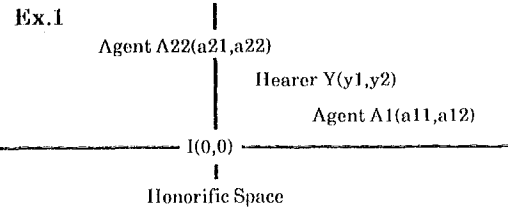
Mizutani's theory of honorific expression in Japanese is described first. Then the model in SS is presented. The context feature of relative social status in Mizutani's theory is realized in the first part of the model. This is followed by explanation of some basic features designed to handle the mechanism of context switching in the second part. Finally, an experimental system based on this model is given. This system was implemented in CIL (Complex Indeterminate Language) [Mukai 1985a, 1985b]. Results from some experiments processing Japanese honorific expressions are given at the end of the paper.

## 2. Mizutani's theory of Japanese honorific expression

### 2.1. Honorific Status

Honorific relations are represented as vectors in an abstract two-dimensional honorific space. In the honorific space the speaker in the discourse is set as the origin. Other individuals like hearer and agents who are presented in the sentence of discourse are represented by vectors as in the following example.

An honorific attitude is defined as the vector between these points. For example, the honorific attitude from the speaker (I) to the hearer (Y) is defined as a vector from I(0,0) to Y(y1,y2). The honorific attitude from the



hearer Y to agent2 is defined as the vector from (y1,y2) to (a21, a22), i.e., the vector (a21-y1, a22-y2).

Next, we define the honorific value and the direction in the following way.

### Definition 1 Honorific value

For  $t = \langle a1, a2 \rangle$ ,  
 honorific value of  $\langle t \rangle = a2$  iff  $a1 = 0$ ;  
 0 iff  $a1 \neq 0$ ;

### Definition 2 Honorific direction

- 1) Up  $\langle t \rangle > 0$ , 3) Flat  $\langle t \rangle = 0 \wedge a1 = 0$ ,
- 2) Down  $\langle t \rangle < 0$ , 4) Across  $\langle t \rangle = 0 \wedge a1 \neq 0$ ,

We represent the "flat" honorific relation between agents explicitly, but the "across" relation is represented as in which there is no need to express the honorific relation explicitly. For conventional use, we define the following directions.

- 5) any1 up or down or flat 6) any2 up or down or flat or across

To analyze the sentence uttered, definitions of the following honorific relations are necessary.

### Definition 3 First order honorific relation

The honorific attitude of the speaker to the hearer.

$$\overrightarrow{IY}$$

### Definition 4 Second order honorific relation

The honorific attitude of the speaker or the hearer toward the agent in the sentence of discourse. In this case the original point of the vector should be the point of the hearer or speaker, whichever is higher. If  $I > H$  the original point of the vector will be I, and if  $I < H$  the origin will be H. We introduce the notation J which stands for the higher individual.

$$\overrightarrow{JA}$$

### Definition 5 Third order honorific relation

The honorific relation between agents of a discourse.

$$\overrightarrow{A1A2}$$

## 2.2. Japanese Grammar

Now we can represent the relation between these three honorific relations and the sentences of discourse. Before looking at this honorific relation, we will show the small number of Japanese grammar rules used to define the structure of sample Japanese sentences. This grammar is taken from the "Sketch of Japanese Grammar" [Mizutani 1983a], a part of which is shown in Figure 1. This grammar is presented in CFG, but we give the rules in DCG.

Figure. 1

sentence	-> sn	sn	-> sn0
*1) sn	-> sn0,[to],sn0.	*2) sn	-> sm,s0,em,[to],s0.
sn0	-> ph,ps.	ph	-> np,cm,ph.
ph	-> vp.	vp	-> sub1,v,sub2. honorific form
vp	-> v.	vp	-> v,sub4. honorific form
np	-> n.	np	-> n,sub3. honorific form
n	-> {(taro);[hanako].		(name of individual)
cm	-> [ga].	cm	-> [ni]. agent / object case marker
v	-> [au]. (meet)	v	-> [iu]. (say)
ps	-> [ta].	ps	-> [mashi,ta]. honorific form
sub1	-> [o].	sub2	-> [nasaru].
sub4	-> [mousu].	sub3	-> [sama]. (like "Mr.")

In his theory, Mizutani attaches Japanese terms to each terminal and non-terminal node. Table 2 gives the correspondence between Mizutani's Japanese terms and standard English grammatical terms. Rules \*1) and \*2) above are not represented in his grammar. These rules were included specifically to represent direct and indirect speech.



notation for lexical items has its origin in Lexical Functional Grammar [Kaplan & Bresnan], so this expression can be represented like (↑object) in the LFG manner.

