Selective Auditory Attention: Master Your Focus at Will

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Selective auditory attention or selective hearing is a type of selective attention and involves the auditory system of the nervous system. Selective hearing is characterized as the action in which people focus their attention on a specific source of a sound or spoken words. The sounds and noise in the surrounding environment is heard by the auditory system but only certain parts of the auditory information are processed in the brain. Most often, auditory attention is directed at things people are most interested in hearing. In an article by Krans, Isbell, Giuliano, and Neville (2013), selective auditory attention is defined as the ability to acknowledge some stimuli while ignoring other stimuli that is occurring at the same time. An example of this is a student focusing on a teacher giving a lesson and ignoring the sounds of classmates in a rowdy classroom (p. 53). This is an example of bottlenecking which means that information cannot be processed simultaneously so only some sensory information gets through the "bottleneck" and is processed. A brain simply cannot process all sensory information that is occurring in an environment so only that which is most important is thoroughly processed. Selective hearing is not a physiological disorder but rather it is the capability of humans to block out sounds and noise. It is the notion of ignoring certain things in the surrounding environment. Over the years, there has been increased research in the selectivity of auditory attention, namely selective hearing.

History

The cocktail party problem was first brought up in 1953 by Colin Cherry. This common problem is how our minds solves the issue of knowing what in the auditory scene is important and combining those in a coherent whole, such as the problem of how we can perceive our friend talking in the midst of a crowded cocktail party. He suggested that the auditory system can filter sounds being heard. Physical characteristics of the auditory information such as speaker's voice or location can improve a person's ability to focus on certain stimuli even if there is other auditory stimuli present. Cherry also did work with shadowing which involves different information being played into both ears and only one ear's information can be processed and remembered (Eysneck, 2012, p. 84). Another psychologist, Albert Bregman, came up with the auditory scene analysis model. The model has three main characteristics: segmentation, integration, and segregation. Segmentation involves the division of auditory messages into segments of importance. The process of combining parts of an auditory message to form a whole is associated with integration. Segregation is the separation of important auditory messages and the unwanted information in the brain. It is important to note that Bregman also makes a link back to the idea of perception. He states that it is essential for one to make a useful representation of the world from sensory inputs around us. Without perception, an individual will not recognize or have the knowledge of what is going on around them. While Begman's seminal work is critical to understanding selective auditory attention, his studies did not focus on the way in which an auditory message is selected, if and when it was correctly segregated from other sounds in a mixture, which is a critical stage of selective auditory attention. Inspired in part by Bregman's work, a number of researchers then set out to link directly

work on auditory scene analysis to the processes governing attention, including Maria Chait, Mounya Elhilali, Shihab Shamma, and Barbara Shinn-Cunningham.

Recent Research

Recently, researchers have attempted to explain mechanisms implicated in selective auditory attention. In 2012, an assistant professor in residence of the Neurological Surgery and Physiology in the University of California San Francisco examined the selective cortical representation of attended speaker in multiple-talker speech perception. Edward Chang and his colleague, Nima Mesgarani undertook a study that recruited three patients affected by severe epilepsy, who were undergoing treatment surgery. All patients were recorded to have normal hearing. The procedure of this study required the surgeons to place a thin sheet of electrodes under the skull on the outer surface of the cortex. The activity of electrodes was recorded in the auditory cortex. The patients were given two speech samples to listen to and they were told to distinguish the words spoken by the speakers. The speech samples were simultaneously played and different speech phrases were spoken by different speakers. Chang and Mesgarani found an increase in neural responses in the auditory cortex when the patients heard words from the target speaker. Chang went on to explain that the method of this experiment was well-conducted as it was able to observe the neural patterns that tells when the patient's auditory attention shifted to the other speaker. This clearly shows the selectivity of auditory attention in humans.

The development of selective attention has also been examined. Jones and Moore for instance, studied how well children across various age groups could hear and respond to a target sound when it was masked by other auditory stimuli. They discovered that 9-11 year old children became as adept as adults at paying attention only to the target sound and filtering out the masking sound (2015, p. 366). This shows that research on selective auditory information is important to continue as it allows us to better understand our world.

Prevalence

The prevalence of selective hearing has not been clearly researched yet. However, there are some that have argued that the proportion of selective hearing is particularly higher in males than females. Ida Zündorf, Hans-Otto Karnath and Jörg Lewald carried out a study in 2010 which investigated the advantages and abilities males have in the localization of auditory information. A sound localization task centered on the cocktail party effect was utilized in their study. The male and female participants had to try to pick out sounds from a specific source, on top of other competing sounds from other sources. The results showed that the males had a better performance overall. Female participants found it more difficult to locate target sounds in a multiple-source environment. Zündorf et al. suggested that there may be sex differences in the

attention processes that helped locate the target sound from a multiple-source auditory field. While men and women do have some differences when it comes to selective auditory hearing, they both struggle when presented with the challenge of multitasking, especially when tasks that are to be attempted concurrently are very similar in nature (Dittrich, and Stahl, 2012, p. 626).

Disorder Status

Selective hearing is not known to be a disorder of the physiological or psychological aspect. Under the World Health Organization (WHO), a hearing disorder happens when there is a complete loss of hearing in the ears. It means the loss of the ability to hear. Technically speaking, selective hearing is not "deafness" to a certain sound message. Rather, it is the selectivity of an individual to attend audibly to a sound message. The whole sound message is physically heard by the ear but the idea is the capacity of the mind to systematically filter out unwanted information. Therefore, selective hearing should not be confused as a physiological hearing disorder.