

The Human Brain: Detective of Auditory and Visual Change

January 16, 2008

The human brain is capable of detecting the slightest visual and auditory changes. Whether it is the flash of a student's hand into the air or the faintest miscue of a flutist, the brain instantaneously and effortlessly perceives changes in our environment. Several studies have indicated, however, that even a small span of time in between pre- and post-change images can disturb the brain's ability to detect visual discrepancies.

"The pre-change scene must be memorized in some way," explained psychologists Laurent Demany, Wiebke Trost, Maja Serman and Catherine Semal from the University of Bordeaux and the French National Center for Scientific Research (CNRS). "In the visual domain, numerous experiments have shown that even a very short gap of less than 100ms can dramatically disrupt our ability to detect a local change in complex images. Following such a gap, local changes can be detected only in very simple images." This phenomenon is known as 'change blindness.'

In a recent study, the aforementioned psychologists conducted an experiment to test the effects of 'change blindness' in audition and to determine if the brain uses similar mechanisms to perceive auditory changes as it does with vision. Participants listened to pre- and post-change sounds that varied in number of tones, changes in pitch and duration of the silent interval between sounds.

The experimenters proposed that if auditory change detection is similar to the visual process, a complex (i.e., greater number of simultaneously-presented tones) rather than simple sound would affect the participant's ability to remember the pre-change sound. The psychologists discovered, however, that the participants were able to remember even the most complex sounds—reaching up to 12 tones—despite the time delays.

The results of the study, which appear in the January 2008 issue of *Psychological Science*, a journal of the Association for Psychological Science, suggest that, contrary to previous notions, the brain actually uses different mechanisms in auditory memory than in visual memory. And as a result, the human brain is a keener detective of auditory change than visual change.