How do we hear time within sound?

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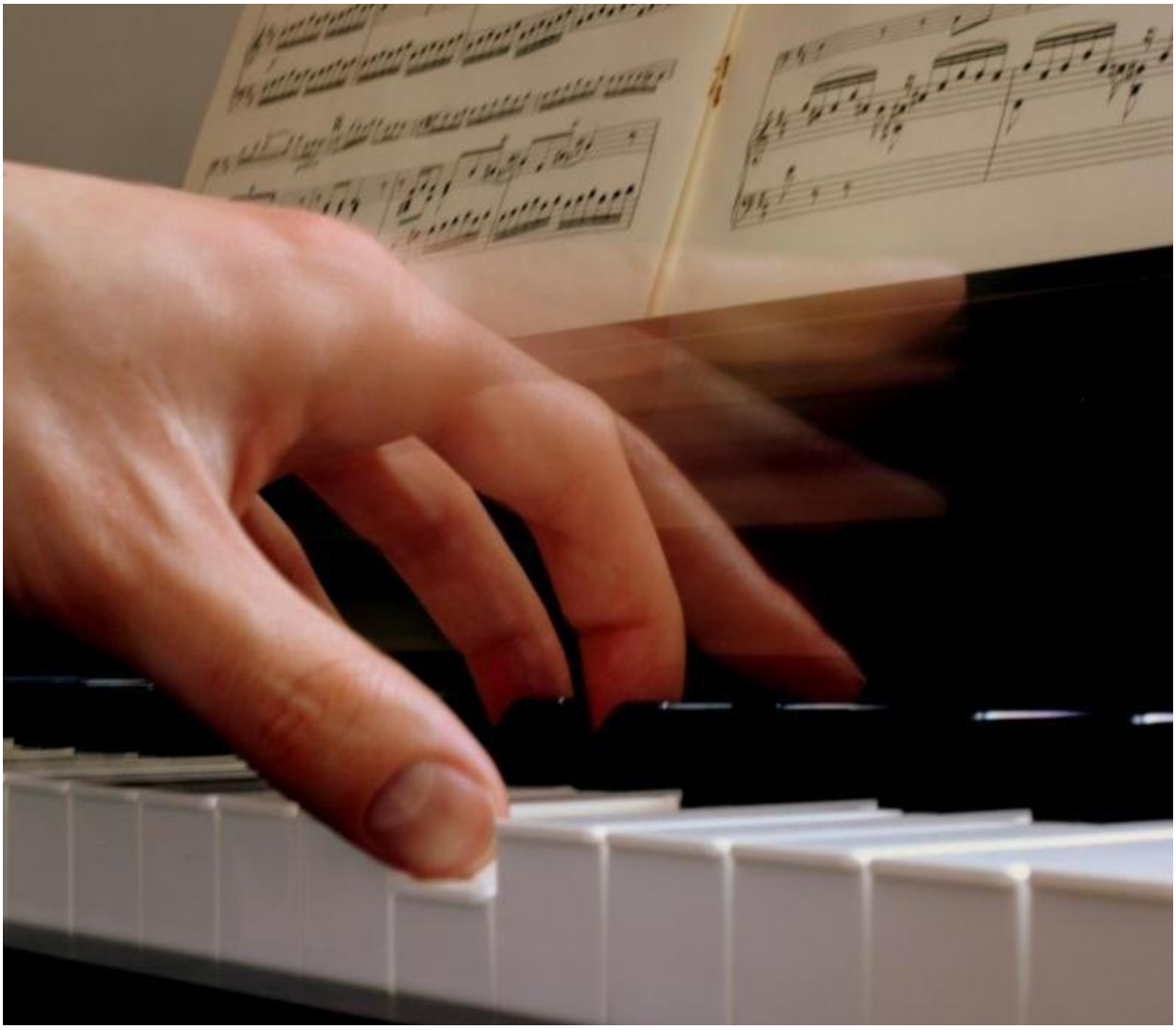

Auditory cortex uses neural excitation and inhibition to encode temporal patterns in a sound, like the rhythm produced from a melody. Credit: Daniel Bendor

How does our auditory system represent time within a sound? A new study published in *PLOS Computational Biology* investigates how temporal acoustic patterns can be represented by neural activity within auditory cortex, a major hub within the brain for the perception of sound.

Dr. Daniel Bendor, from University College London, describes a novel way that neurons in auditory cortex can encode temporal information, based on how their excitatory and inhibitory inputs get mixed together.

Your car moves when you press the accelerator and stops when you step on the brakes. In much the same way, a neuron's activity depends on the excitation and inhibition it receives from other neurons. But how these inputs combine together to make a neuron "go" or "stop" can also convey information.

Dr. Bendor describes how a neuron's excitatory and inhibitory inputs can be used to encode the temporal patterns within a sound. Varying the timing and strength of these inputs can produce either a rate or temporal neural code, effectively switching the "language" used by the brain for describing the temporal patterns within a sound.

Understanding how the brain generates these neural codes can lead to the development of state-of-the-art neural prosthetic devices, more closely imitating the neural coding patterns normally used by the brain.

More information: Bendor D (2015) The Role of Inhibition in a Computational Model of an Auditory Cortical Neuron during the Encoding of Temporal Information. *PLoS Comput Biol* 11(4): e1004197. DOI: 10.1371/journal.pcbi.1004197