

On the perception of voicing in whisper: a cross-modal semantic priming study

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This study focuses on the perception of the voicing feature in whispered words in French. A voiced consonant in whispered voice is produced without vibration of the vocal folds, i.e. the main property of the [+voiced] feature in this language. In French, some studies show that the [+voice] whispered obstruents retain some phonetic properties of their underlying identity, regarding acoustical traces related to their duration (Vercherand, 2010, Meynadier et Gaydina, 2013), to their intra-oral pressure (Meynadier, Gaydina 2013, Garnier et al. 2014, Meynadier 2015) or to their glottal area (Malécot et Peebles 1965, Crevier-Buchman et al. 2009, Meynadier 2015). However, even fewer studies teach us how the voicing contrast could be recognized by French. The few studies examining how French listeners perceive the voicing contrast in whispered speech have produced elliptical and contradictory results with not really comparable methods (Vercherand 2010, Fux 2012, Meynadier et al. 2013).

Here, the perception of the voicing feature of whispered obstruent consonants is examined in two cross-modal semantic priming experiments. In Experiment 1 with visual targets presented at the offset of auditory primes, a priming effect of similar magnitude to that observed in modal voice is found only when the whispered prime includes a voiceless obstruent (e.g. [s] in *dessert* primes CHOCOLAT). No priming effect appears when the whispered prime includes a voiced obstruent (e.g. [z] in *désert*), neither on the target word SABLE (sand) semantically related to *désert*, nor on the target word CHOCOLAT semantically related to *dessert*. In Experiment 2 with visual targets presented 50 ms after the offset of auditory primes, primes with a whispered voiced obstruent facilitate the processing of their respective semantic associated target words (i.e. [z] in *desert* primes SABLE).

Hence, our study shows that the reconstruction of the voiced feature is not immediate during whispered word recognition and requires a certain amount of time. During this time, the listener may extract the phonetic traces needed to recover the underlying voicing of whispered voiced obstruents.

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