



- (3) a. Kim-sensayng.nim-kkeyse o. si. ess.upnita. (Speaker < Hearer,  
 teacher.HON-SBJ(HON) come.HON.PST.FO/DCL Speaker < Subject)  
 'Prof. Kim came.'  
 b. Mia-ka o. ass. ta. (Speaker ≥ Hearer,  
 SBJ come.PST.PL/DCL Speaker ≥ Subject)  
 'Mia came.'

## 2. Representing Discourse Information

### 2.1. Infons<sup>3</sup> and AVMs

We set up the following types of discourse infons (4) and speech-act infons (5). They are both represented in the AVM format in (4b) and (5b), respectively. The specific infons entered here will be made use of in the discourse analysis in Section 3.

#### (4) Discourse Infon Types<sup>4</sup>

- DP (= discourse participant ), N (= name/address term),
- SX (= male/female), AT (= attribute)

##### a. Infons

DP: { ⟨person, a⟩ , ⟨person, b⟩ , ⟨person, c⟩ , ⟨person, d⟩ , ⟨person, e⟩ , ⟨person, f⟩ }  
 N: { ⟨named, a, kim-sensayng⟩ , ⟨named, b, tol⟩ , ⟨named, c, yong⟩  
 ⟨named, d, mia⟩ , ⟨named, e, cheli⟩ , ⟨named, f, hia⟩ }  
 SX: { ⟨male, a⟩ , ⟨male, b⟩ , ⟨male, c⟩ , ⟨female, d⟩ , ⟨male, e⟩ , ⟨female, f⟩ }  
 AT: { ⟨teacher, a, b⟩ , ⟨student, b, a⟩ , ⟨friend, b, c⟩ , ⟨friend, c, d⟩ }

##### b. AVMs

DP: {RELN person, RELN person, RELN person, RELN person, RELN person, RELN person}  
 ARG a ARG b ARG c ARG d ARG e ARG f  
 N: {RELN named , RELN named, RELN named, RELN named,  
 BEARER a BEARER b BEARER c BEARER d  
 NAME kim-sensayng NAME tol NAME yong NAME mia  
 RELN named, RELN named}  
 BEARER e BEARER f  
 NAME cheli NAME hia  
 SX: {RELN male, RELN male, RELN male, RELN female, RELN male, RELN female}  
 ARG a ARG b ARG c ARG d ARG e ARG f  
 AT: {RELN teacher, RELN student, RELN friend, RELN friend}  
 ARG1 a ARG1 b ARG1 b ARG1 c  
 ARG2 b ARG2 a ARG1 c ARG2 d

#### (5) Speech-act Infon Types

- DX (= deixis) , DL (= discourse level), IA (=illocutionary act)
- The prefix (\*) (as in \*x) is to indicate the prefixed object (x) is an indeterminate.

##### a. Infons

DX: { ⟨speaker, a⟩ , ⟨hearer, b⟩ , ⟨sbj-ref, c⟩ }  
 DL: { ⟨formal, a, b⟩ , ⟨polite, a, b⟩ , ⟨blunt, a, b⟩ , ⟨familiar, a, b⟩ ,  
 ⟨plain, a, b⟩ , ⟨intimate, a, b⟩ , ⟨honor, a, b; 0⟩ , ⟨honor, b, a⟩ ,  
 ⟨honor, b, c; 0⟩ }

IA: { {assert, a, b, \*ctt}, {question, a, b, \*ctt}, {request, a, b, \*ctt},  
 {propose, a, b, \*ctt} }

b. AVMs

C-INDS SP a  
 HR b  
 UT t

DL: {RELN formal, RELN polite, RELN blunt, RELN familiar, RELN plain,  
 SP a SP a SP a SP a SP a  
 HR b HR b HR b HR b HR b

