A Corpus-Based Study of *Accept* and *Assessment* in SWBD-DAMSL

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Abstract

A series of studies have focused on backwards functions in conversation, especially to explore the distinction among *backchannel/acknowledgement*, *accept* and *yes-answer*, while for *accept* and *assessment/appreciation*, little attention has been obtained. This paper describes a quantitative investigation into two dialogue acts *accept* and *assessment/appreciation*, exhibiting their similarities and differences in the preceding contexts and lexical realization, which is expected to help the automatic detection of dialogue acts.

1 Introduction

Backwards communicative functions (Jurafsky et al., 1997), as one class of dialogue acts (DAs) in conversation, serve to give feedback to the interlocutor, playing a significant role in the interpretation of language in interaction. Data-intensive studies have been conducted in English language to detect discourse structure for speech recognition and understanding tasks (Jurafsky et al., 1998) as well as the design of spoken dialogue system (Bunt, 2012; Gravano et al., 2012). Particularly, it has been widely noted that *backchannel/acknowledgement*, *accept* and *yes-answer* strongly overlap in lexical realization (e.g. Jurafsky et al., 1998; Shriberg et al. 1998; Gardner, 2001; Stolcke et al. 2000; Gravano et al., 2007). While it has been discovered in the current study that *accept* ("aa") and *assessment/appreciation* ("ba") also share similarities, which has not been discussed in past studies. For example, the same utterance string has been found to be tagged as "aa" and "ba" (e.g. "that's right", "that's true" and so on) with similar preceding tags. The current study presents qualitative evidence as the first step for a broad analysis of various backwards functions, to show similarities and differences in the preceding contexts and lexical realization, which we believe is crucial to the successful automatic detection of DAs.

2 Corpus Resource

This study uses Switchboard Dialogue Act corpus (www.ldc.upenn.edu), which comprises 1,155 transcribed telephone conversations, totaling in 223,606 utterances (Fang et al., 2011). In this corpus, the segmented unit for utterances is defined as "slash-unit" (Meeter et al., 1995: 16), which has been coded with DA information according to the SWBD-DAMSL coding scheme (Jurafsky et al., 1997). In this scheme, "aa" refers to the case where the speaker explicitly accepts a proposal, or makes agreements with previous opinions (Jurafsky et al., 1997: 37), while "ba" is defined as "a backchannel/continuer which functions to express slightly more emotional involvement and support than just 'uh-huh'" (P48). See Table 1 for the basic statistics of the two DAs in the corpus.

	Total		Intersection			
	Tokens	Types	Types		Token	
aa	10,136	1,374	139	10.1%	7,718	76.1%
ba	4,523	1,621		8.6%	1,077	23.8%

Table 1. Basic statistics of "aa" and "ba"

139 utterances in the intersection indicate they can function as "aa" or "ba" in the corpus, accounting for 76.1% and 23.8% respectively in terms of tokens. It demonstrates that 76% of utterances in "aa" reoccur as "ba", implying significant lexical similarities between them.

3 Empirical Statistics

DA from the previous utterance as one of the predictors helps to improve the accuracy for recognition of some DAs (Coria & Pineda,

2007). So investigation here is to explore whether the preceding DA tags can be used to differentiate "aa" and "ba". Since "aa" and "ba" are both positive responses to what has been stated by others rather than by themselves, their previous contexts are restricted to immediately previous utterances uttered by others, tags of which have been partly listed in Table 2.

Pre-aa	F	%	Pre-ba	F	%
sv	4204	41.5	sd	2497	55.3
sd	1907	18.8	+	569	12.6
+	1378	13.6	sv	400	8.8
%	556	5.5	%	309	6.8
bf	451	4.4	b	134	3.0
ba	248	2.4	ny	95	2.1
^2	160	1.6	sd^e	81	1.8
ad	153	1.5	aa	49	1.1
b	126	1.2	x	49	1.1
qh	91	0.9	sd(^q)	40	0.9

Table 2. Top ten previous DA tags

As can be noted in Table 2, the top four tags of previous contexts for both "aa" and "ba" include "sv", "sd", "+" and "%", and constitute about 80% in both cases, indicating "aa" and "ba" share lots of similarities in immediately preceding DA tags. Nevertheless, "sd" and "sv" exhibit their own preference: one is more likely to appear in the preceding of "ba", while the other prefers "aa". For 139 utterances lying in the intersection, it is expected to check whether their preceding tags could offer more cues to disambiguation. Table 3 presents the top ten tags of preceding contexts for these 139 utterances.

Pre-aa	F	%	Pre-ba	F	%
sv	3153	40.9	sd	495	46.0
sd	1511	19.6	sv	205	19.0
+	1079	14.0	+	171	15.9
%	407	5.3	%	70	6.5
bf	357	4.6	b	23	2.1
ba	193	2.5	sd^e	17	1.6
^2	141	1.8	ny	11	1.0
ad	106	1.4	x	10	0.9
qh	72	0.9	ba	9	0.8
b	63	0.8	sd(^q)	8	0.7

Table 3. Top ten previous DA tags of the intersection

Similarly, the top four tags account for 80% preceding contexts, which is in line with those in Table 2. Therefore, it can be inferred "aa" and "ba" occur in overlapping environments. As for lexical realization, normally it is believed that "aa" and "ba" are totally different, but their intersection manifests in some cases one utterance can function as "aa" or "ba". Table 4 exhibits these utterances as well as the results of significant test.

Utterances	F-aa	F-ba	Log-likelihood	Sig.	
yeah	2993	6	2136.15	0	***
right	948	6	640.87	2.2E-141	***
yes	565	2	395.05	6.6E-88	***
no	445	3	299.41	4.4E-67	***
that's great	1	88	196.73	1.1E-44	***
…	…	…	…	…	…
I'm sure <laughter>	2	1	0.0085	0.9265	
exac-	2	1	0.0085	0.9265	
<laughter> true	2	1	0.0085	0.9265	
that's right <laughter>	16	7	0.0019	0.9652	

Table 4. Intersection between "aa" and "ba"

Log-likelihood and significant values, calculated by log-likelihood ratio calculator (Xu, 2009), are used to compare two models, expressing "how many times more likely the data are under one model than the other" [1]. The larger the log-likelihood value is, the smaller the significant value is, so the difference between the two sets is more salient. Cases indicated by the symbol "*" are significant, more likely performing one function over the other. Statistically, lexical realization for 29% (40/139) utterances in the intersection can be the predictor to distinguish "aa" from "ba". However, cases like "*that's right*" show little preference.

4 Conclusion

This paper presents a corpus-based investigation into "aa" and "ba" in Switchboard Dialogue Act Corpus. According to a batch of quantitative evidence and analyses, "aa" and "ba" share similar contexts expressed and lexical realization. Also, they exhibit a few statistical differences, which can be used to differentiate them, providing evidence to the automatic detection of DAs. In the future, a broader study of various backwards communicative functions will be further conducted. Apart from the preceding contexts and lexical realization, a more specific view will be held on grammatical and syntactic constructions that have been overlooked before.

[1] http://en.wikipedia.org/wiki/Likelihood-ratio_test

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