

Investigating the loss of musical ability

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Amusia is a severe musical disorder affecting both the perception and production of music. It may be either congenital, hereditary tone deafness, or acquired, that is, a condition caused by brain damage. Although amusia has been known in neurology since the late 19th century, the neural basis and mechanisms of music processing and associated disorders are not yet fully understood.

A study by a group of researchers from Finland and the United States has now provided new information on the origin of amusia in the brain and differences in processing music and [language](#), respectively.

The results have been [published](#) in the *Journal of Neuroscience*.

Music resides in the right temporal lobe

The processing of music in the brain is complex, involving several parts and systems. The frontotemporal regions contributing significantly to such processing are also important for language functions.

Contrary to what might be expected, however, amusia may also be manifested independently of aphasia, a language disorder resulting from a [brain injury](#). This is why researchers have believed music uses as-yet-unknown neural connections in the brain that are distinct from language functions.

The new study discovered that strokes causing amusia are located in several brain regions with no common denominator. The researchers also succeeded in locating the brain network affected by such strokes. This was done with the help of network analysis based on functional magnetic resonance imaging.

"The method allows us to localize the [brain network](#) affected when damage occurs in different brain regions but gives rise to the same symptoms," says University Researcher Aleksi Sihvonen of the University of Helsinki.

Unlike language functions located in the left brain hemisphere, the [neural network](#) behind amusia focuses on the right hemisphere. Its key node was the superior temporal gyrus. A progressive loss in brain tissue was observed in this region at six months follow-up; the scope of such

loss was associated with the severity of amusia.

This means the [superior temporal gyrus](#) may be a promising target in the treatment and rehabilitation of amusia.

"All in all, our findings underline the differences between perceiving and processing music and language in the brain," notes Sihvonen.

Treatment and rehabilitation potential

The prevalence of congenital amusia in the population is only about 2%, but acquired amusia is much more common. For example, amusia after a cerebrovascular disturbance occurs in up to two-thirds of patients in the acute stage of the disease and in about one-third in the chronic stage.

Amusia is also associated with aprosodia, a disorder in interpreting language prosody or ranges of rhythm and melody, which results in an inability to interpret and convey emotions in speech. This has implications for the social interactions of patients with cerebrovascular disorders and naturally affects their fitness for work, particularly if their profession is closely related to music.

"Although amusia is typically not as debilitating or serious a symptom as aphasia, it can have a significant effect on the patient's well-being, hobbies and quality of life," Sihvonen states.

Accordingly, the researchers say that the evaluation of amusia would be particularly important for patients with cerebrovascular disorders for whom music-based rehabilitation is planned or who work with [music](#).

More information: Aleksi J. Sihvonen et al, Focal brain lesions

causing acquired amusia map to a common brain network, *The Journal of Neuroscience* (2024). [DOI: 10.1523/JNEUROSCI.1922-23.2024](https://doi.org/10.1523/JNEUROSCI.1922-23.2024)

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