Brain learns to recognize familiar faces regardless of where they are in the visual field

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A Dartmouth study finds that recognition of faces varies by where they appear in the visual field and this variability is reduced by learning familiar faces through social interactions. These biases are stable and idiosyncratic. More importantly, these biases are reduced for more familiar identities suggesting that the brain recognizes personally familiar faces more uniformly across the visual field. The findings suggest that repeated social interactions may tune populations of visual neurons in the face processing network to enable consistent and rapid recognition of familiar faces. The study was published in *eNeuro*, an open-access journal of the Society for Neuroscience.

Prior research in human facial recognition has often focused on how people perceive unfamiliar faces but this is one of the first to examine how early visual processes may be tuned by regular, social interactions with others to optimize one's ability to recognize faces of people who are important to us.

"For many of us, we spend most of our time with people we know, so understanding the underlying brain activity that enables us to recognize our friends, family, colleagues and peers, is essential to learning more about how we process relevant social stimuli," said senior author Maria Gobbini, an associate professor of psychological and brain sciences at Dartmouth.

To understand how the brain processes personally familiar faces across different retinal locations, study participants (graduate students) were asked to identify either two or three photographs of their peers' faces. As participants stared at a central red dot on a computer screen, an image of a peer's face would flash briefly on the screen peripherally in one of eight locations. After the image disappeared, they were prompted to identify which person they saw. Following the experiment, participants were asked to rate how well they knew the person in the image on a scale of one (not close) to seven (very close). The team then ran computational simulations to test the effect of learning in face-responsive cortical areas. The results of the simulation suggest that early face areas in face processing pathways are more likely to show a visual field bias that can be tuned by learning.

Previous research in facial recognition and identity has shown that the perception of gender and age varies across retinal locations as well. For example, an androgynous face may appear as a female face when shown in a specific visual location and as a male face when shown in another location. Gobbini and colleagues' new study found that this same type of variability across the visual field (idiosynchratic, retinotopic biases) is found for identification of faces that are low in familiarity but is reduced for highly familiar faces. The results suggest that personally familiar faces may be detected in a prioritized way at an early stage of visual processing. "Much in the same way that the human language system is adapted and optimized to process an individual's native language, including auditory recognition of speech sounds, the face perception system is finely tuned in each individual for interaction with the people that play an important role in that person's life, and this tuning extends to learning at early stages of visual processing," concludes Gobbini.

More information: Matteo Visconti di Oleggio Castello et al, Idiosyncratic, Retinotopic Bias in Face Identification Modulated by Familiarity, *eneuro* (2018). DOI: 10.1523/ENEURO.0054-18.2018

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