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Signal emotion

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Published in:

Mind hacks: tips & tools for using your brain

[Link to publication](#)

Citation for published version (APA):

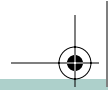
Fradera, A., & Sauter, D. (2004). Signal emotion. In T. Stafford, & M. Webb (Eds.), *Mind hacks: tips & tools for using your brain* (pp. 320-324). Sebastopol, CA: O'Reilly.

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We are so good at identifying faces that our brains are primed to see them everywhere. We see them in clouds (where they aren't) and in smileys (where they are). Our ability to perceive faces so readily from a relatively small amount of information in the smileys or emoticons used in text and online messaging—the fact that we can readily understand that :-) is intended to represent a happy face and ;-) a wink—is a legacy of how important face recognition has been to us evolutionarily.

See Also

1. Thompson, P. (1980). Margaret Thatcher: A new illusion. *Perception*, 9, 483–484. Reprinted with permission from Pion Limited, London. Many thanks to Peter Thompson for supplying the image.
2. Kanwisher, N., McDermott, J., & Chun, M. (1997). The fusiform face area: A module in human extrastriate cortex specialized for face perception. *The Journal of Neuroscience*, 17(11), 4302–4111.
3. Burton, A., Wilson, S., Cowan, M., & Bruce, V. (1999). Face recognition in poor-quality video: Evidence from security surveillance. *Psychological Science*, 10(3), 243–248.
4. Gauthier, I., Skudlarski, P., Gore, J.C., & Anderson, A. W. (2000). Expertise of cars and birds recruits brain areas involved in face recognition. *Nature Neuroscience*, 3, 191–197.
5. McNeil, J., & Warrington, E. (1993). Prosopagnosia—a face specific disorder. *Quarterly Journal of Experimental Psychology Section A: Human Experimental Psychology*, 46(1), 1–10.
6. Nelson, C. (2001). The development and neural bases of face recognition. *Infant and Child Development*, 10, 3–18.

—Andrew Brown

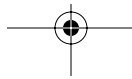


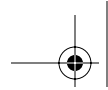
HACK #93

Signal Emotion

Emotions are powerful on the inside, but often displayed in subtle ways on the outside. Are these displays culturally dependent or universal?

We find our emotional lives impossible to detangle from ourselves and examine critically. They're a core part of who we are. If you could imagine it, a life without feelings would be far more alien than any Mr. Spock. Emotions prepare us for situations physiologically and cognitively too and emerge from multiple dedicated systems that interact below the level of consciousness. Advances in psychology and neuroscience unveil these systems and reveal how we signal our emotional states to others and decode even subtle emotional expressions.





In Action

Take a stroll down an imaginary lane in a distant, foreign land. You've no knowledge of the language spoken and no idea of the local customs and practices. Before you is a fork in the road with no clear sign of which direction leads to where. Thankfully, you spy a local working the land. Hungry for information to guide you, you point to the first path. His mouth broadens until his teeth are visible. After taking this in, you point to the second. His brow furrows as his mouth becomes small and tight. Lo and behold, despite any language and cultural barriers, you most likely have enough information to know that the first is probably a better bet.

Try it yourself. Consider the photo in [Figure 10-3](#).

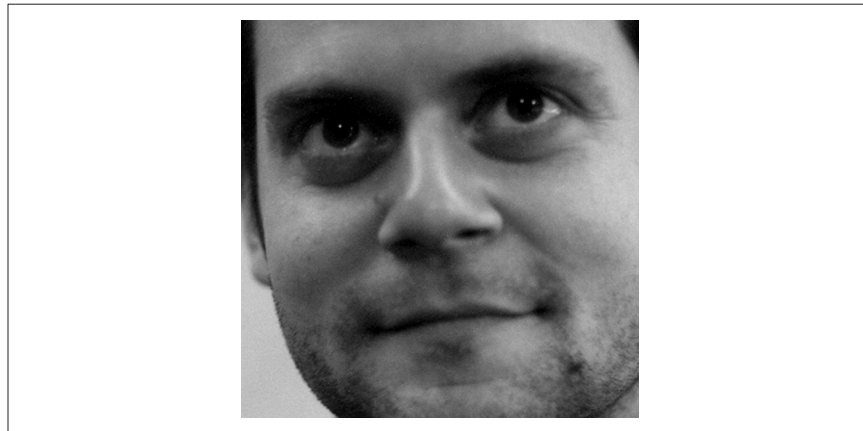


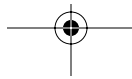
Figure 10-3. What emotion is this face signaling?

