

# Know that noise? Scientists probe formation of auditory memories

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New research uses "noise," sound waves formed from many thousands of completely unpredictable random numbers played as a sound, to probe how the human brain acquires auditory memories. The study, published by Cell Press in the May 27 issue of the journal *Neuron*, reveals that learning new sounds is quick, robust, and long-lasting, resembling a sudden insight.

Auditory [perception](#) requires the listener to learn recurring properties of complex sounds and associate them with plausible physical sources. "Most of our knowledge about auditory [memory](#) is based on simple sounds," says lead study author Dr. Trevor Agus from the Ecole Normale Supérieure in Paris. "How templates emerge from everyday auditory experience with arbitrary complex sounds is currently largely unknown."

Dr. Agus and colleagues used unpredictable, random hissing sounds, also known as noise, as a tool to observe the creation of new auditory memories in human listeners. Noise was particularly suitable for probing memory formation because the different sounds were acoustically complex, meaningless, and completely new to the listener.

Importantly, the listeners were unaware that identical copies of some of the noise samples would occasionally reoccur throughout the experiment.

The researchers discovered that repeated exposure induced learning for totally unpredictable and meaningless sounds. The listeners were better at detecting repetitions within noise samples that had been presented

several times than new noise samples, showing that a new auditory memory had been created. "The sound memories were formed rapidly, with performance becoming abruptly near-perfect, and multiple noises were remembered for several weeks," reports Dr. Agus.

The authors suggest that the fast, robust, and durable auditory learning observed in this study would be highly desirable for learning about the acoustic environment in realistic situations. "To our knowledge, this is the first time that auditory learning with such ecologically relevant characteristics has been revealed through a psychophysical paradigm. We propose that rapid sensory plasticity in the auditory [brain](#) creates useful memories from the ever-changing, but sometimes repeating, acoustical world," concluded coauthor Dr. Agus.

**More information:** Pressnitzer et al.: "Rapid Formation of Robust Auditory Memories: Insights from Noise." Publishing in *Neuron* 66, 610-618, May 27, 2010. [DOI 10.1016/j.neuron.2010.04.014](https://doi.org/10.1016/j.neuron.2010.04.014)

Provided by Cell Press

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