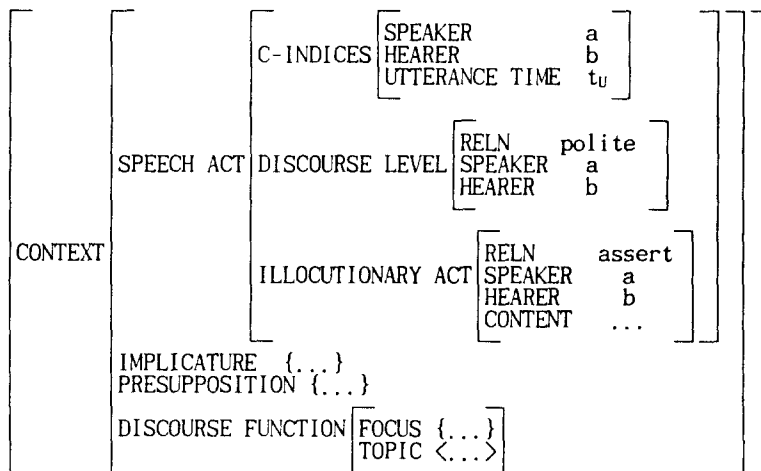
RELN intimate, RELN honor, RELN honor, RELN honor )  
 SP a HONORER a HONORER b HONORER b  
 HR b HONOREE b HONOREE a HONOREE c  
 POL 0 POL 0

IA: {RELN assert, RELN question, RELN request, RELN propose}  
 SP a SP a SP a SP a  
 HR b HR b HR b HR b  
 CTT \*ctt CTT \*ctt CTT \*ctt CTT \*ctt

## 2.2. The CONTEXT Attribute

An expanded feature structure of the CONTEXT attribute is presented in full form in (6) and in short form in (7).

(6) CONTEXT (in full)



(7) CONTEXT (in short)

CXT SA C-INDS SP a  
 HR b  
 UT t<sub>u</sub>  
 DL RELN polite  
 SP a  
 HR b  
 IA RELN assert  
 SP a  
 HR b  
 CTT ...  
 IMPL {...}  
 PRSP {...}  
 DF FOC {...}  
 TOP <...>

### 3. Discourse Analysis

#### 3.1. A Dialog

The following is a short dialog exchange between Kim (Teacher) and Tol (Student).

- (8) Dialog
- a. Kim-sensayng: Nwu-ga Mia-lul ttayly.ess.nya?  
 who-SUBJ -OBJ beat.PST.PL/INT  
 'Who beat Mia?'
  - b. Tol : Yong-i ttaylyess.yo.  
 -SUBJ beat.PST.POL/DCL  
 'Yong did.'
  - c. Cheli-to ttayly.ess.eyo.  
 -too  
 'Cheli did, too.'
  - d. Kim-sensayng: Ne-to ttayly.ess.nya?  
 you-too  
 'Did you beat her, too?'
  - e. Tol : Ce-nun an ttayly.ess.eyo.  
 I-SUBJ not  
 'I didn't beat her.'
  - f. Cheli-nun Hia-to ttayly.ess.eyo.  
 'Cheli beat Hia, too.'

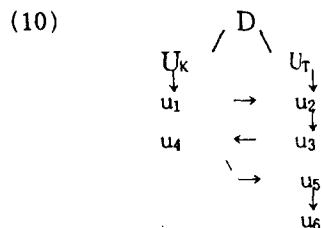
#### 3.2. Discourse Structure

Distinct from the structure analysis of a sentence or an utterance in isolation, that of a dialog makes use of a superimposed database, which we call discourse-initial data or  $CXT_{DI}$ . It consists of the discourse-infon types given in (4). They are the sort of background information minimally shared by the dialog participants, including their names, sexes, and some attributes or properties mutually known to them. We are not concerned with other types of background information such as DPs' world knowledge, their beliefs, their cognitive and emotive states. Those speech-act infons, which have to do with the DPs' role as speaker and hearer and their manner of speaking and illocutionary acts get in as soon as the dialog takes place. So they properly constitute SA, a subsort of CONTEXT in our system. And its subsort DL plays a crucial role in constraining the honorification of spoken Korean as overviewed earlier.

According as who the speaker is, the dialog D is divided up into two subsets: Kim's utterance set ( $U_K$ ) and Tol's ( $U_T$ ).