I'm sure there is no doubt in your mind what is being expressed here. At the very least, it's a very different face from that shown in [Figure 10-4](#).

It's clear that the first face is happy and the second is in a less than positive mood.

Obvious, you say?

It might feel so, but before you dismiss this disambiguation out of hand, you should know that many of the cues are fairly subtle and there's a lot more going on behind the scenes than you might realize. In fact, these cues can slip by brain-damaged patients entirely, even those whose perception is otherwise fairly good. Let's dig a little deeper.



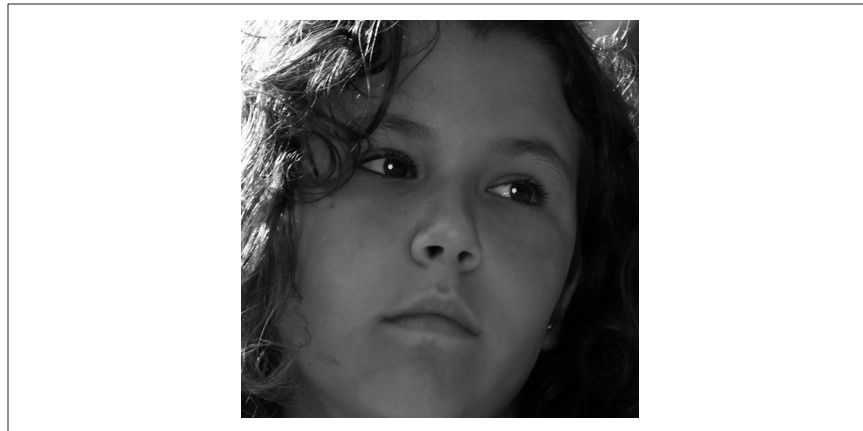
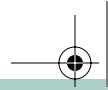


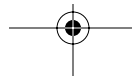
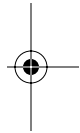
Figure 10-4. What emotion is this second face signaling?

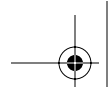
How It Works

We may take it for granted, but the existence of a universal emotion expression system is an impressive feat. Masses of evidence show that our brains are wired to distinguish and respond to expressions of a number of emotional states. The *basic emotions*, a concept born of lauded psychologist Sylvan Tomkins, are anger, fear, disgust, sadness, surprise, and happiness. We can be confident that these are really universal thanks to the cross-cultural work of Paul Ekman, the leading proponent of basic emotion theory, whose work with tribes in New Guinea confirm what our example asserts: despite some cultural nuances, a smile is a smile worldwide.

Furthermore, it turns out that this capacity is not only universal, but also innate. The ubiquity of our expressions is not purely a consequence of convergence by imitation, as they are present to some extent even when there is no input. German ethologist Irenäus Eibl-Eibesfeldt conducted research in the 1960s that showed that congenitally blind children still produced emotional expressions via the face, even those who were also severely cognitively impaired. This preserved ability of the sensory impaired has been noted often, including Charles Darwin's comment that blind children can "blush with shame."

Basic emotions are distinct categories, and each appears to be distinctly localized within the brain, as evidenced by both [imaging studies](#) "Functional Magnetic Resonance Imaging: the State of the Art" [\[Hack #4\]](#) and observation of brain-damaged patients. While the amygdala, a part of the [limbic system](#) "Get Acquainted with the Central Nervous System" [\[Hack #7\]](#), is traditionally considered the emotion area, it is tied most closely to fear. Meanwhile, disgust appears to be instantiated in the basal ganglia and insula and





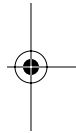
quite unrelated to the amygdala. Other emotions also show distinct neural patterns of activation “The Neuron” [Hack #9]. This may imply that the emotions arose for distinct functional needs, arguably independently. Many see fear as essentially a response to external threat. Disgust has been characterized as a complementary system that deals with internal threat—an eject response that seeks to rid the body of toxins. The disgust face itself is really just an extension of the gagging reflex. Stories can be told (although with less confidence) for the other emotions.



