For most people, speech comprehension is often quite effortless. It is only in noisy environments or in the case where hearing is impaired, that speech understanding becomes noticeably effortful. Clinical Psychology PhD candidate Rachel Wayne's research focuses on understanding the neurocognitive basis of speech comprehension under difficult listening conditions.

One of Rachel's research interests is how we make use of visual speech information (such as lipreading) to boost speech understanding in poor listening conditions. She is currently conducting a neuroimaging project to investigate how attention affects integration of the auditory and visual speech channels in noisy environments. "When speech is difficult to understand, it becomes a fill-in-the-blanks task," Rachel explains. "The more information you have, the easier this becomes. Listeners can exploit visual speech to fill in these gaps, but they may not be able to do so if they aren't attending to the speech channel".

Rachel is also looking at the contribution of various aspects of cognition (such as working memory or processing speed) in aiding this ‘fill-in-the-blanks’ process. In another study, Rachel assigns older adults to either online adaptive or placebo cognitive training, and all participants also complete cognitive and speech-in-noise testing in the lab before and after training. According to Rachel, "This study will help us to evaluate whether cognitive training translates into real-world speech benefits. It will also improve our understanding of which cognitive processes most contribute to success with speech understanding in noise, which is difficult for many older adults."

This research is especially relevant to developing rehabilitative strategies to aid the growing population of older adults with age-related hearing loss. Assistive listening devices such as hearing aids and cochlear implants amplify sounds, but communication difficulties persist because they do not necessarily make speech sounds clearer. "The ultimate goal of this research is to get a better sense of the cognitive processes that support hearing function in order to develop better strategies for mitigating the negative social consequences of hearing loss. For example, we might be able to advise on the importance of
minimizing distractions in the listening environment, or train older adults with hearing loss to make better use of their existing cognitive resources to support speech understanding.”

Rachel was recently awarded an NSERC Michael Smith Foreign Study Supplement to conduct a study in Spring of 2015 at the University College of London, UK with Dr. Mairead MacSweeney to examine individual differences in lipreading ability.

“As a hard-of-hearing individual, I rely heavily on lipreading for communication, and without it, my ability to follow a conversation is significantly compromised,” says Rachel. “This information is usually readily available in day-to-day conversation and everyone uses lipreading to some degree. However, hearing loss aside, it's still not clear what makes one person a better lipreader than another, and this could be important for hearing loss rehabilitation.”

Rachel recently gave a TEDx talk at Queen’s University discussing her experiences with congenital hearing loss and how she came to terms with her identity as a hard-of-hearing individual. Rachel ultimately aims to raise awareness about strategies for communicating with individuals with hearing loss.

Looking to the future, Rachel would like to obtain greater experience in working with deaf and hard-of-hearing individuals in clinical settings. She stressed that the population of older adults with hearing loss is growing and there is an urgent need for rehabilitative strategies to improve communication and reduce the depression and social isolation that often follows.

“Ultimately, I’d like to merge my interests in auditory cognitive neuroscience with my clinical background to develop evidence-based rehabilitative strategies for hearing loss, and include scope for psychological interventions in the process.”

Watch Rachel's TedX talk here.

To read Rachel's 3-part series on communication with individuals with hearing loss and strategies for managing hearing loss in higher education, click below:

Part 1
Part 2
Part 3