Cross-Speaker Influences on Intonation in Dialogue

Jacqueline Kowtko
Human Communication Research Centre
2 Buccleuch Place
Edinburgh EH8 9LW, U.K.

ABSTRACT

Following up previous claims that a mapping exists between intonation contour and discourse function, this paper provides evidence that another factor is involved, that of cross-speaker influence: there are systematic relationships between adjacent speakers' contours.

INTRODUCTION

Recent work on intonation in dialogue tends to follow one of two opposite approaches: it either describes very general discourse functions or identifies very specific discourse contexts.

The former approach is taken by McLemore (1991), in a study of phrase-final tunes in monologue and conversation. McLemore finds that the tunes indicate certain general discourse functions: *rising* tune *connects*, *level* tune *continues*, and *falling* tune *segments*. Context determines how each of these tunes operates. For instance, phrase-final rise—indicating non-finality or connection—can manifest itself as turn-holding, phrase subordination, or intersentential cohesion.

The latter approach is adopted by Hockey (1992). She examines three types of contour in terms of two contexts in task oriented dialogue, distribution of pronominal anaphora and turn-taking behaviour.

In order to further the understanding of intonational function, the present work attempts to combine these two approaches. This in turn requires an independent description of dialogue context as the basis for a robust account of intonational function. Such an independent description is the conversational games analysis outlined in Kowtko, Isard and Doherty-Sneddon (1992).

DIALOGUE CONTEXT

Kowtko *et al.* (1992) propose a repertoire of interactional exchanges, called *conversational games* (deriving from a tradition of literature originating in Power, 1974), which can be identified in dialogue. Within each game, we can identify individual *moves*, which are defined in terms of speaker intention and dialogue function. This analysis makes it possible to describe an utterance or part of an utterance as a specific move at a specific point within a specific game.

The repertoire of games and moves is based upon a map task (See Anderson *et al.*, 1991, for a detailed description) in which one person who has a map with a path marked on it describes this route to another person with a similar map who then draws the path onto their map. A barrier separates the two participants. The nature of the task is such that the speaker's intentions in the conversation

are fairly obvious. Kowtko *et al.* (1992) report that one expert and three naïve judges achieve 83% agreement when classifying conversational moves in two map task dialogues.

Six games appear in the dialogues: Instructing, Checking, Querying-YN, Querying-W, Explaining, and Aligning. They are initiated by the following moves:

INSTRUCT	Provides instruction
CHECK	Elicits confirmation of known information
QUERY-YN	Asks yes-no question for unknown information
QUERY-W	Asks content, *wh*-, question for unknown information
EXPLAIN	Gives unelicited description
ALIGN	Checks alignment of position in task

Six other moves provide response and additional feedback:

CLARIFY	Clarifies or rephrases given information
REPLY-Y	Responds affirmatively
REPLY-N	Responds negatively
REPLY-W	Responds with requested information
ACKNOWLEDGE	Acknowledges and requests continuation
READY	Indicates intention to begin a new game

Since the task involves one player telling the other how to draw a path, the conversation naturally consists of many Instructing games. Games occur in series and may nest within one another. Response and feedback moves may loop within a game.

The prototypical game consists of an initiating move, a response move, and an optional feedback move. The majority of games (84% from a sample of 3 dialogues, $n = 65$) match the simple prototype. Games that do not match this structure are still well-formed, containing extra moves, additional response–feedback loops, or nested games. Very few games (less than 2%) break down as the result of a misunderstanding or other problem.

Here is an example of a prototypical Instructing game. The vertical bar indicates the boundary of a move:

A: Right,|| just draw round it.
READY || INSTRUCT
B: Okay.
ACKNOWLEDGE

INTONATION

Once we have analysed the game structure of a dialogue, we can look for relationships between move type and intonation contour. Kowtko (1992) takes this approach with promising results. However, this procedure presupposes that discourse function, as defined by move type, is the principal factor in determining the choice of contour. This assumption is consistent with much recent work on functional factors influencing intonation (e.g. Hockey, 1991, 1992; Litman and Hirschberg, 1990; McLemore, 1991) and is supported by earlier work on game structure and intonation in task-oriented dialogue (Kowtko, 1992), but it ignores another factor that may be significant, namely the influence of the previous speaker's contour.

