

Study sheds light on the voices in our head

December 8 2017, by Wendy Van Zuijlen



We spend a lot of our time talking to ourselves in our heads. Credit: UNSW Science

New research showing that talking to ourselves in our heads may be the same as speaking our thoughts out loud could help explain why people with mental illnesses such as schizophrenia hear voices.

As far our brains are concerned, talking to ourselves in our heads may be fundamentally the same as speaking our thoughts out loud, new research shows.

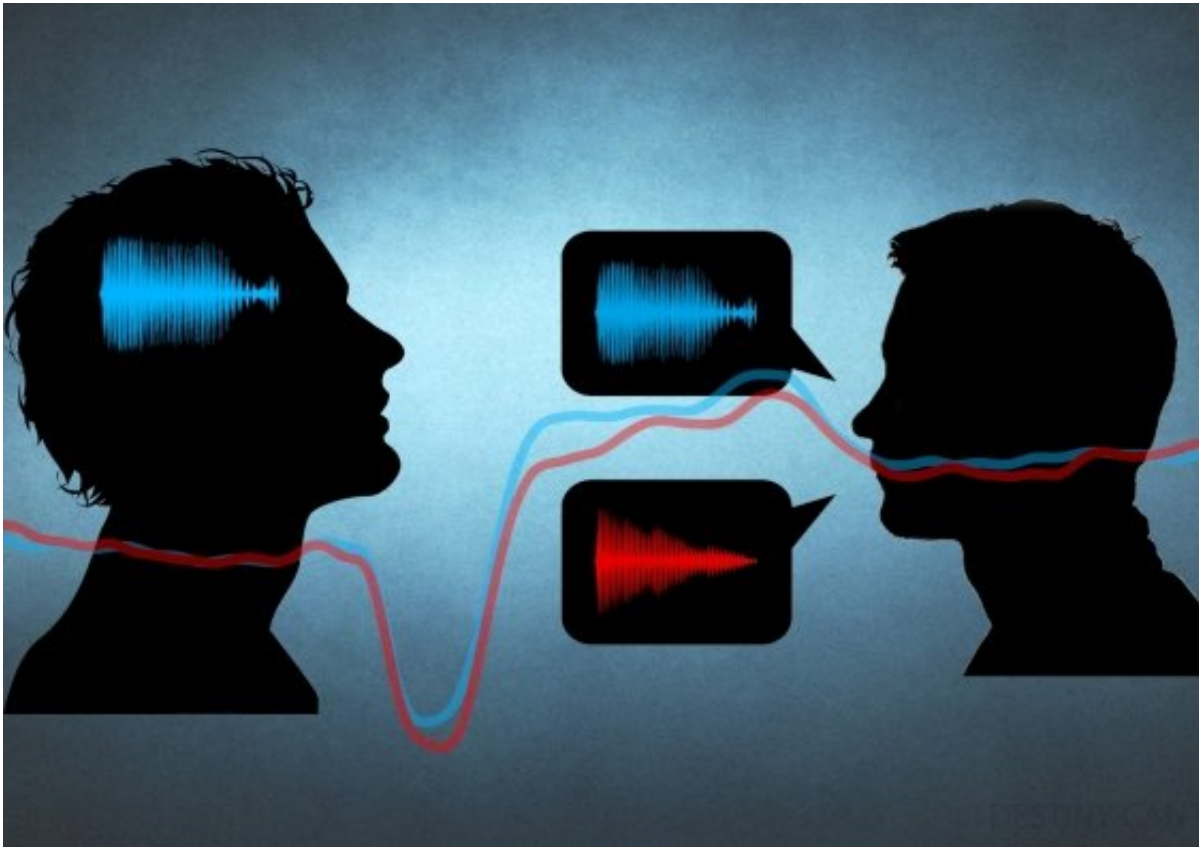
The findings may have important implications for understanding why [people](#) with [mental illnesses](#) such as schizophrenia hear voices.

UNSW Sydney scientist and study first author Associate Professor Thomas Whitford says it has long been thought that these auditory-verbal hallucinations arise from abnormalities in inner [speech](#) – our silent internal dialogue.

"This study provides the tools for investigating this once untestable assumption," says Associate Professor Whitford, of the UNSW School of Psychology.

Previous research suggests that when we prepare to speak out loud, our [brain](#) creates a copy of the instructions that are sent to our lips, mouth and vocal cords. This copy is known as an efference-copy.

It is sent to the region of the brain that processes sound to predict what sound it is about to hear. This allows the brain to discriminate between the predictable sounds that we have produced ourselves, and the less predictable sounds that are produced by other people.



As far as our brains are concerned, talking to ourselves in our heads may be fundamentally the same as speaking our thoughts out loud. Credit: UNSW

"The efference-copy dampens the brain's response to self-generated vocalisations, giving less mental resources to these sounds, because they are so predictable," says Associate Professor Whitford.

"This is why we can't tickle ourselves. When I rub the sole of my foot, my brain predicts the sensation I will feel and doesn't respond strongly to it. But if someone else rubs my sole unexpectedly, the exact same sensation will be unpredicted. The brain's response will be much larger and creates a ticklish feeling."

The study, published in the journal *eLIFE*, set out to determine whether

inner speech – an internal mental process – elicits a similar efference-copy as the one associated with the production of spoken words.

The research team developed an objective method for measuring the purely mental action of inner speech. Specifically, their study in 42 healthy participants assessed the degree to which imagined sounds interfered with the [brain activity](#) elicited by actual sounds, using electroencephalography (EEG).

The researchers found that, just as for vocalized speech, simply imagining making a sound reduced the brain activity that occurred when people simultaneously heard that sound. People's thoughts were enough to change the way their brain perceived sounds. In effect, when people imagined sounds, those sounds seemed quieter.

"By providing a way to directly and precisely measure the effect of inner speech on the brain, this research opens the door to understanding how inner speech might be different in people with psychotic illnesses such as schizophrenia," says Associate Professor Whitford.

"We all hear voices in our heads. Perhaps the problem arises when our brain is unable to tell that we are the ones producing them."

More information: Thomas J Whitford et al. Neurophysiological evidence of efference copies to inner speech, *eLife* (2017). [DOI: 10.7554/eLife.28197](#)

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