

# Eyebrow Raises in Face-to-Face Dialogue as Markers in Discourse Structure, Utterance Function, and Prosody

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## INTRODUCTION

When we interact face to face we use both verbal and non-verbal communication, including facial expressions. Eyebrow raises and other non-articulatory facial movements have attracted a great deal of research, mostly in relation to emotion or social signals. By contrast, empirical studies on their relation with speech from a linguistic point of view have been scarce. If we could establish and characterise a relation between eyebrow raises and the linguistic signal we could better understand face-to-face communication behaviour. This is important for psycholinguistic theories of speech production and for the development of multimodal communication systems. In the research described here I investigated eyebrow raising in a corpus of face-to-face dialogues in English. In particular, I studied possible linguistic functions of eyebrow raises in relation to discourse structure, utterance function, and pitch accents.

The hypotheses tested stated that:

1. Eyebrow raises will be more frequent in utterances starting new levels of the dialogue structure than in other parts of the dialogue
2. Eyebrow raises will be more frequent in instructions than in other types of utterance
3. Eyebrow raises will be more frequent in questions than in other types of utterance
4. Eyebrow raises will be temporally aligned with pitch accents.

## METHOD

A corpus of task-oriented dialogues was recorded using the experimental design of the Map Task (for details see Flecha-García, 2006). The materials for this study came from six of the dialogues between three participants in pairs. The average dialogue duration was 369 seconds. Dialogue structure and utterance function were annotated according to the Conversational Games Analysis coding scheme (Carletta *et al.*, 1997). Eyebrow raises and pitch-accented syllables were also annotated.

Multiple linear regression analyses were conducted to find out whether the number of eyebrow raises in an utterance could be predicted from the function of the utterance and its position in the dialogue structure, or whether it was only predicted by the utterance length indicating that eyebrow raises occurred at random. Regarding the alignment with pitch accents, a frequency distribution was plotted for the distance in seconds between eyebrow raises and their nearest accent. Additionally, a pairwise t-test was used to compare the distance from the brow raise to its preceding accent with the distance to its following accent.

## RESULTS AND CONCLUSIONS

Eyebrow raises were found to relate most strongly to the length of utterances. As the number of words increased, so did the number of eyebrow raises. However, other relations appeared that were independent of utterance length and partially supported the first and second hypotheses above. Speakers raised their eyebrows significantly more frequently at the beginning of the highest level in the dialogue structure and also when uttering instructions than in other parts of the dialogue. When asking a question, on the contrary, they did not raise their eyebrows more often than in other types of utterances. In Map Task dialogues the highest level of the dialogue structure reveals the speakers' mental organisation of the description of a map route into segments. Eyebrow raises at the start of these high-level segments could perhaps mark the introduction of a new coherent section of this

description. This has some similarities with previous findings that eyebrow raises could mark the start of topics (Chovil, 1991) and of new speaking turns in French (Cave, Guaitella, & Santi, 2002).

In the analysis of a possible alignment with pitch accents, eyebrow raises did indeed occur remarkably close to an accented syllable (mean distance = 0.063 seconds, SD = 0.458) and significantly closer to its following accent than to the preceding one ( $t = 2.381$ ,  $df = 271$ ,  $p < .05$ ). To the best of my knowledge, this is the first empirical study that provided evidence of alignment between eyebrow raises and pitch accents in English. This coordination may reveal an emphasising function for eyebrow raising which is in agreement with suggestions by Krahmer and Swerts (2004) in their perception studies in Dutch. An emphasising function also agrees with the fact that speakers raised their eyebrows more often when giving instructions, as mentioned above. In Map Task dialogues, instructing utterances carry the most important information to complete the task and it makes sense that the speaker would put more emphasis on them.

To conclude, we can speculate that eyebrow raising may have a structuring function, by marking the start of new dialogue segments, and an emphasising function, providing emphasis to important words and utterances.

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