

Shout now! How nerve cells initiate voluntary calls

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"Should I say something or not?" Human beings are not alone in pondering this dilemma – animals also face decisions when they communicate by voice. University of Tübingen neurobiologists Dr. Steffen Hage and Professor Andreas Nieder have now demonstrated that nerve cells in the brain signal the targeted initiation of calls – forming the basis of voluntary vocal expression. Their results are published in *Nature Communications*.

When we speak, we use the sounds we make for a specific purpose – we intentionally say what we think, or consciously withhold information. Animals, however, usually make sounds according to what they feel at that moment. Even our closest relations among the primates make sounds as a reflex based on their mood. Now, Tübingen neuroscientists have shown that [rhesus monkeys](#) are able to call (or be silent) on command. They can instrumentalize the sounds they make in a targeted way, an important behavioral ability which we also use to put language to a purpose.

To find out how the [neural cells](#) in the brain catalyse the production of controlled vocal noises, the researchers taught rhesus monkeys to call out quickly when a spot appeared on a computer screen. While the monkeys solved puzzles, measurements taken in their [prefrontal cortex](#) revealed astonishing reactions in the cells there. The [nerve cells](#) became active whenever the monkey saw the spot of light which was the instruction to call out. But if the monkey simply called out spontaneously, these nerve cells were not activated. The cells therefore did not signaled for just any

vocalisation – only for calls that the monkey actively decided to make.

The results published in *Nature Communications* provide valuable insights into the neurobiological foundations of [vocalization](#). "We want to understand the [physiological mechanisms](#) in the brain which lead to the voluntary production of calls," says Dr. Steffen Hage of the Institute for Neurobiology, "because it played a key role in the evolution of human ability to use speech." The study offers important indicators of the function of part of the brain which in humans has developed into one of the central locations for controlling speech. "Disorders in this part of the human brain lead to severe speech disorders or even complete loss of speech in the patient," Professor Andreas Nieder explains. The results – giving insights into how the production of sound is initiated – may help us better understand speech disorders.

More information: Steffen, R., Nieder, H., and Nieder, A. Single neurons in monkey prefrontal cortex encode volitional initiation of vocalizations, *Nature Communications*. [DOI: 10.1038/ncomms3409](#), 2013doi:10.1038/ncomms3409, 2013

Provided by University of Tübingen

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