Important details revealed in the search for the causes of face blindness

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As part of a cooperation with the Physikalisch-Technische Bundesanstalt Berlin and the University of Bamberg, researchers from Charité - Universitätsmedizin Berlin have been studying a probably congenital dysfunction that is characterized by the inability to recognize familiar faces. Results from this study have been published in the journal *PLOS ONE*.

For the very first time, researchers have been able to show that the causes of congenital face blindness can be traced back to an early stage in the perceptual process. These findings are crucial, not just for our understanding of face recognition, but also because they allow us to understand the processes behind the recognition of any visually presented object.

Each face is unique and forms a crucial part of a person's identity and interpersonal communication. It is the unique details of our facial features that allow us to recognize one another. However, the situation is different for people with congenital prosopagnosia, or face blindness. People affected by this condition are unable to use facial features to identify the person in front of them. In everyday life, people with facial blindness are often able to compensate for this inability to recognize others by instead focusing on, for example, a person's characteristic appearance, hair style, or gait. However, the true extent of the impairment becomes evident in social situations, when the affected person has to interact with others, or when the nature of their job (e.g. as a teacher or police officer) means they have to be able to distinguish

between and identify many different people. It is estimated that approximately one to two percent of people are affected by this condition.

Until now, the cause of facial blindness was assumed to be associated with the later stages of the perceptual process. These are the stages involved in converting facial information into abstract code for long-term storage. A team of researchers led by Dr. Andreas Lüschow, who heads the Cognitive Neurophysiology Working Group (AG Kognitive Neurophysiologie, Klinik für Neurologie mit Experimenteller Neurologie) have been focusing their efforts on a group of persons who have experienced severe problems recognizing familiar faces from a young age, but show no evidence of other cognitive impairments. "We were able to show that even the earliest face-selective responses, those recorded approximately 170 milliseconds after seeing a face, are altered in people with congenital prosopagnosia; we were also able to show that these changes are closely linked to their deficit in recognizing faces," says Dr. Lüschow.

Researchers used MEG (magnetoencephalography) to measure the magnetic signature of cortical activity. Results showed that even life-long contact with other people does not enable affected persons to compensate for this face recognition deficit. This would suggest that the underlying neural mechanisms are divided into distinct, closed units, making it impossible for other areas of the brain to take over their function. One of the main aims of future studies will be to further define the interplay that may exist between different mechanisms. A better understanding of cognitive processes is not only important in the field of medicine, but also in other areas of research, such as robotics, where such knowledge may be able to provide 'biological inspiration' for the development and improvement of technological systems.

More information: Andreas Lueschow et al. The 170ms Response to

Faces as Measured by MEG (M170) Is Consistently Altered in Congenital Prosopagnosia, *PLOS ONE* (2015). DOI: 10.1371/journal.pone.0137624