Sound, vision & hearing loss

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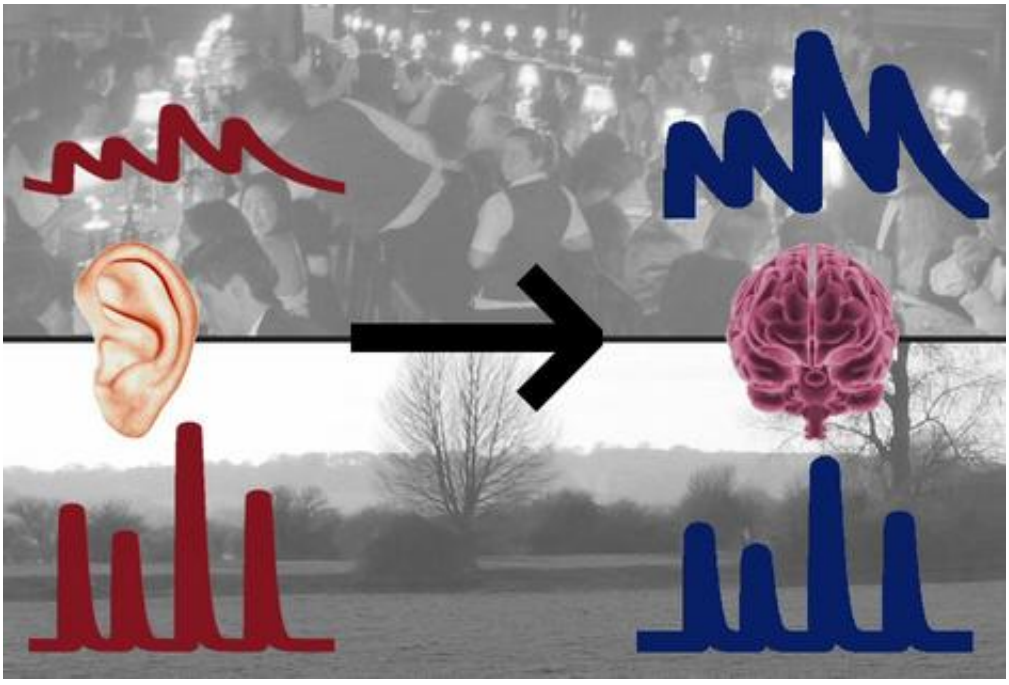

(Medical Xpress) -- The mechanisms used by the brain to distinguish contrasting sounds may be similar to those used to visually pick out a face in the crowd.

Scientists at Oxford University's Department of Physiology, Anatomy and Genetics are studying the ways in which sound is represented in the brain and their latest research, published in the journal *Neuron*, looks at how the brain's nerve cells respond to sounds heard under different

conditions.

The study, carried out by Neil Rabinowitz, Ben Willmore, Jan Schnupp and Andrew King, shows that neurons in the auditory cortex of the ferret's brain adjust their activity to compensate for the contrast between a sound and its background. Examples in human terms could be situations where the underlying environment is silent or very quiet - such as the countryside at night - or very loud, as in a busy pub or high street.

This is known as contrast gain control, a mechanism that our visual systems are thought to use to help focus attention on a particular object. Professor King says: ‘There could be a similar mechanism in the auditory system for picking out sounds of interest against a background of other sounds of different frequencies.’

The research is contributing to the efforts of Professor King’s group to unravel the way the brain processes sound. ‘Auditory scenes around us are changing all the time. We are interested in how our experience of this influences the way information is processed in the brain, and whether that helps to maintain a reliable perception of where and what a sound is under different listening conditions.’

These findings could have significance for our understanding of how the brain compensates for partial loss of hearing and, in time, have implications for the development of cochlear implants and hearing aids.

‘For cochlear implants and hearing aids to work the brain must be able to re-learn how to interpret sounds that have been restored,’ Professor King explains.

Professor King and his team have already shown that the brain can compensate for partial hearing loss. In research published last year, human subjects wore an earplug in one ear and were asked to identify

which of several speakers was producing a sound.

‘Our ability to place sound relies on the comparison of signals between our two ears and when tested, when the earplug was first worn, subjects were very poor at locating the sound. But with practice several times a day for a week they re-learnt how to localise the sounds and once again became very accurate. In other words although the inputs received by the brain had changed, by practising the task, the study showed that we can recover from partial hearing loss.’

Professor King and colleagues are working closely with clinicians and with the hearing charities Deafness Research UK and Action on Hearing Loss (RNID), which aim to help those suffering hearing loss.

‘We hope our work will lead to improvements in the design of devices aimed at restoring hearing. Being aware of the plasticity or adaptability of the brain is important in understanding our ability to respond to hearing loss.’

More information: www.sciencedirect.com/science/ … ii/S0896627311004351

Provided by Oxford University