Experiential Design – Rethinking relations between people, objects and environments

- Paper / Proposal Title:

Effects of environmental factors on speech perception and cognitive processes in children

- Author(s) Name:

Douglas MacCutcheon

- University or Company Affiliation:

University of Gävle, Sweden

- Abstract (300 words):

In contemporary classrooms, environmental factors present acoustic challenges such as long reverberation time and noise that disrupt children’s cognitive performance and learning, placing some groups at risk of speech perception deficits. Two experiments will be presented that investigate how environmental factors, cognitive ability and language background influence speech perception in groups of children likely to suffer from the effects of challenging listening environments; specifically, poorer cognitive performers and children learning in a second language. The first experiment aimed to explore how children’s speech perception in a virtually simulated classroom environment is modulated by environmental factors including the type of noise and spatial configurations of sounds on the one hand, and cognitive and linguistic ability on the other. Thirty-nine 5-7 year-olds were assessed on memory, language and speech-in-noise perception under four challenging acoustic conditions. These conditions included two spatial configurations in which the target speech was either co-located or spatially separated from the maskers (speech-shaped white noise and a single interfering talker). Results indicated that the challenging acoustic environment interacted with cognitive
and auditory processes in a number of ways that depended on the type of masker, the spatial configuration of sounds and the cognitive abilities of the listener. The second study considered whether second language learners are among those on which higher processing and cognitive demands are placed under challenging environmental listening conditions. Forty-four Swedish 15 year-olds that spoke Swedish as a mother-tongue but attended an English school, were given memory, vocabulary and speech-in-noise assessments in both languages. Observed relationships between memory and speech perception in first versus second language suggest that second-language listening is more taxing on cognitive resources. The implications of these findings for the design of classroom environments that are inclusive for all students will be discussed.

- Author(s) Biography (200 words each):

Douglas MacCutcheon is an interdisciplinary researcher whose publications span environmental psychology, cognitive psychology and music psychology. He focuses on how environmental factors affect children most at risk of speech perception deficits, and the role of cognition and other background variables in mediating this process. His future research concerns the potential for different types of auditory training (e.g., musical training) to help children cope with challenging listening environments. Douglas completed an MA in music psychology in 2012 at the University of Jyväskylä, Finland, with a focus on the development of sensorimotor synchronization skills in informally versus formally trained musicians. Thereafter he held a Marie Curie Trainee Early Stage Researcher (ESR) position at University College London, UK, in 2014-2015, investigating the interplay of cognitive and auditory processing in children with mild to moderate hearing loss. Since 2016 he has been employed full-time at the University of Gävle, Sweden, in the Environmental Psychology group. He is set to defend his PhD in 2020 concerning a number of quantitative psychological experiments that explore how children’s speech perception in classroom environments is mediated by an interaction between cognitive and perceptual abilities, and whether musical training can help children deal with challenging classroom acoustics that threaten speech perception.