The contribution of visual information in lexical access: evidence from vowel detection

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Seeing the labial gestures of the speaker enhances phoneme detection in noisy environments (Sumby & Pollack, 1954; Benoît, Mohamadi & Kandel, 1994). The goal of our study was to provide evidence that visual cues on the articulatory gestures of the speaker also activate lexical representations during word recognition. Surprisingly, lexical contributions to phoneme perception have been mostly studied in an auditory context (Cutler, Mehler, Norris & Segui, 1987). To our knowledge, only three studies investigated this issue in an audiovisual context (Barutchu, Crewther, Kiely, & Murphy, 2008; Brancazio, 2004; Sams, Manninen, Surakka, Helin, & Kättö, 1998). They found contradictory results. In our study, the participants (n = 60) had to perform a vowel phoneme monitoring task in bi-syllabic words and pseudo-words through an auditory only (A) and audiovisual (AV) presentations both in silent and noisy environments.

The results revealed that the participants detected faster the vocalic phoneme in the AV than in A conditions and also when the target phoneme was embedded in a word than in a pseudo-word. In the noisy condition, there was a significant interaction between lexical status and modality. The outcome of this study suggests that both the lexical context and AV conditions accelerate the vowel detection process. Furthermore, in noisy conditions, the contribution of the lexical level during phoneme processing is more important in AV than in A. This provides evidence that visual information can mediate lexical activation processes during word recognition.

References

Barutchu A., Crewther S., Kiely P., & Murphy M. (2008). When /b/ill with /g/ill becomes /d/ill: Evidence for a lexical effect in audiovisual speech perception. European Journal of Cognitive Psychology, 20 (1), 1-11.

Benoît, C., Mohamadi, T., & Kandel, S. (1994). Effects of phonetic context on audio-visual intelligibility of speech. Journal of Speech and Hearing Research, 37, 1195-1203.

Brancazio, L. (2004). Lexical influences in audiovisual speech perception. Journal of Experimental Psychology: Human Perception and Performance, 30, 445-463.

Cutler, A., Mehler, J., Norris, D., & Segui, J. (1987). Phoneme identification and the lexicon. Cognitive Psychology, 19, 141-177.

Sams, M, Manninen, P., Surakka, V., Helin, P., & Kättö, R. (1998). Mc Gurk effect in Finnish syllabes, isolated words and words in sentence: Effects of word meaning and sentence context. Speech Communication, 26, 75-87.

Sumby, W.H., & Pollack, I. (1954). Visual contribution to speech intelligibility in noise. Journal of the Acoustical Society of America, 26, 212-215.