This example states that if "ps" = {ta}, then there should be honorific information in the resource situation of the individual who is the speaker. If the speaker's RS contains two or more different terms expressing the honorific relationship between the same agents, fail. Thus, the mechanism of 2) in dsolve is very important because it shows that in the honorific information of one individual there should not be different information about the binary honorific relation between two individuals.

(II) **Second order honorifics** Lexical rules for second order honorifics can be represented as in following example program.

Ex.4 This corresponds to Eh in 7) and 8) in Section 3.1.2.

```
np(X0,X2,Context) <-
  n(X0,X1,Context),sub3(X1,X2,Context),
  dsolve(hono!((agent!(ds!Context)))(rs!Context),
  up(agent!(ds!X),obj!(lex!X))).
```

(III) **Third order honorifics** Lexical rules for third order honorifics can be represented as in the following example program.

Ex.5 This corresponds to Eh in 10) in section 3.1.2.

```
vp(X0,X2,Context) <-
  v(X0,X1,Context),sub4(X1,X2,Context),
  dsolve(hono!((agent!(ds!Context)))(rs!Context),
  up(agent!(lex!X),obj!(lex!X))).
```

### 3.2.3 Context switching in honorific sentences

When we utilize the contextual elements like DS and RS in discourse it is very difficult to decide the context for each sentence. A sentence in discourse can be represented by the expression "DS,CS,[α]S,E", but then how do we map contexts like DS and CS to complex sentences?

Mizutani's theory of honorific forms does not go into context switching in a complex sentence. So we have expanded his grammar and propose a basic mechanism for context switching.

Consider sentence 1) below uttered by individual S to R which means "individual T said that individual U said that Taro met Hanako." In this example, we establish relations a) through j) among S, T, U, Taro and Hanako. The operator > denotes the situation in which the left hand side honors the right hand side, < denotes the situation in which the right hand side honors the left hand side, and = denotes the situation in which there is no need to use honorifics between left hand side and right hand side.

The main point in utterances of this form is that honorifics in these sentence change according to the form of speech, such as direct or indirect speech. But in the Japanese discourse there are no markers like "" and "", so in order to process these sentences correctly, we need the mechanism of "context switching." Without this mechanism, all sentences would be parsed with one context, but this cannot explain the reason why honorifics change in complex sentences.

1) In S's utterance he said to R

("T said, U said, Taro met Hanako")

"taro sama ga hanako sama ni ai nasat ta' to U ga iware ta' to T ga iu ta.

In RS of S a) S > Taro b) S > Hanako c) S > T d) S > U

e) taro > hanako

In RS of T f) T < U g) T = Taro h) T < Hanako

i) Taro < Hanako

In RS of U j) U < Taro k) U < Hanako l) Taro > Hanako

These are the parsing rules used to analyze utterances.

L1) sentence --> sn(X), ds!X = Y, agent!Y = s, obj!Y = r, at!Y = L,  
/\* a,b,c,d,e \*/ hono!(s!(rs!X)) = [down(s,taro),down(s,hanako),

down(s,t),down(s,u),down(taro,hanako)],  
/\* f,g,h,i \*/ hono!(t!(rs!X)) = [up(t,u),eq(t,taro),up(t,hanako),  
up(taro,hanako)],

/\* j,k,l \*/ hono!(u!(rs!X)) = [up(u,taro),up(u,hanako),  
down(taro,hanako)].

L2) sn(X) --> sn0(X).

L3) sn(X) --> sn0(X),[to!,sn0(X),

sm,sn0(Y),em,[to!,sn0(Z),  
agent!(ds!Y) = agent!Z,ds!X = ds!Z,obj!(ds!Y) = obj!Z.  
L4) sn(X) --> sn0(Y),[to!,sn0(Z),agent!(ds!Y) = agent!Z,ds!X = ds!Z,  
obj!(ds!Y) = obj!Z.

L1) and L2) are formal rules to start the process, while L3),L4) and L5) are basic rules for determining context switch in sentences of discourse.

L1) specifies the initial stage for parsing. In 1) above S tells R something so this context is set in the slot denoted by ds!X.

L2) states that all of the features of sn0 are transferred to sn to meet a requirement of Mizutani's grammar. This is done easily by unification.

L3) means that all of the features in sn0 are transferred to sn. This mechanism corresponds to indirect speech.

L4) means that there should be context switch. As the discourse situation for sn0, set agent of discourse of sn0 to agent of Z who utters sn0 and set object of discourse of sn0 to object of Z who hears this utterance.

