

Hearing brains are 'deaf' to disappearance of sounds, study reveals

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Our brains are better at hearing new and approaching sounds than detecting when a sound disappears, according to a study published today funded by the Wellcome Trust. The findings could explain why parents often fail to notice the sudden quiet from the playroom that usually accompanies the onset of mischief.

Hearing plays an important role as an [early warning system](#) to rapidly direct our attention to new events. Indeed we often rely on sounds to alert us to things that are happening around us before we see them, for example somebody walking into the room while our back is turned to the door. Yet little is known about how our brains make sense of the sounds happening around us and what makes us hear certain events while completely missing others.

Researchers at the UCL Ear Institute wanted to try and understand what makes certain sounds easily detectable while others go unnoticed. They created artificial 'soundscapes' comprised of different on-going sounds and asked listeners to detect the onset or disappearance of different sound-objects within the melee.

Overall, the team found that listeners are remarkably tuned to detecting new sounds around them but are much less able to detect when a sound disappears. In busy sound environments, the [participants](#) missed more than half of the changes occurring around them and the changes that were detected involved much longer reaction times. The effects were observed even in relatively simple soundscapes and didn't seem to be

affected by volume.

Dr Maria Chait, who led the research at the UCL Ear Institute, said: "On the one hand, we might expect to be more sensitive to the [appearance](#) of new events. In terms of survival, it is clearly much more important to detect the arrival of a predator than one that has just disappeared. But this reasoning doesn't apply to other situations. Imagine walking in a forest with your friend behind you and suddenly having the sound of their footsteps disappear. Our results demonstrate that there are a large number of potentially urgent events to which we are fundamentally not sensitive. We refer to this phenomenon as 'disappearance blindness'"

The study also explored how resilient listeners are to scene interruptions. In busy scenes, such as those we often face in the world around us, important scene changes frequently coincide in time with other events. The study showed that even brief interruptions, such as a short 'beep' occurring at the same time as the change, are sufficient to make [listeners](#) fail to notice larger scene changes. It is thought that this occurs because the interruption briefly captures our attention and prevents the information about the change from reaching our consciousness.

"Understanding what makes certain events pop out and grab attention while others pass by un-noticed is important not only for understanding how we perceive the world but also has important practical applications. For example, to aid the design of devices intended to help professionals such as air traffic controllers and pilots who operate in environments where the detection of change is critical," added Dr Chait.

More information: F. Cervantes Constantino et al. Detection of appearing and disappearing objects in complex acoustic scenes. PLOS ONE, 27 September 2012 [Epub]
dx.plos.org/10.1371/journal.pone.0046167

Provided by Wellcome Trust

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