- (9) a.  $D = \{u_1, u_2, \dots, u_6\}$   
 b.  $U_K = \{u_1, u_4\}$   
 c.  $U_T = \{u_2, u_3, u_5, u_6\}$

The sequence of the dialog exchange is presented in (10).





(12)

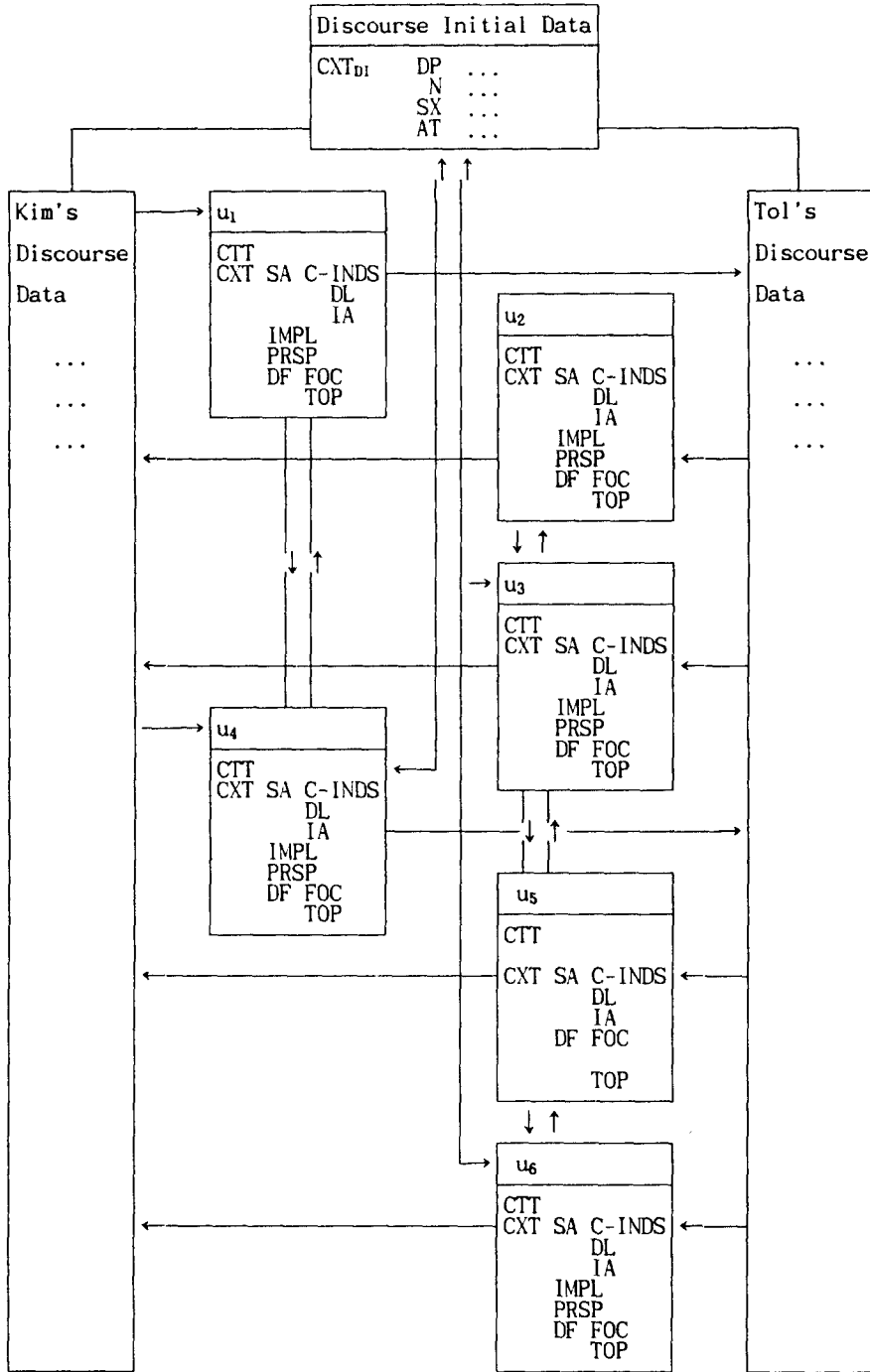


Figure: Flow of Contextual Information

### 3.3. Analysis and Annotations

A circled symbol (e.g. ©) is a tag indicating a token identity of feature structures. Some remarks are entered on the right column.

