

This Week in The Journal

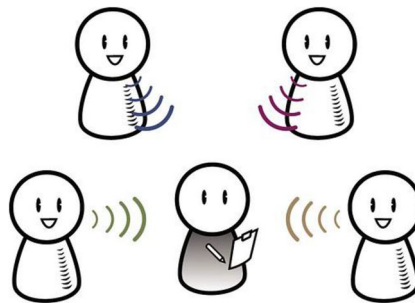
Processing Sound Requires Making Multiple Internal Predictions

Alejandro Tabas and Katharina von Kriegstein

(see article [e2219222023](#))

Our sensory systems take in vast amounts of information about our external surroundings. We would certainly be overwhelmed by this if not for the ability to form internal predictions about how external stimuli in our near future will look, sound, smell, etc. To form these predictions, neural systems are engaged at different stages. One theory is that this is a linear process, meaning that at each stage these systems process and evaluate the predictions drawn by prior stages. However, this theory does not explain what might occur if predictions made by previous stages contradict each other. In this issue, Tabas and Kriegstein investigated how expectations at each stage of the sensory processing pipeline are used to form internal predictions. They measured fMRI responses from the human auditory cortex, thalamus, and midbrain as participants listened to repetitive sequences of sounds. Participants made predictions on when “deviant” tones occurred in each sound sequence based on either a strategy supporting the linear processing theory, a strategy supporting multiple stages being engaged to process

a prior stage, or both. The authors found that populations of neurons in all brain regions of interest required both types of predictions. This suggests that internal predictive coding engages with the auditory system in a nonlinear way. These data advance our understanding of how complex auditory signals, like speech, are sensed and understood and are informative for future studies on the auditory system and predictive coding.



An individual sensing sounds from others. Image: Openverse/Rosenfeld Media, licensed under [CC BY 2.0](#)

New Insights on Mechanisms Underlying Muscle Spasms after Spinal Cord Injury

Amr Mahrous, Derin Birch, C.J. Heckman, and Vicki Tysseling

(see article [e1695232023](#))

Following spinal cord injury (SCI), individuals quickly experience decreased

neuron excitability, muscle weakness, and paralysis below the level of injury. Over time, SCI eventually leads to increased muscle tone, exaggerated reflexes, and spontaneous muscle spasms. Muscle spasms can be attributed, in part, to maladaptive changes that occur during neuroplasticity. However, developing treatments for muscle spasms that do not impede the recovery of motor function has proven difficult. In this issue, Mahrous and colleagues investigated novel mechanisms to target with treatment by exploring synaptic inputs to motoneurons in the spinal cord following SCI. They induced SCI in adult mice of both sexes and identified those with low or high recovery before extracting their spinal cords. Electrically stimulating the dorsal roots below the site of the injury triggered spasm-like activity in SCI but not in control mice. This experimental model enabled the authors to measure synaptic inhibition and excitation following SCI. The authors ultimately found that changes in motoneuron excitability and synaptic inhibition but not excitation contributed to spasms. These findings point to novel mechanisms underlying muscle spasms that may be further studied to identify molecular targets for pharmacological treatment.

This Week in The Journal was written by Paige McKeon
<https://doi.org/10.1523/JNEUROSCI.twij.44.1.2024>