

What's in a Face?

The human brain is good at identifying faces, but illusions can fool our “face sense”

BY SUSANA MARTINEZ-CONDE AND STEPHEN L. MACKNIK

Our brains are exquisitely tuned to perceive, recognize and remember faces. We can easily find a friend's face among dozens or hundreds of unfamiliar faces in a busy street. We look at each other's facial expressions for signs of appreciation and disapproval, love and contempt. And even after we have corresponded or spoken on the phone with somebody for a long time, we are often relieved when we meet him or her in person and are able to put “a face to the name.”

The neurons responsible for our refined “face sense” lie in a brain region called the fusiform gyrus. Trauma or lesions to

this brain area result in a rare neurological condition called prosopagnosia, or face blindness. Prosopagnosics fail to identify celebrities, close relatives and even themselves in the mirror. But even those of us with normal face-recognition skills are subject to many illusions and biases in face perception.

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ILLUSION OF SEX

This illusion, created by psychologist Richard Russell, won third prize in the 2009 Best Illusion of the Year Contest. The side-by-side faces are perceived as female (left) and male (right). Yet both are versions of the same androgynous face (see <http://illusioncontest.neuralcorrelate.com/2009/the-illusion-of-sex>). The two images are identical, except that the contrast between the eyes and mouth and the rest of the face is higher for the face on the left than for the face on the right.

This illusion shows that contrast is an important cue for determining the sex of a face, with low-contrast faces appearing male and high-contrast faces appearing female. It may also explain why females in many cultures darken their eyes and mouths with cosmetics: a made-up face looks more feminine than a fresh face.

FOCUS ON FACES

Facial expressions play a key role in our everyday social interactions. Even when watching movies or looking at photographs, we spend most of our time looking at the faces they portray. Our intense focus on faces is at the expense of other potentially interesting information, however. Take a quick look at this woman and child.

Their smiling faces suggest they are having a good time. But is that it? Look more closely, and you may notice that the girl has an extra finger on her right hand: something that you probably missed at first because your attention was fixed on the faces.



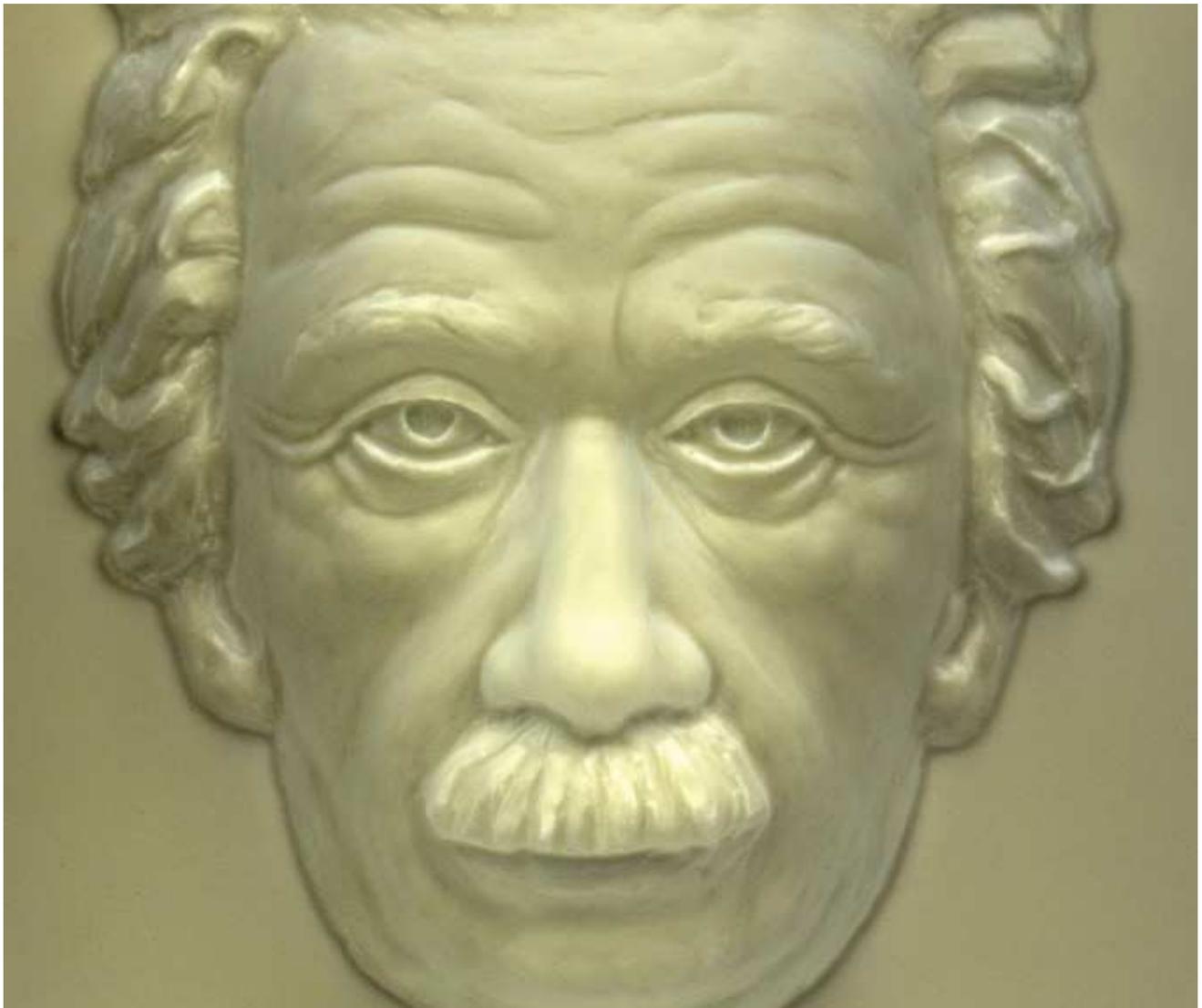


HOLLOW MASK ILLUSION

This hollow mask created by sculptor Bryan Parkes gives the eerie impression that Albert Einstein's face is following you as you move around the room (*below*). The mask is placed in front of a window, with its open back facing toward you, so that sunlight illuminates the plastic face. Although the mask is concave, your brain assumes that all faces are convex. While a convex face would look in only one direction, Einstein's hollow face seems to look forward when the viewer is directly ahead, but at an angle when the viewer moves sideways. In another demonstration of this well-known illusion, when