(13)

CXT<sub>DI</sub>: DP, N, SX, AT

% Discourse Initial Database

u<sub>1</sub>: *Nwu-ka Mia-lul ttayly.ess.n ya?*

% from CXT<sub>DI</sub>  
% from U<sub>k</sub>

CXT SA C-INDS SP a  
HR b  
UT t<sub>U1</sub>  
DL RELN plain  
SP a  
HR b  
IA RELN question  
SP a  
HR b  
CTT ©  
PRSP©RELN ^  
SOA-ARG1 RELN beat  
BEATER \*x  
BEATEN d  
ET t<sub>E1</sub>  
SOA-ARG2 RELN precede  
ET t<sub>E1</sub>  
UT t<sub>U1</sub>  
DF FOC {nwuka}  
TOP <mia-lul, ttaylyessnya>

% grammaticalized: *nya*-  
ending, together with the plain DL

% CTT is what is presupposed.

% grammaticalized: past tense *ess*

% *mia-lul*: possible Cb in u<sub>2</sub>

CXT<sub>1</sub>\* ( = CXT<sub>DI</sub> + SA<sub>1</sub> + PRSP<sub>1</sub> + DF<sub>1</sub> )

% CXT<sub>1</sub>\* (cumulative CXT<sub>1</sub>)

u<sub>2</sub>: *Yong-i ttaylyesseyo.*

% from U<sub>T</sub> (speaker-hearer shift).  
% from CXT<sub>DI</sub>

CTT©RELN ^  
SOA-ARG1 RELN beat  
BEATER c  
BEATEN d  
ET t<sub>E1</sub>  
SOA-ARG2 RELN precede  
ET t<sub>E1</sub>  
UT t<sub>U2</sub>

% from Tol's database

% from DF

% grammaticalized: past tense

CXT SA C-INDS SP b  
HR a  
UT t<sub>U2</sub>  
DL RELN polite  
SP b  
HR a  
IA RELN assert  
SP b  
HR a  
CTT ©  
DF FOC {yong-i}  
TOP <ϕ, ttaylyesseyo>

% grammaticalized: *yo*-ending,  
together with polite DL<sup>6</sup>

% assertion of CTT<sub>2</sub>  
% FOCUS<sub>1</sub> value-assigned  
% zero = Cb:  
i.e. SLASH: {mia-lul} in u<sub>1</sub><sup>7</sup>

CXT<sub>2</sub>\* ( = CXT<sub>DI</sub> + CTT<sub>2</sub> + SA<sub>2</sub> + DF )

% CXT<sub>2</sub>\* (cumulative CXT<sub>2</sub>)