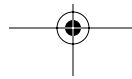
The *limbic system* is a fairly deep, old part of the brain, beneath the *cortex* “Tour the Cortex and the Four Lobes” [Hack #8] (the outer layer of the brain), and the *amygdala* falls just under the surface of the more anterior and medial part of the temporal lobe, making it bulge into what is called the *uncus*. The *basal ganglia* are a collection of structures that reside close by. The *insula* is a gyrus (or fold) of the temporal lobe, on its surface but somewhat hidden by the way the cortex overlaps just there. All structures are found twice, once in each hemisphere, and all broadly in the same neighborhood—just under (or on, in the case of the *insula*) the temporal lobe.



The basic emotions produce expressions that are hard to fake given the genuine physiological changes that accompany them. There are subtle cues, such as a flush or tightening of muscles. These are handy for others to spot—as a source of useful information—but they can also benefit the one expressing the emotion, as when an angry face says “Don’t try and take this from me; I’m willing to die to protect it.” Discriminating the real Mr. Angry from a faker is therefore highly important, so we evolved to detect ever more subtle signs and distinguish real emotion from mere pantomime.



For a social animal such as humans, it pays to be adept at deciphering genuine and subtle signs—as well as at giving them out—in order to quickly communicate within a group and coordinate emotions (group communication is discussed in “Make Yourself Happy” [Hack #94]). Coordinated emotions are essential for cooperative responses to situations, and recent work has been looking at how coordination can occur over longer distances—after all, using facial expression as a group communication tool is limited to face-to-face interaction. Voice is one possibility, and there has been investigation into what vocal behaviors typically go alongside crying and laughing. Maybe research into the vocal component of emotion will resolve the mystery of why only one of the six basic emotions is positive. As Ekman has suggested there may be many more, but expressed via the voice rather than the face.





In Real Life

Because emotional expressions are the automatic outcomes of emotion, they are hard to totally suppress; likewise, they are hard to fake. What this means is that practice and attention to the features of expressions on others' faces can allow us to divine the true intentions and feelings of those around us. While we're all pretty good at this sort of "mind reading," some take this ability further; just think how important these cues are to police detectives, security operatives, psychologists, and high-stakes gamblers.

See Also

1. This is Noam Chomsky's "Argument from Poverty of the Stimulus," which concluded innateness if a skill is developed without sufficient stimulus. It is reviewed in Geoffrey Pullum's "Learnability, Hyperlearning, and the Poverty of the Stimulus" (<http://www.ecs.soton.ac.uk/~harnad/Papers/Py104/pullum.learn.html>).
2. Paul Ekman's web site (<http://www.emotionsrevealed.com>) has essays, training CDs, and the original photo sets of the basic emotions and offers emotion recognition workshops.
3. "Emotions Revealed: Recognising Facial Expressions" (http://www.studentbmj.com/back_issues/0404/education/140.html) is a good, simple article by Ekman summarizing the basic emotion research.
4. "Neuropsychosocial Factors in Emotion Recognition: Facial Expressions" (http://www.neuropsychologycentral.com/interface/content/resources/page_material/resources_general_materials_pages/resources_document_pages/neuropsychosocial_factors_in_emotion_recognition.pdf) discusses in more depth how emotions are signaled. The article is in the Resources section of Neuropsychology Central (<http://www.neuropsychologycentral.com>).
5. Scott, S. K., Young, A. W., Calder, A. J., & Hallowell, D. J. (1997). Impaired auditory recognition of fear and anger following bilateral amygdala lesions. *Nature*, 385(6613), 254–257.
6. Eibl-Eibesfeldt, I. (1973). The expressive behaviour of the deaf-and-blind-born. In M. von Cranach & I. Vine (eds.), *Social Communication and Movement*, 163–194. London: Academic Press.
7. Malcolm Gladwell's article "The Naked Face" (http://www.gladwell.com/2002/2002_08_05_a_face.htm) looks at Paul Ekman, the emotions, and facial expression and asks how much of our thoughts we give away on our faces.

—Alex Fradera & Disa Sauter

