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ABSTRACT BOOK



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Abstract book



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Does every speech sound in a word matter to dogs? – an fMRI study

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Companion dog, Cognition

Recent advances in dog neuroimaging revealed remarkable similarities in how dog and human brains process spoken words. Among others, there is neural evidence for speech sound discrimination, for the recognition of known speech sound sequences, and for sensitivity to word meaningfulness in the canine brain. However, it is debated whether dogs have similar abilities to humans in accessing the phonetic details of words during lexical processing. While a behavioural study has suggested that dogs may attribute a meaning-changing role to a single speech sound in a word, an electroencephalography (EEG) experiment has suggested that dogs may not realize that every sound of a word matters. It is also an open question whether the previously identified brain areas involved in lexical processing are sensitive to the phonetic details of words.

The aim of our study was to investigate speech processing in the canine brain, with a particular focus on phonetic sensitivity during lexical processing.

Twenty awake, unrestrained dogs were presented with commands (WORD), phonetically similar (SIM-differing in only one vowel) and dissimilar nonsense words (NONW) during the experiment, while the elicited brain activity was measured using functional magnetic resonance imaging (fMRI).

In a whole-brain analysis, we found extensive bilateral auditory cortex activity when comparing all vocal stimuli to silence ($p_{FWE} < 0.001$). Using region of interest analyses, we also found that within certain brain areas involved in lexical processing (as identified in previous fMRI studies), the original commands and their phonetically similar forms were processed differently than dissimilar nonwords (mid ectosylvian gyrus - SIM vs. NONW: $p = 0.026$, WORD vs. NONW: $p = 0.028$; caudal ectosylvian gyrus - SIM vs. NONW: $p = 0.03$). However, the activity elicited by words and phonetically similar nonwords did not differ.

These findings confirm the presence of lexical representations in the dog near-primary and secondary auditory cortex, but also shed light on the limited capacity of these brain areas to access the phonetic details of words.



Presenter

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