L5) means that in a sentence with no marker, there can be context

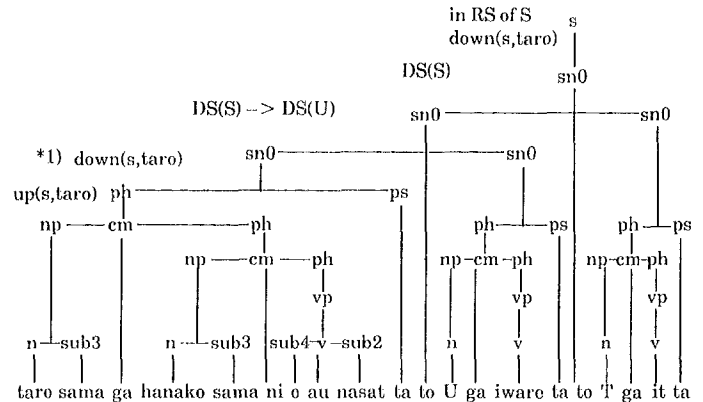
switch, so if a parsing failed because of the context of honorifics, use this rule.

Sentence 1) is analyzed using rule L5) and the mechanism of context switch is derived from phase (I) to phase (III).

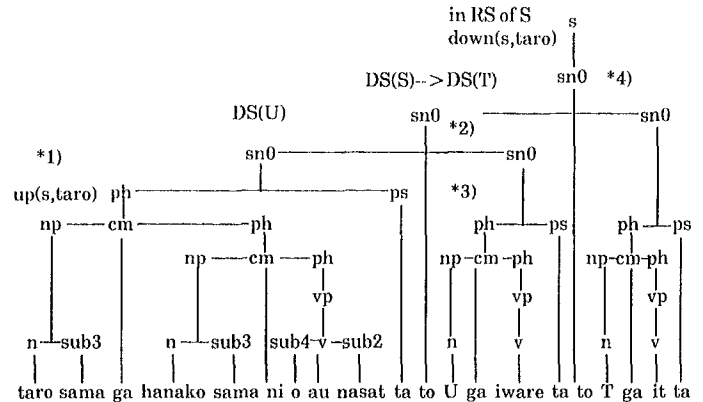
(I) Parsing really starts with the rule 3) estimating that there is no context switching. But at point \*1, a conflict between S's resource situation and honorific expression occurs. In S's resource situation, the honorific relation between S and Taro is down(S,taro), but [taro,sama] requests the honorific relation up(S,taro), so context switch occurs at \*2. Rule 5) switches the agent of discourse from S to U. Context switch does not occur at this point again. We use the notation DS(S) to state that the agent of discourse is S. The symbol --> means the context of left hand side is changed to the context of the right hand side as the result of context switch.

(T said U said Taro met Hanako)

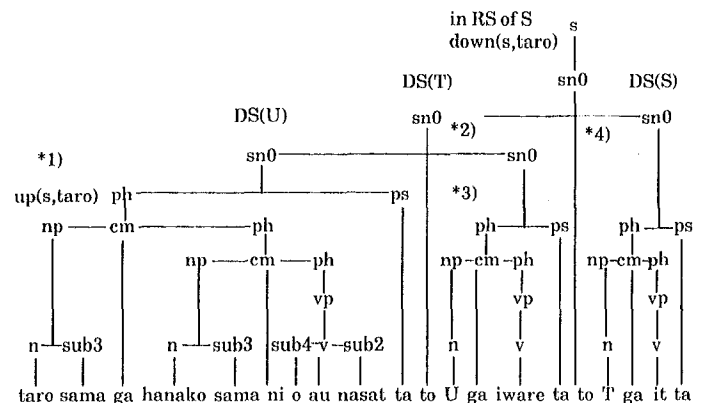
taro sama ga hanako sama ni ai nasat ta to U ga iware ta to T ga iu ta.



(II) Next, the parsing mechanism finds a conflict at point \*3). [U,ga,iware,ta] requests honorific relation up(S,U), but the resource situation of S contains the honorific relation down(S,U). Then context switch given in 5) is applied at point \*4).



(III) Finally, this sentence is parsed like the following tree.



### 3.3. Ch and Cw

Now, we have come to the main point of our model, but there remains an interesting feature of Cw. This constraint is not verified so with some trepidation we touch on it briefly here.

For example, when a worker "Suzuki" refers to his friend "Tanaka" with contempt, he will intentionally use a polite word to refer to him such as "Tanaka sensei" (Mr.Tanaka). When the hearer (Y) hears this polite expression, he decides on honorific event types but finds conflicts between these types and the normal social event types in his resource situation.

#### Ex.6

expression [Tanaka sensei] where Eh := at l: honor\_\_up,Suzuki,Tanaka  
expression [Tanaka sensei] where Eh := at l: honor\_\_down,Suzuki,Tanaka  
in RS of Y

HE := Hr Y,Eh;yes

Eh := at lu: honor\_\_eq,Tanaka,Suzuki

-> hearer find conflict and the hearer wonders why !!