a hollow mask rotates on a turntable, it appears to turn opposite to the actual direction of the turntable.

Vision researcher Thomas Papathomas of Rutgers University created an interesting variation on this illusion by attaching three-dimensional eyeballs and a nose ring to a hollow mask. As shown in these three frames from a movie of the rotating mask, the eyeballs and nose ring appear to rotate in the opposite direction to that of the mask (*above*). This illusion won third prize in the 2008 Best Illusion of the Year Contest. You can view the movie at <http://illusioncontest.neuralcorrelate.com/2008/rolling-eyes-on-a-hollow-mask>.

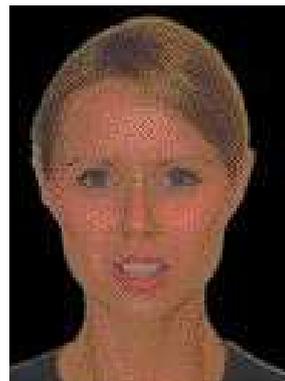
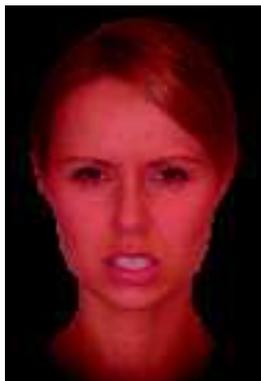
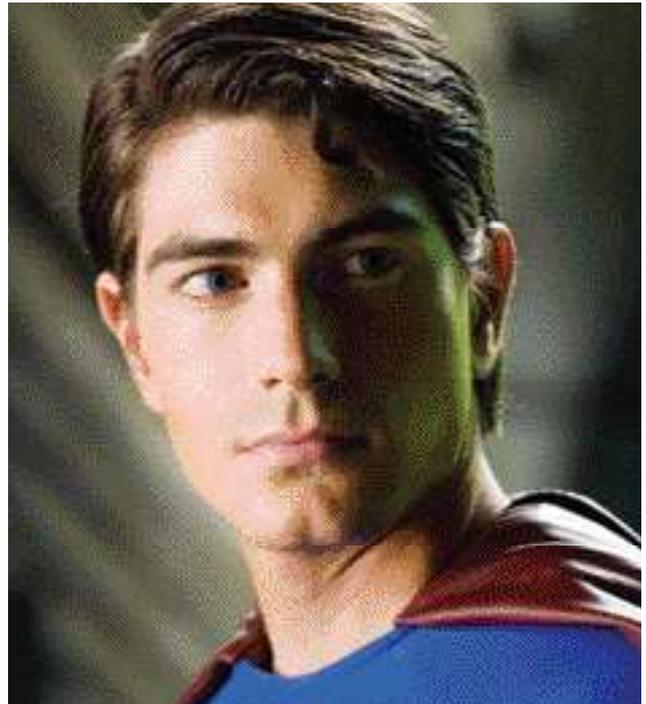




THE MANE DIFFERENCE

Visual illusions showcasing politicians are all the rage. At first sight it looks like Al Gore is standing behind Bill Clinton, but notice that Gore is really a doppelgänger Clinton, only with Gore's gorgeous head of hair (*left*). A set of face features (Clinton's) mixed with a different set of attributes (Gore's hair) isn't easily recognized as being misplaced.

Superman relies on the same illusion to protect his identity: thanks to a pair of glasses, a change of clothes and a different hairstyle, nobody in Metropolis realizes that he and Clark Kent are the same person (*below*).



EMOTION ADAPTATION

Gaze at the angry face (*left*) for about 30 seconds while looking around the face from the eyes to the mouth, to the nose, back to the eyes, and so on. Then look at the center face. It looks scared, right? Now look at the scared face (*right*) for 30 seconds and then look at the center face again. This time it is angry! In reality, the center face is a 50–50 blend of an angry and a scared face.

Created by Andrea Butler and her colleagues at the University of British Columbia, this illusion shows that our visual-processing system adapts to an unchanging facial expression by temporarily becoming less responsive to it. As a result, the other facial expression dominates when you view the blend. This adaptation

occurs in higher-level brain circuits, rather than in the retina, because the illusion works even if you view the left or right image with one eye only and then look at the center image with your other (unadapted) eye.

TOP TO BOTTOM: COURTESY OF PAWAN SINHA AND TOMASO POGGIO M.I.T.; WARNER BROS./DC COMICS/THE KOBAL COLLECTION; FROM "FACTORS CONTRIBUTING TO THE ADAPTATION AFTEREFFECTS OF FACIAL EXPRESSION," BY ANDREA BUTLER ET AL., IN *BRAIN RESEARCH*, VOL. 1191, JANUARY 29, 2008. REPRINTED WITH PERMISSION FROM ELSEVIER