There is no evidence that pupil mimicry is a social phenomenon

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When you look at someone with large pupils, your own pupils dilate as well; when you look at someone with small pupils, your own pupils constrict. This phenomenon is referred to as pupil mimicry. Recently, in PNAS, Prochazkova et al. (1) claim that pupil mimicry reflects trust and theory of mind, and is thus a social phenomenon.

Their claim is problematic, because pupil mimicry reflects, at least in part, a pupil light response: Pupils are darker than the iris, and pupil dilation thus reduces the brightness of the eye region. Therefore, when you look at someone else's dilated pupils, your own pupils necessarily dilate as well simply because of a pupil light response to the darker eye region (2).

To investigate whether a pupil light response can fully account for pupil mimicry, we recently conducted an experiment in which we equated the overall brightness and contrast of the eye region between face stimuli with large and small pupils (3). With these luminance-controlled stimuli, we did not observe any pupil mimicry. Our study raises the worrying possibility that pupil mimicry is entirely due to the darkness of the pupil, and that many studies using pupil mimicry as a social marker were therefore not measuring what they believed they were measuring.

If pupil mimicry reflects a pupil light response, and thus has little to do with social cognition, then why has it repeatedly been linked to social factors (1, 4–7)? For example, Prochazkova et al. (1) show that mimicry of dilating pupils is linked to increased trust, whereas mimicry of constricting pupils is linked to decreased trust. They further show that pupil mimicry correlates with activity in a network of brain areas that is linked to social cognition. Similarly, Harrison et al. (4) found a link between pupil size and activity in a network of brain areas that partly overlapped with those reported by Prochazkova et al. (1). Kret et al. (5) showed that mimicry of pupil dilation is stronger for ingroup faces than for outgroup faces, whereas mimicry of constriction is strongest for outgroup faces. Lastly, Fawcett et al. (6) [also refer to Hess (7)] showed that children exhibit pupil mimicry of eye-like pairs of circles, but not of pairs of squares.

If not social mimicry, then what have these studies been measuring (1, 4–7)? We agree that there must be a social component somewhere in the chain of events that leads up to pupil mimicry. Specifically, social factors determine how much people attend to the eyes (8). Even a covert shift of attention toward the eye region is sufficient to trigger an attention-induced pupil light response (2). Therefore, even though pupil mimicry is modulated by social factors, it could still be merely a pupil light response. This is the most parsimonious explanation of pupil mimicry and should therefore be disproved before invoking explanations that involve social cognition.

In sum, there is no compelling reason to believe that pupil mimicry is, in fact, mimicry.

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