The brain needs to remember faces in 3-dimensions

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In our dynamic 3D world, we can encounter a familiar face from any angle and still recognize that face with ease, even if the person has, for example, changed his hair style. This is because our brain has used the 2D snapshots perceived by our eyes (like a camera) to build and store a 3D mental representation of the face, which is resilient to such changes.

This is an automatic process that most of us are not consciously aware of, and which appears to be a challenge for people with a particular type of face-blindness, as reported in the September 2010 issue of Elsevier's Cortex.

Prosopagnosia is a condition in which the ability to recognize faces is impaired; it can arise from damage to the brain or can also be present from early childhood, without any discernible brain damage. The latter is known as Developmental Prosopagnosia (DP) and in many cases it runs in families.

To investigate familial prosopagnosia, Drs. Yunjo Lee and Hugh Wilson at York University in Canada, together with colleagues from University College London and Harvard University, extensively assessed the face-processing abilities of three cases of DP within a single family. The participants, a father and two daughters, all have trouble recognizing faces, despite having otherwise normal visual sensory and intellectual abilities.

All three are highly educated and socially well integrated; they know

what a face looks like and can read facial expressions, attractiveness and gender from the face. One of the daughters is in fact a visual artist who frequently portrays faces with great detail in her sculptures, demonstrating her ability to process generic faces. However, the study showed that changes in lighting conditions and viewing angles affected their ability to recognize faces. For example, one of the daughters was able to detect subtle differences between two faces when looking at them from the same angle, but not when viewed from different angles.

The findings of this study suggest that some cases of familial DP result from an inability to form a robust mental representation of a face that can cope with changes in viewpoint or other conditions.

More information: The article is "Three cases of developmental prosopagnosia from one family: Detailed neuropsychological and psychophysical investigation of face processing" by Yunjo Lee, Bradley Duchaine, Hugh R. Wilson, Ken Nakayama, and appears in Cortex, Volume 46, Issue 8 (September 2010). www.elsevier.com/locate/cortex

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