

Audiovisual Speech Integration in Dyslexia

In everyday life we rely on all our senses. Optical illusions demonstrate however, that our senses cannot always be trusted – we are easily fooled as, for example, this illusion (see pic. 1) shows:



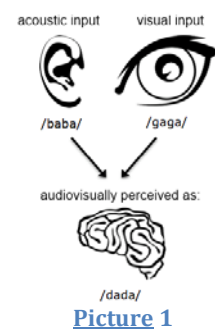
The three pairs of nuns in the cloister vault seem to be of different sizes – but they are not. With the help of a ruler it can be proven that the three pairs of nuns are actually the exact same size. So, why do we perceive them to be different?

Visual information is processed within a specific context and associated experiences and expectations are interpreted into a percept. Hence experiences and expectations have a strong influence on perception. An

explanation of such phenomena may be found [here](#), alongside other optical illusions.

Harry McGurk and *John MacDonald* discovered – quite by accident – what came to be known as the McGurk- effect or McGurk Illusion in 1976. The effect, which is a robust phenomenon, is often used to demonstrate how linguistic information is processed both, acoustically and visually. Audiovisual integration of speech is the basis of multimodal language processing.

The ability to lipread is crucial, especially in situations where the acoustic input is masked, for example by background noise. In the case of the McGurk effect the incongruent visual and acoustic input leads to a multimodal mismatch. The brain processes both inputs and the perceptual result is a compromise:



With the acoustic input /baba/ and the visual (i.e. lipread input) is /gaga/, a McGurk response would be /dada/. The effect can still be triggered in subjects even when they previously have been informed of how the phenomenon works and how it is induced. It is hence referred to as a robust effect and can be viewed here: BBC [Video](#) .

Together with the research team from the ‘Language, Culture and Cognition’ project of the *Intercultural College Salzburg* (Thomas Kaltenbacher and Birgit Breninger: www.uni-salzburg.at/icc)

this research project has been launched to analyse the McGurk Effect in dyslexic subjects. The aim of the study is to examine their perception of audiovisual speech and show correlations between deficient audiovisual processing and the deficit in phonological reading tasks. We suspect that the effect cannot be as robustly triggered in dyslexic subjects, due to deficient audiovisual integration. This should be noticeable by different brain activation patterns. An fMRI study is supposed to reveal these patterns and- in combination with an eyetracking experiment – will help us identify the process of audiovisual speech perception via non- invasive methods. The study should also lead to a better understanding of speech perception in dyslexia and may help optimise therapeutic approaches in dyslexia treatment.