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Letter

Humans Are Visual Experts at Unfamiliar Face Recognition

Bruno Rossion[1,2,3,*]

A recent Opinion article [1] redefines expertise at individual face recognition (IFR), claiming that typical human adults have only limited expertise with unfamiliar faces. I agree with the authors that long-term familiarity with individual faces provides a massive advantage in generalization (i.e., invariance) of recognition in behavioral tasks, but this advantage may be based on associated semantic, affective, and lexical (rather than visual) processes/representations. Compared with non-expert populations (young children, patients with prosopagnosia, other animal species), typical human adults possess a remarkable ability to readily grasp the idiosyncratic visual characteristics of an unfamiliar face.

IFR occurs when one individual identifies another according to individually distinctive facial characteristics. It is a key human brain function, involving the most complex processes of perception and memory. IFR is often measured with unfamiliar face images, for practical and methodological reasons (e.g., control of stimuli and participants' level of exposure). Experimentally, pictures of individual faces never seen before are (explicitly or incidentally) encoded, to be subsequently recognized. Alternatively, they are presented briefly one after the other or simultaneously, with participants having to determine whether they depict the same person or not. Recognition corresponds to the match between two or more stimuli of the same face identity. It generally implies visual discrimination (from other individual faces) and generalization (across different images of the same individual).

Hundreds of behavioral experiments show that typical human adults are very good at such tasks. For example, participants reach 83% accuracy on a classical difficult simultaneous individual face-matching test [2]. Even in extremely difficult tasks requiring high levels of generalization with many similar-looking distractors, performance reaches 70–80% for unfamiliar faces [1,3] without task training. Why are such levels of performance sometimes defined as 'poor', 'low', or 'limited' [1,3]? Because they are compared with performance at the same tasks with familiar faces, approaching ceiling [1,3]. However, matching different pictures of unfamiliar faces must be based on visual processes/representations, while the same task for familiar faces can be supported by semantic, affective, and lexical processes/representations (Figure 1). Hence, comparing behavioral recognition performance for familiar and unfamiliar faces is comparing apples and oranges: this comparison does not provide evidence that visual processes differ qualitatively between familiar and unfamiliar faces.

A related claim is that unfamiliar IFR is essentially based on pictorial/iconic cues or low-level visual processes, while only familiar face recognition would be based on high-level processes [1,3]. This claim is not only problematic (i.e., how would a face become familiar?), but unfounded. Indeed, pictures of unfamiliar faces selectively recruit high-level visual regions of the ventral occipitotemporal cortex [4]. Moreover, simultaneous or delayed matching of individual faces resists large changes of size, head orientation, and even lighting direction [2]. However, it is largely affected by picture plane inversion [5], against the claim of reliance on low-level information. The composite face illusion, reflecting mandatory integration of facial parts into a unified representation of a face identity (holistic/configural processing [6,7]), is best illustrated with pictures of unfamiliar faces [8]. In addition, the other-race face effect, reflecting a level of expertise specific to experienced facial morphologies, is readily demonstrated with unfamiliar faces [9].

I argue that fully realizing and characterizing our visual expertise level at unfamiliar IFR requires comparing it with non-experts. For instance, human adults who lose this expertise (only) following brain damage (i.e., patients with prosopagnosia) perform significantly below typical human adults in accuracy and/or speed at unfamiliar IFR tasks, even for matching identical images [2,10,11]. Young children perform much lower/slower than adults at unfamiliar IFR tasks because they have not yet developed this expertise [12]. Also, perhaps most significantly, other animal species such as monkeys, who do not possess the neural circuitry and social constraints to achieve this expertise level at IFR naturally, struggle considerably at unfamiliar IFR tasks, even with limited sets requiring matching of identical images [13]. These fair points of comparison show that typical human adults' performance at unfamiliar IFR already reflects a high level of visual expertise.

