

Sense and sensibility in short-term memory

More than three centuries ago, Sir Isaac Newton reflected on the similarities between the sense of hearing and the sense of sight. Newton's speculations were impossible to test scientifically, until now. A novel Brandeis University study confirms the Newtonian idea that sight and sound are indeed parallel—at least when it comes to encoding and retrieving short-term memories from the two senses.

Published in this week's issue of the open-access journal *Public Library of Science Biology*, the study was inspired by Newton's 1706 book, *Opticks*, and set out to investigate whether sight and hearing behave similarly in encoding short-term memories.

"Obviously, sound and light are physically different, processed by different receptors—eyes and ears—and furthermore, processed in different neural streams within the brain," explained coauthor Robert Sekuler, a neuroscientist at the Volen National Center for Complex Systems at Brandeis University, and an expert on the neural and cognitive terrain associated with vision. "Previous studies that tried to compare auditory and visual memory did little or nothing to put the stimuli that would be remembered on equal footing—comparing 'apples to apples' between the two senses."

"But in this study we used insights from neuroscience to identify test materials in vision and hearing that the human brain would process and treat in similar ways, and then we used these well-matched stimuli to examine memory for studied lists of either auditory or visual items," said Sekuler.

The study used computer-generated visual images and sounds to test auditory and visual memory mechanisms. Both the sounds and the visual materials were intentionally unfamiliar to test subjects, who also found it difficult to name the test items. The results were based on behavioral measures and a computational model for memory.

"Memories are not exact representations of the past," said coauthor Kristina Visscher, a post-doctoral fellow at Brandeis. "This study shows that our representations of sight and sound get contorted on the way to being remembered, and they get contorted in the same ways." The errors we make in memory for sounds are the same types of errors we make in memory for sight.

The first of its kind, the study opens the door to the tantalizing possibility that, according to Visscher, "the brain, in this case at least, is relatively uninventive: it may use fairly similar methods to generate light-based and sound-based memories." So three centuries after Newton published his inspired speculation, there is evidence that his intuition was close to the mark.

Source: Brandeis University

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