u<sub>3</sub>: *Cheli-to ttaylyesseyo.*

% from U<sub>T</sub>  
% from CXT<sub>DI</sub>

CTT©RELN ^  
SOA-ARG1 RELN beat  
BEATER e  
BEATEN d  
ET t<sub>E3</sub>

% from Tol's database

% from DF

|   |   |
|---|---|
| SOA-ARG2 RELN precede<br>ET t <sub>E3</sub><br>UT t <sub>U3</sub><br>CXT SA C-INDS SP b<br>HR a<br>UT t <sub>U3</sub><br>DL RELN polite<br>SP b<br>HR a<br>IA RELN assert<br>SP b<br>HR a<br>CTT ©<br>IMPL: QUANTS < (∃⊗) ! {person(⊗)} >><br>NUCLEUS RELN ^<br>SOA-ARG1 RELN beat<br>BEATER ⊗*x<br>BEATEN d<br>SOA-ARG2 RELN ≠<br>ARG1 ⊗<br>ARG2 e<br>DF FOC {chelito}<br>TOP < φ, ttaylyesseyo >  | % grammaticalized: past tense<br><br>% grammaticalized: yo-ending,<br>together with polite DL<br><br>% assertion of CTT <sub>3</sub><br>% implicature: someone other<br>than Cheli beat Mia:<br>the indeterminate (*x) is<br>anchored to Yong in u <sub>2</sub> : so<br>the implicature is simply<br>CXT <sub>2</sub> in u <sub>2</sub> .   |
| CXT <sub>3</sub> * ( = CXT <sub>DI</sub> + CTT <sub>3</sub> + SA <sub>3</sub> + IMPL <sub>3</sub> + DF <sub>3</sub> )<br>u <sub>4</sub> : Ne-to ttaylyessnya?   | % = TOP <sub>2</sub> (zero = Cb; SLASH: {mia-lul})<br>% CXT <sub>3</sub> * (cumulative CXT <sub>3</sub> )<br>% from U <sub>k</sub> (speaker-hearer shift)   |
| CXT SA C-INDS SP a<br>HR b<br>UT t <sub>U4</sub><br>DL RELN plain<br>SP a<br>HR b<br>IA RELN question<br>SP a<br>HR b<br>CTT ©<br>CTT©RELN ^<br>SOA-ARG1 RELN beat<br>BEATER b<br>BEATEN d<br>ET t <sub>E4</sub><br>SOA-ARG2 RELN precede<br>ET t <sub>E4</sub><br>UT t <sub>U4</sub><br>IMPL QUANTS < (∃⊗) ! {person(⊗)} >><br>NUCLEUS RELN ^<br>SOA-ARG1 RELN beat<br>BEATER ⊗*x<br>BEATEN d<br>SOA-ARG2 RELN ≠<br>ARG1 ⊗<br>ARG2 b<br>DF FOC {ne-to}<br>TOP: < φ, ttaylyessnya > | % from SA, 2nd PER pronoun<br>ne is identified as referring to b.<br><br>% grammaticalized: nya-ending<br><br>% CTT questioned<br><br>% from CXT <sub>1</sub> and SA: 2nd PER<br>pronoun ne identified as<br>referring to b<br>% grammaticalized: past tense<br><br>% implicature: someone other<br>than Tol beat Mia: the<br>indeterminate (*x) is<br>anchored to Yong and Cheli<br>in the cumulative CXT <sub>4</sub> . |
| CXT <sub>4</sub> * ( = CXT <sub>4</sub> + CTT <sub>4</sub> + IMPL <sub>4</sub> )<br>u <sub>5</sub> : Ce-nun an ttaylyesseyo.  | % = TOP <sub>3</sub> (zero = Cb; SLASH {mia-lul})<br>% CXT <sub>4</sub> * (cumulative CXT <sub>4</sub> )<br>% from U <sub>7</sub> (speaker-hearer shift)  |
| CTT©RELN ^<br>SOA-ARG1 RELN beat<br>BEATER b<br>BEATEN d<br>ET t <sub>E5</sub><br>POL 0<br>SOA-ARG2 RELN precede<br>ET t <sub>E5</sub><br>UT t <sub>U5</sub><br>CXT SA C-INDS SP b<br>HR a  | % from CXT <sub>DI</sub> and SA: 1st PER<br>pronoun ce identified as<br>referring to b.<br><br>% grammaticalized: past tense  |