In conclusion, I agree with my colleagues [1] that expertise at human IFR should be redefined, but not with their proposal to remove it from vision. Expertise in IFR has often been considered as being generic (i.e., applicable to many visual signals beyond faces [12]). However, there is now sufficient evidence supporting the view that a domain-specific visual expertise arises in the human species essentially due to extensive experience and social constraints during development with a specific visual category (i.e., faces). This face expertise allows typical human adults to grasp the idiosyncratic characteristics of novel faces at a glance, automatically, for a seemingly unlimited number of exemplars. Only when this visual expertise with unfamiliar faces is acknowledged, well characterized, and

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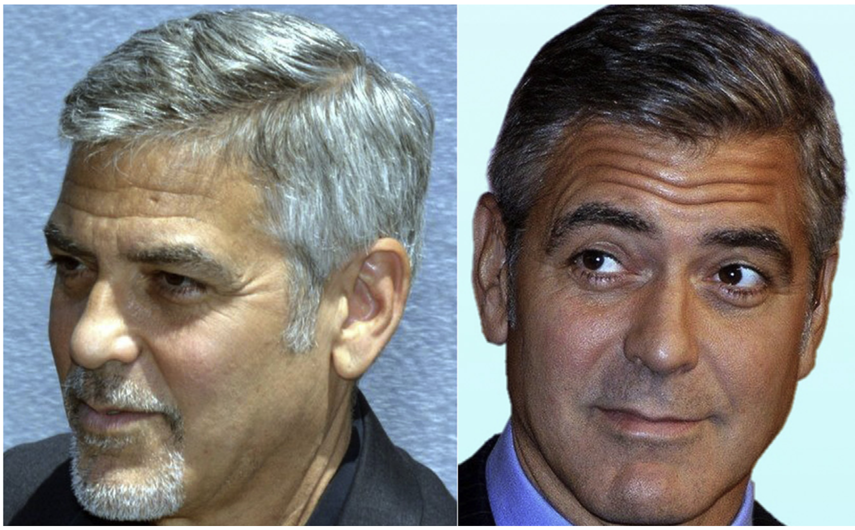

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Figure 1. Matching of Familiar versus Unfamiliar Faces: Apples and Oranges? Behavioral matching of different pictures of highly familiar faces may not be based on visual processes. Each of these two highly different pictures of George Clooney can be recognized independently and their association can be made by comparing (i.e., matching) semantic/lexical/affective representations rather than performing a comparison between visual representations. By contrast, the same task with unfamiliar faces would have to be based on visual processes only. Hence, higher behavioral performance for matching familiar compared with unfamiliar faces as emphasized by Young and Burton [1] and previous papers (e.g., [3]) does not imply increased expertise at the level of visual processes. Pictures licensed under the Creative Commons Attribution–Share Alike 3.0 Unported. Attribution: Georges Biard.

operationalized will we be able to understand how it is enriched by semantic/affective/linguistic information with long-term face familiarization, further extending our generalization capacities.

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Letter

What We See in Unfamiliar Faces: A Response to Rossion

Andrew W. Young[1,*] and A. Mike Burton[1]

Rossion [1] offers a clear summary of reasons why so many researchers have been persuaded that humans have developed expertise for perceiving and recognising face identity that includes the identities of unfamiliar faces. We appreciate that this is an important debate and are grateful for the opportunity further to clarify our views on face expertise. In particular, we emphasise that Young and Burton [2] (hereafter Y&B) did not claim that people are somehow blind to the identities of unfamiliar faces. Our point was that recognition of unfamiliar face identity is limited and does not show the full range of characteristics that Y&B identified as criteria for expertise. By contrast, familiar face recognition largely meets these criteria. From this we concluded that, although it is appropriate to say that we are familiar face experts, it is necessary to reconsider claims that human observers are experts in recognising unfamiliar faces. Although we do not think that, as humans, we are experts at recognising their identities, we nonetheless fully appreciate the interest and importance of Rossion's focus on understanding what we can see in unfamiliar faces.

Rossion suggests that neuropsychological patients with prosopagnosia and members of other animal species offer examples of non-expert populations, but this conflates questions concerning expertise with the possibility of an evolved neural substrate for face perception. For example, prosopagnosia will almost