

Eyes are windows to the soul—and evolution

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Credit: Cornell University

Why do we become saucer-eyed from fear and squint from disgust?

These near-opposite facial expressions are rooted in emotional responses that exploit how our eyes gather and focus light to detect an unknown threat, according to a study by a Cornell University neuroscientist.

Our eyes widen in fear, boosting sensitivity and expanding our field of vision to locate surrounding danger. When repulsed, our eyes narrow, blocking light to sharpen focus and pinpoint the source of our [disgust](#).

The findings by Adam Anderson, professor of human development in Cornell's College of Human Ecology, suggest that human facial expressions arose from universal, adaptive reactions to environmental stimuli and not originally as social communication signals, lending support to Charles

Darwin's 19th century theories on the evolution of emotion.

"These opposing functions of eye widening and narrowing, which mirror that of pupil dilation and constriction, might be the primitive origins for the expressive capacity of the face," said Anderson. "And these actions are not likely restricted to disgust and fear, as we know that these movements play a large part in how perhaps all expressions differ, including surprise, anger and even happiness."

Anderson and his co-authors described these ideas in the paper, "Optical Origins of Opposing Facial Expression Actions," published in the March 2014 issue of *Psychological Science*.



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Looks of disgust result in the greatest visual acuity—less light and better focus; fearful expressions induce maximum sensitivity—more light and a broader visual field.

"These emotions trigger facial expressions that are very far apart structurally, one with eyes wide open and the other with eyes pinched," said Anderson, the paper's senior author. "The reason for that is to allow the eye to harness the properties of light that are most useful in these situations."

What's more, emotions filter our reality, shaping what we see before light ever reaches the inner eye.

"We tend to think of perception as something that happens after an image is received by the brain, but in fact emotions influence vision at the very earliest moments of visual encoding."

Anderson's Affect and Cognition Laboratory is now studying how these contrasting [eye](#) movements may account for how [facial expressions](#) have developed to support nonverbal communication across cultures.

"We are seeking to understand how these expressions have come to communicate emotions to others," he said. "We know that the eyes can be a powerful basis for reading what people are thinking and feeling, and we might have a partial answer to why that is."

Provided by Cornell University

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