|   |   |
|---|---|
| DL RELN polite<br>SP b<br>HR a<br>IA RELN assert<br>SP b<br>HR a<br>CTT ©<br>IMPL QUANTS <{(V⊗){person(⊗)}}><br>NUCLEUS RELN ^<br>SOA-ARG1 RELN beat<br>BEATER ⊗*x<br>BEATEN d<br>POL i<br>SOA-ARG2 RELN ≠<br>ARG1 ⊗<br>ARG2 b<br>DF FOC {ce-nun, an}<br>TOP <0, ttaylyessyo>   | % grammaticalized: yo-ending<br>% implicature: Tol is not<br>one of those who beat Mia;<br>the indeterminate (*x) is<br>anchored to Yong and Cheli<br>in CXT <sub>2</sub> and CXT <sub>4</sub> , respectively.<br>% ce-nun: contrastive <sup>9</sup><br>% = TOP <sub>4</sub> (zero = Cb; SLASH {mia-lul}) |
| CXT <sub>5</sub> * (= CTT <sub>5</sub> + SA + IMPL <sub>5</sub> + DF <sub>5</sub> )<br>u <sub>6</sub> : Cheli-nun Hia-to ttaylyesseyo.  | % CXT <sub>5</sub> * (cumulative CXT <sub>5</sub> )<br>% from CXT <sub>D1</sub><br>from U <sub>T</sub>  |
| CTT©RELN ^<br>SOA-ARG1 RELN beat<br>BEATER e<br>BEATEN f<br>ET t <sub>E6</sub><br>SOA-ARG2 RELN precede<br>ET t <sub>E6</sub><br>UT t <sub>U6</sub><br>CXT SA C-INDS SP b<br>HR a<br>UT t <sub>U6</sub><br>IMPL QUANTS <{(∃⊗){person(⊗)}}><br>NUCLEUS RELN ^<br>SOA-ARG1 RELN beat<br>BEATER e<br>BEATEN ⊗*x<br>SOA-ARG2 RELN ≠<br>ARG1 ⊗<br>ARG2 f<br>DF FOC {hia-to}<br>TOP <cheli-nun, ttaylyesseyo> | % grammaticalized: past tense<br>% UT overrides UT <sub>5</sub><br>% implicature: Cheli beat<br>someone other than Hia;<br>the indeterminate (*x)<br>is anchored to Mia in<br>CXT <sub>3</sub> .<br>% Cb shift:<br>Cb = cheli-nun, from DF <sub>3</sub> in u <sub>3</sub>                                 |
| CXT <sub>6</sub> * (= CXT <sub>6</sub> + CTT <sub>6</sub> + SA + IMPL <sub>6</sub> + DF <sub>6</sub> )  | % CXT <sub>7</sub> * (cumulative CXT <sub>6</sub> )   |
| Information shared by Kim and Tol (as a result of the dialog):<br>Plus CONTEXT-1:<br>- Yong beat Mia.<br>- Cheli beat Mia.<br>- Tol didn't beat Mia.<br>- Cheli beat Hia.   |   |

In concluding the analysis of the dialog, the last utterance, u<sub>6</sub> is given a full-scale AVM, including CATEGORY, CONTENT, and CONTEXT, followed by a list of annotations.

(14) Utterance-6

Tol: Cheli-nun Hia-to ttayli.esse.yo.

PHON /cheli,nun,hia,to,ttayli,esse.yo/

SYNSEM LOC CAT HEAD ①

SUBCAT < >

CTT ©

CXT ⊗  
 DTRS H-DTR PHON /ttayli,esse,yo/  
 SYNSEM LOC CAT HEAD ① POS V  
 VFORM TENSE PST: ①  
 FIN POL/DCL: ①, ①  
 SUBCAT <①NP, ②NP><sup>10</sup>  
 CTT ③{RELN beat, ①RELN precede}  
 BEATER e ET t<sub>ε6</sub>  
 BEATEN f UT t<sub>υ6</sub>  
 ET t<sub>ε6</sub>  
 CXT ⊗{SA C-IND SP b  
 HR a  
 UT t<sub>υ6</sub>  
 DL ①RELN polite  
 SP b  
 HR a  
 IA ①RELN assert  
 SP b  
 HR a  
 CTT ③  
 IMPL QUANT < (∃ ⊗!{person(⊗)}) >  
 NUCLEUS RELN ^  
 SOA-ARG1 RELN beat  
 BEATER e  
 BEATEN ⊗\*x  
 SOA-ARG2 RELN ≠  
 ARG1 ⊗  
 ARG2 f

PRSP { }  
 DF TOP

C1-DTR PHON /cheli,nun/  
 ①SYNSEM LOC CAT HEAD ①  
 SUBCAT < >  
 MARKING ③  
 CTT ③  
 CXT ⊗

DTRS H-DTR PHON /cheli/  
 SYNSEM LOC CAT ① HEAD POS N  
 GF SBJ  
 SUBCAT < >  
 CTT ③ PARA IND e PER 3  
 NUM sg  
 CXT ⊗ CXT<sub>D1</sub>(e)