Then the hearer (Y) wonders why he broke the universal honorific event. Finally, he comes to the conclusion that Suzuki intends either to praise Tanaka or berate him. We can go no further on this problem here.

There are other aspects to Eh. If the sentence is given first, Eh will be calculated for each word and there remains a possibility of conflict between honorific event types Eh in a simple sentence. In a complex sentence the mechanism of context switch will be used, but in a simple sentence this mechanism is not effective. When the hearer tries to deal with this conflict, he or she will assume that the speaker has some illegal honorific constraint Ch'. We have implemented this mechanism in our model system.

#### 4. System Configuration

Our experimental system written in CIL runs on the DEC 2060 and utilizes Prolog as the basic programming environment, which enables us to use CIL. CIL is now compiled and runs very fast on DEC 2060. Next, we want to run this DCG parser on the Bottom Up Parser [Matsumoto 1983], [Matsumoto, Kiyono, 1984].

#### 5. Some Other Examples

In this section, we give some examples which have no relation to context switching.

##### 1) Sentence without honorific expression.

A sentence without honorifics is parsed. These are resource situations for this type of sentence.

[? - parse([taro,ga,hanako,ni,at,ta],[],Context).

RS.....

```
[_1855      :: anchor: = _1857,relation: = rs,agent: = r,
  has: = [_1626,_3422]_3885]
[_1624:: anchor: = _1626,relation: = honor,spec: = equi
  agent1: = s,agent2: = taro
  _3420:: anchor: = _3422,relation: = honor,spec: = equi
  agent1: = s,agent2: = hanako  ]]
```

##### 2) Sentence with illegal honorific expression

The following is an sentence with conflict between honorific word expressions. [taro] is a word without honorifics but [o,ai,nasat] are words with honorifics from the speaker to Taro. In a simple sentence, there should not be conflict between honorific relations. If there is, then the hearer R gets information that the speaker S has some trouble with honorific word expression.

[? - parse(DS,RS,CS,[taro,ga,hanako,ni,o,ai,nasat,ta],[],).

RS.....

```
[_1870      :: anchor: = _1872,relation: = rs,agent: = r,
  has: = [_1641,_3437,_4555]_5330]
[_1639:: anchor: = _1641,relation: = honor,spec: = equi,
  agent1: = s,agent2: = taro
  _3435:: anchor: = _3437,relation: = honor,spec: = equi,
  agent1: = s,agent2: = hanako
  _4553:: anchor: = _4555,relation: = honor,spec: = up,
  agent1: = s,agent2: = taro],
_5688::      anchor: = _5690,relation: = rs,agent: = r,
  has: = [_5812]_5620]
[_5810:: anchor: = _5812,relation: = illegal,arg1: = honor,arg2: = s]
```

##### 3) Complex case

This example sentence contains many honorific expressions. The system analyzes these expressions to find some honorific event type in the speaker's mind.

[? - parse(DS,RS,CS,[taro,sama,ga,hanako,ni,o,ai,nasai,masita],[],).

RS.....

```
[_2545      :: anchor: = _2547,relation: = rs,agent: = r,
  has: = [_2316,_4046,_6558]_7153]
[_2314:: anchor: = _2316,relation: = honor,spec: = up,
  agent1: = s,agent2: = taro,
  _4044:: anchor: = _4046,relation: = honor,spec: = equi,
  agent1: = s,agent2: = hanako,
  _6556:: anchor: = _6558,relation: = honor,spec: = up,
  agent1: = s,agent2: = r]_12068 ]
```

#### 7. Conclusion

It is easy to model honorific context in situation semantics. But we

don't know how this context is represented in the human mind. This requires further research.

This treatment of the context switching mechanisms of honorifics is a first step toward analyzing more complicated phenomena. The main contribution of this model derives from the fact that in any complex sentence, there will probably be context switching on honorifics. But this model shows context switching in a complex sentence only and there remains more complicated phenomena like the following.

S Hanako sama ni atta' [Hanako sama] is a honorific form  
(I met Hanako.)

R 'Hanako sama tte dare?' (Who is "Hanako"?)

[- \$1 -]

S 'Tanaka Hanako' (Hanako Tanaka)

R 'Aa, hana no yatsu ka' [hana] is nonhonorific form  
(Oh, Hana!)

\$1 is the direct speech act and there should be a context switch because when R knows who Hanako is, he refers to her with the nonhonorific "Hana." But we do not formalize the context switch which decides who is the agent of sentence \$1. To solve this problem, we should use an "anaphora mechanism for the honorific context" and in order to build a firm model of this mechanism, study not only of the anaphora mechanism [Barwise 1985c] but also the focusing mechanism [Sidner] is required. These also are topic for further research.

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