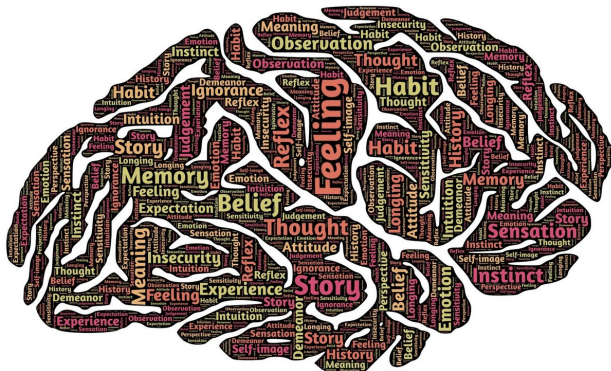


The 'loudness' of our thoughts affects how we judge external sounds

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The "loudness" of our thoughts—or how we imagine saying something—influences how we judge the loudness of real, external sounds, a team of researchers from NYU Shanghai and NYU has found.

Its study, titled "Imagined Speech Influences Perceived Loudness of Sound" and published in the journal *Nature Human Behaviour*, offers new insights into the nature of brain activity. The research project was conducted by Tian Xing and Bai Fan from NYU Shanghai with, David Poeppel and Teng Xiangbin from NYU, and Ding Nai from Zhejiang University.

"Our 'thoughts' are silent to others—but not to ourselves, in our own heads—so the loudness in our thoughts influences the loudness of what we hear," says Poeppel, a professor of psychology and neural science.

Using an [imagery-perception](#) repetition paradigm, the team found that auditory imagery will decrease

the sensitivity of actual loudness perception, with support from both behavioural loudness ratings and human electrophysiological (EEG and MEG) results.

"That is, after imagined speaking in your mind, the actual sounds you hear will become softer—the louder the volume during imagery, the softer perception will be," explains Tian, assistant professor of neural and cognitive sciences at NYU Shanghai. "This is because imagery and perception activate the same auditory brain areas. The preceding imagery already activates the auditory areas once, and when the same brain regions are needed for perception, they are 'tired' and will respond less."

According to Tian, the study demonstrates that perception is a result of interaction between top-down (e.g. our cognition) and bottom-up (e.g. sensory processing of external stimulation) processes. This is because human beings not only receive and analyze upcoming external signals passively, but also interpret and manipulate them actively to form perception.

The findings are the team's latest in a series of studies using mental imagery paradigms to investigate speech monitoring and control in production process—namely, a motor-based predictive process, which can extend and predict low-level auditory attributes such as loudness.

"Combining perception and speech production monitoring and control, this study can implicate the mechanisms of mental disorders," Tian says. "The most relevant one is auditory hallucination mostly in schizophrenia."

More information: Xing Tian et al, Imagined speech influences perceived loudness of sound, *Nature Human Behaviour* (2018). [DOI: 10.1038/s41562-018-0305-8](https://doi.org/10.1038/s41562-018-0305-8)

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