M-DTR PHON /nun/  
 SYNSEM LOC CAT HEAD POS P  
 SPEC N[DF TOP]  
 SUBCAT < >  
 MARKING ③nun  
 CTT { }  
 CXT {DF TOP}

C2-DTR PHON /hia,to/  
 ②SYNSEM LOC CAT HEAD ①  
 SUBCAT < >  
 MARKING ③

CTT ③  
 CXT ⊗  
 DTRS H-DTR PHON /hia/  
 SYNSEM LOC CAT ① HEAD POS N  
 GF OBJ  
 SUBCAT < >  
 CTT PARA IND f PER 3  
 NUM sg  
 CXT ⊗ CXT<sub>D1</sub>(f)

M-DTR PHON /to/

```

SYNSEM LOC CAT HEAD POS P
                        SPEC N[DF FOC]
SUBCAT < >
MARKING @to
CTT { }
CXT {...DF FOC}11

```

#### Annotations:

Most remarkable in the cross-utterance analysis of  $u_6$  is the inheritance of the discourse-initial context  $CXT_{DI}$  by default. The  $CXT_{DI}(e)$  and  $CXT_{DI}(f)$  given as context values to C-1 and C-2 in the AVM indicate that the contextual information about the third-person referents (e, f) are inherited from CONTEXT-1, which is anchored to CONTENT as indices e and f. The context values of e and f then get inherited locally to the respective phrases *Cheli-nun* and *Hia-to* by the Context Inheritance Principle as tagged by the prefix ⑧.

Operations of unification applied in (14), which are theory-internal to Head-driven Phrase Structure Grammar (HPSG), include the following:

1. ①,②: Head daughter's SUBCAT value is the concatenation of Mother's SUBCAT list with the list (in order of increasing obliqueness) of the SYNSEM values of the COMP daughters--by the Subcategorization Principle.

2. ④: Mother's Head feature value is structure shared with that of the Head daughter--by the Head Feature Principle.

3. ③: Mother's CONTENT value is structure shared with that of the (semantic) Head daughter--by the Semantics Principle.

4. ⑧: Mother's CONTEXT value is structure shared with those of the daughters-- by the Context Inheritance Principle (Chang 1990) or equivalently, by the Principle of Contextual Consistency (Pollard and Sag (in press)).

5. @: Mother's Marking value is structure shared with that of the Marker daughter--by the Marker-Head Schema.

6. ⑥: The time relation in CONTENT is mapped to TENSE|PST in CATEGORY as its content value (Chang 1990).

7. ①,①: The DL and IA values are mapped respectively to the verb-final SL and ST forms in CATEGORY as their context values (Chang 1990).

8. DF marking: C-2 daughter is marked as FOC; C-1 and Head daughters are marked as TOP. The Context Inheritance Principle licenses unification of daughters' DF values with mother's, i.e.:

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CXT|DF  FOC {mia-to}
        TOP <cheli-nun,ttaylyesseyo>

```

9. Morphological operations involved are:

a. Past Tense:  $f_{PST}(VFORM[PREFINAL]) = ess$

b. S-ending:  $f_{POL/DCL}(VFORM[FINAL]) = yo$

#### 4. Conclusions

The dialog analysis presented here is an attempt to expand HPSG beyond a sentence boundary. Conspicuous for the approach taken here are the following.

First, flow of contextual information in a dialog exchange is quadri-directional, that is: up-and-down and left-and-right between the discourse participants, originated in the discourse-initial database,  $CXT_{DI}$ . It reduces the amount of grammatical description in each constituent utterance. Second, in keeping with the mechanism of default inheritance the contextual information cumulatively expands across the utterance and speaker-hearer boundaries, assembling

content and various sorts of context, speech acts, implicatures, and presuppositions. Third, two discourse functions, focus and topic are made available for an account of anaphora and ellipsis as well as preference of interpretation. Fourth, two subsorts of speech acts, the discourse level and the illocutionary act are mapped to sentence endings in spoken Korean.

Details of HPSG-based Korean grammar are not dealt in here, as we are concerned not with a sentence-based grammar but a discourse grammar. HPSG itself has been constantly revised and expanded. As it stands, HPSG is an information-based grammar well-founded for exploration of discourse understanding. We have begun to implement the HPSG-based Korean grammar (Chang 1992) using GULP, a preliminary version of which will come out soon.<sup>12</sup>

## Notes

1. The 'presupposition' is delimited to cover only what is called 'pragmatic' presupposition' (Keenan 1971), which is cancellable and nonconventional; by contrast, the 'implicature' is used here to cover only the 'conventional' one, which is noncancellable and conventional, although the distinction between the two has not always been clear-cut (Karttunen and Peters 1977, Gazdar 1979, Levinson 1983). The 'point of view' is also known as 'empathy' (Kuno 1976), and as 'identification' (Kameyama 1985) or 'ID' (Chang 1986). The 'topic', misleading as it may be, is 'presuppositional' and in complementary to 'focus' (Chang 1989, 1990). A list of topics, hierarchically ordered, correspond functionally to the 'forward-looking centers' (Cfs) of the centering theory (Grosz et al 1983; Kameyama 1985, 1986; Chang 1986; Walker et al 1990), of which the most prominent center becomes the 'backward-looking center' (Cb) in the succeeding utterance.  
<topic, subject, object, object2,...>
2. The terms used for discourse levels are originally from Martin (1954), modified in Chang (1973). Martin's Yale Romanization is used here.
3. The 'infon', a unit of information (Devlin 1991), is formerly known in situation semantics (Barwise and Perry 1983, Barwise 1989) as 'soa (states of affairs)'.
4. It is only a partial list of discourse infon types. Polarity is not entered when its value is positive.
5. The Context Inheritance Principle guarantees that the CONTEXT value of a phrase in a headed structure is the union of the CONTEXT values of its daughters. In Pollard and Sag (in press) it is called the Principle of Contextual Consistency.
6. The polite declarative ending *-yo* must be further marked as falling ( $\downarrow$ ) in terminal contour (TC), in contrast to the interrogative ending *yo*↑ (marked as rising in TC).
7. The gap is filled with a topic in  $u_1$  (i.e. *Mia-lul*). So it is inherited as an element of TOPIC. In terms of centering, the Cb of  $u_2$  is the zero pronominal (topic) referring to *Mia-lul* in  $u_1$ . In HPSG's term it is the value of the NONLOCAL|INHERITED|SLASH attribute.
8. In the implicature 'some X beat Mia', X is 'anchored' to Yong in  $u_2$ . Another possible interpretation of  $u_3$  is: 'Yong beat Cheli, too'. This reading, however, is not preferred as it requires a Cb shift -- a shift from Mia (the Cb in  $u_2$ ) to Yong. Continuation of the same Cb is preferred according to the theory of centering (Grosz et al 1983). The Cb, the null element in  $u_3$  continues to be *Mia-lul*, the object referent. For the second reading, 'Yong-un' (as the new Cb) must be mentioned overtly as in 'Yong-un Cheli-to ttaylyeseyo.'
9. The *nun*-marked subject NP (*ce-nun*) is a contrastive focus, not a topic and as such it bears a contrastive and exclusive implicature in  $U_5$ :  

$$\forall x[\text{person}(x) \rightarrow \text{beat}(x, \text{mia}) \wedge x \neq b]$$
 Notice also that the *nun*-marked subject NP in  $u_6$  (*Cheli-nun*) is the primary topic, the Cb of  $U_6$ . It looks back to 'Cheli' mentioned in  $u_3$ .
10. In Pollard and Sag (in press), the SUBCAT list does not contain the subject. It is no longer considered a complement. This view is not adopted in this paper, though.
11. The implicature meaning carried in the particle *to* 'also' (e.g.  $\lambda Q[\lambda P[\exists x, y[Qx \wedge Px] \wedge \neg(x=y)]]$ ) should be entered here. Instead, it is given in the head daughter's CONTEXT.
12. For an implementation of HPSG/K (HPSG-based Korean grammar for NLP -Chang 1992) GULP 2.0 (Graph Unification Logic Programming; Covington 1989) is being used in collaboration with Y. Min (University of Arizona).

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