The present results use data from map task dialogues: single words which compose moves within themselves (*mmhmm, uh-huh, okay, yup, yes, no, almost, fine, right, okay, aye*[1]). These words typically surface as 6 of the 12 moves in the games analysis: ALIGN, REPLY-Y, REPLY-N, REPLY-W, ACKNOWLEDGE, and READY. The data set consists of 100 out of 151 single word moves spoken by four conversants in two entire dialogues. To avoid interference with pitch accents in larger intonational phrases, words which form partial utterances are excluded (the other 51 moves). The intonation of each word has been transcribed as high level, low level, rise, fall, rise-fall, or fall-rise.

When categorized according to *move* (specific function) and position in *game* (discourse context), trends emerge from the data. Results are summarised in Table 1.

Table 1: Intonation Associated with Move

Move	*Preceding Move*	*Tune*	*Data*
ALIGN		Rise	6 of 7
REPLY-Y, or REPLY-N, or REPLY-W	ALIGN ALIGN, embedded	Fall Level	6 of 7 4 of 6
REPLY-Y, or REPLY-N	QUERY-YN	Fall	13 of 16
REPLY-Y	CHECK	Level	1 of 1
ACKNOWLEDGE	INSTRUCT	Level	18 of 36
ACKNOWLEDGE	EXPLAIN	Level	2 of 3
ACKNOWLEDGE	CLARIFY	Fall $\star$	4 of 7 3 of 7
ACKNOWLEDGE	ACKNOWLEDGE	$\star$	3 of 4
ACKNOWLEDGE	REPLY-Y, or REPLY-N, or REPLY-W	$\star$	10 of 12
READY		Fall	1 of 1

It has been proposed (e.g. Brazil *et al.*, 1980, Brown Currie and Kenworthy, 1980) that the pitch range of one speaker can influence the pitch range of another. Results in the starred ($\star$) categories of Table 1 suggest that the intonation contour of one speaker can influence the intonation contour of another speaker. When an ACKNOWLEDGE move follows a response move (CLARIFY, ACKNOWLEDGE, or a REPLY), the relative final height of its intonation contour matches the relative final height of the contour in the last utterance spoken by the other conversant (70% of the time). Final heights are judged within a speaker's own pitch range.

CONCLUSION

The data here supports the view that intonation contours may be influenced by those of the previous speaker's utterance. While this is a preliminary study it nevertheless provides sufficient evidence of interesting trends to support further work.

[1]Participants in the map task were undergraduates at Glasgow University, and therefore spoke Scottish English.

REFERENCES

A H Anderson, M Bader, E G Bard, E Boyle, G Doherty, S Garrod, S Isard, J Kowtko, J McAllister, J Miller, C Sotillo, H Thompson, and R Weinert, 'The HCRC Map Task Corpus,' *Language and Speech*, **34**:351-366 (1991).

D Brazil, M Coulthard and C Johns, *Discourse Intonation and Language Teaching*, Longman, London (1980).

G Brown, K Currie, and J Kenworthy, *Questions of Intonation*, Croom Helm, London (1980).

B A Hockey, 'Prosody and the interpretation of "okay",' Presented at the *AAAI Fall Symposium on Discourse Structure in Natural Language Understanding and Generation*, November (1991).

B A Hockey, 'Prosody and the interpretation of cue phrases,' Proceedings of the IRCS Workshop on Prosody in Natural Speech, University of Pennsylvania, IRCS Report No.: 92–37, 71-77 (1992).

J C Kowtko, 'Comparing intonational form with discourse function: A study of single word utterances,' Proceedings of the IRCS Workshop on Prosody in Natural Speech, University of Pennsylvania, IRCS Report No.: 92–37, 79-82 (1992).

J C Kowtko, S D Isard and G M Doherty-Sneddon, 'Conversational games within dialogue,' Research Paper HCRC/RP-31, Human Communication Research Centre, University of Edinburgh (1992).

D Litman and J Hirschberg, 'Disambiguating cue phrases in text and speech,' COLING-90 *Proceedings*, 251-256 (1990).

C A McLemore, *The Pragmatic Interpretation of English Intonation: Sorority Speech*, Ph.D. dissertation, University of Texas at Austin (1991).

R Power, *A Computer Model of Conversation*, Ph.D. dissertation, University of Edinburgh (1974).