

Cortical Responses Time-Locked to Continuous Speech in the High-Gamma Band Depend on Selective Attention

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Auditory cortical responses to speech obtained by magnetoencephalography (MEG) show robust speech tracking in the high-gamma band (70-200 Hz), but little is currently known about whether such responses depend at all on the focus of selective attention. In this study we investigate differences in high-gamma cortical responses to male and female speech, and we address whether these responses, thought to originate from primary auditory cortex, depend on selective attention. Twenty-two human subjects listened to concurrent speech from male and female speakers and selectively attended to one speaker at a time while their neural responses were recorded with MEG. The male speaker's pitch range coincided with the lower range of the high-gamma band. In contrast, the female speaker's pitch range was higher, and only overlapped the upper end of the high-gamma band. Neural responses were analyzed using the temporal response function (TRF) framework. As expected, the responses demonstrate robust speech tracking in the high gamma band, but only to the male's speech. Responses present with a peak latency of approximately 40 ms indicating an origin of primary auditory cortex. The response magnitude also depends on selective attention: the response to the male speaker is significantly greater when male speech is attended than when it is not attended. This is a clear demonstration that even very early cortical auditory responses are influenced by top-down, cognitive, neural processing mechanisms. Supported by the National Institutes of Health (R01-DC019394) and the (National Science Foundation (SMA 1734892).