

Phonemic restoration as a key to unveil the mechanisms of human speech perception

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Phonemic restoration is a phenomenon in which a person hears the illusory sound of a missing phoneme as if it were there. Warren (1970) reported that people were unaware of a missing phoneme when the target phoneme was deleted from speech signal and replaced by the sound of cough. The human brain seems to be able to fill the gap in speech when the gap is filled with certain extraneous sounds. On the other hand, Saberi & Perrott (1999) also reported that people could understand speech even when every x-ms of speech signal was reversed on the temporal axis (locally time-reversed speech). The human brain can perceptually retrieve the fragments of speech signal that are dispersed on the temporal axis by the local time reversal, and reorganize them to understand speech. In my research, I have been exploring how native and non-native speakers of English perceptually restore temporally distorted speech. In my talk, I will discuss how native and non-native speakers of English perceive speech (1) when a phoneme in words and non-words was deleted and replaced by white noise, (2) when every certain length of speech signal was flipped in time, and (3) when the temporal envelope of speech signal was degraded by filtering the modulation frequency components that determine the configuration of speech signal. While the human brain can easily get tricked and perceptually restore disrupted speech sounds, people also unconsciously differentiate the acoustic details of speech sounds. The perceptual sensitivity to acoustic details and its relation to perceptual restoration are further discussed.