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How our focus can silence the noisy world around us

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A Kirlian photograph of a human ear. Credit: N Seery, Wellcome Images.

(Medical Xpress) -- How can someone with perfectly normal hearing become deaf to the world around them when their mind is on something else? New research funded by the Wellcome Trust suggests that focusing heavily on a task results in the experience of deafness to perfectly audible sounds.

In a study published in the journal 'Attention, Perception, & *Psychophysics*', researchers at UCL (University College London) demonstrate for the first time this phenomenon, which they term 'inattentional deafness'.

"Inattentional deafness is a common everyday experience," explains Professor Nilli Lavie from the Institute of Cognitive Neuroscience at UCL. "For example, when engrossed in a good book or even a captivating newspaper article we may fail to hear the train driver's announcement and miss our stop, or if we're texting whilst walking, we

may fail to hear a car approaching and attempt to cross the road without looking."

Professor Lavie and her PhD student James Macdonald devised a series of experiments designed to test for inattentional deafness. In these experiments, over a hundred participants performed tasks on a computer involving a series of cross shapes. Some tasks were easy, asking the participants to distinguish a clear colour difference between the cross arms. Others were much more difficult, involving distinguishing subtle length differences between the cross arms.

Participants wore headphones whilst carrying out the tasks and were told these were to aid their concentration. At some point during task performance a tone was played unexpectedly through the headphones. At this point, immediately after the sound was played, the experiment was stopped and the participants asked if they had heard this sound.

When judging the respective colours of the arms - an easy task that takes relatively little concentration - around two in ten participants missed the tone. However, when focusing on the more difficult task - identifying which of the two arms was the longest - eight out of ten participants failed to notice the tone.

The researchers believe this deafness when attention is fully taken by a purely visual task is the result of our senses of seeing and hearing sharing a limited processing capacity. It is already known that people similarly experience 'inattentional blindness' when engrossed in a task that takes up all of their attentional capacity - for example, the famous Invisible Gorilla Test, where observers engrossed in a basketball game fail to observe a man in a gorilla suit walk past. The new research now shows that being engrossed in a difficult task makes us blind and deaf to other sources of information.

"Hearing is often thought to have evolved as an early warning system that does not depend on attention, yet our work shows that if our attention is taken elsewhere, we can be effectively deaf to the world around us," explains Professor Lavie. "In our task, most people noticed the sound if the task being performed was easy and did not demand their full concentration. However, when the task was harder they experienced deafness to the very same sound."

Other examples or real world situations include inattentional deafness whilst driving. It is well documented that a large number of accidents are caused by a driver's inattention and this new research suggests inattentional deafness is yet another contributing factor. For example, although emergency vehicle sirens are designed to be too loud to ignore, other sounds - such as a lorry beeping while reversing, a cyclist's bell or a scooter horn - may be missed by a driver focusing intently on some interesting visual information such as a roadside billboard, the advert content on the back of the bus in front or the map on a sat nav.

More information: Macdonald JSP and Lavie N. Visual perceptual load induces inattentional deafness. *Atten Percept Psychophys* 2011 [epub ahead of print]

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