

Evolution of Emotion: How Our Feelings Shaped Survival

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June 12, 2026

RECOMMENDED CITATION

mohammad looti (2026). *Evolution of Emotion: How Our Feelings Shaped Survival*.
PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=38431>

The study of the evolution of emotions dates back to the 19th century. The theory of evolution and natural selection has been applied to the study of human communication, mainly by Charles Darwin in his 1872 work, *The Expression of the Emotions in Man and Animals*. Darwin researched the expression of emotions in an effort to support his theory of evolution. He proposed that much like other traits found in humans and animals, emotions also evolved and were adapted over time. His work looked at not only facial expressions in both humans and animals, but attempted to point out parallels between behaviors in animals and in humans.

According to modern evolutionary theory, different emotions evolved at different times. Primal emotions, such as fear, are associated with ancient parts of the brain and presumably evolved among our premammal ancestors. Filial emotions, such as a human mother's love for her offspring, seem to have evolved among early mammals. Social emotions, such as guilt and pride, evolved among social primates. Sometimes, a more recently evolved part of the brain moderates an older part of the brain, such as when the cortex moderates the amygdala's fear response. Evolutionary psychologists consider human emotions to be best adapted to the life our ancestors led in nomadic foraging bands.

Origins

Darwin's original plan was to include his findings about expression of emotions in a chapter of his work, *The Descent of Man, and Selection in Relation to Sex* (Darwin, 1871) but found that he had enough material for a whole book. It was based on observations, both those around him and of people in many parts of the world. One important observation he made was that even in individuals who were born blind, body and facial expressions displayed are similar to those of anyone else. The ideas found in his book on universality of emotions were intended to go against Sir Charles Bell's 1844 claim that that human, facial muscles were created to give them the unique ability to express emotions. The main purpose of Darwin's work was to support the theory of evolution by demonstrating that emotions in humans and animals are similar. Most of the similarities he found were between species closely related, but he found some similarities between distantly related species as well. He proposed the idea that emotional states are adaptive, and therefore only those able to express certain emotions passed on their characteristics.

Darwin's Principles

In the 1872 work, Darwin proposed three principles. The first of the three is the "principle of serviceable habits," which he defined as useful habits reinforced previously, and then inherited by offspring. He used as an example contracting of eyebrows (frowning the brow), which he noted is serviceable to prevent too much light from entering the eyes. He also said that the raising of eyebrows serves to increase the field of vision. He cited examples of people attempting to

remember something and raising their brows, as though they could "see" what they were trying to remember.

The second of the principles is that of antithesis. While some habits are serviceable, Darwin proposed that some actions or habits are carried out merely because they are opposite in nature to a serviceable habit, but are not serviceable themselves. Shrugging of the shoulders is an example Darwin used of antithesis, because it has no service. Shoulder shrugging is a passive expression, and very opposite of a confident or aggressive expression.

The third of the principles is expressive habits, or nervous discharge from the nervous system. This principle proposes that some habits are performed because of a build-up to the nervous system, which causes a discharge of the excitement. Examples include foot and finger tapping, as well as vocal expressions and expressions of anger. Darwin noted that many animals rarely make noises, even when in pain, but under extreme circumstances they vocalize in response to pain and fear.

Relevant Research

Paul Ekman is most noted in this field for conducting research involving facial expressions of emotions. His work provided data to back up Darwin's ideas about universality of facial expressions, even across cultures. He conducted research by showing photographs exhibiting expressions of basic emotion to people and asking them to identify what emotion was being expressed. In 1971, Ekman and Wallace Friesen presented to people in a preliterate culture a story involving a certain emotion, along with photographs of specific facial expressions. The photographs had been previously used in studies using subjects from Western cultures. When asked to choose, from two or three photographs, the emotion being expressed in the story, the preliterate subjects' choices matched those of the Western subjects most of the time. These results indicated that certain expressions are universally associated with particular emotions, even in instances in which the people had little or no exposure to Western culture. The only emotions the preliterate people found hard to distinguish between were fear and surprise. Ekman noted that while universal expressions do not necessarily prove Darwin's theory that they evolved, they do provide strong evidence of the possibility. He mentioned the similarities between human expressions and those of other primates, as well as an overall universality of certain expressions to back up Darwin's ideas. The expressions of emotion that Ekman noted as most universal based on research are: anger, fear, disgust, sadness, and enjoyment.

Robert Zajonc, a Michigan University psychologist, published two reviews in 1989 of the "facial efference theory of emotion", also known as facial feedback theory, which he had first introduced to the scientific literature in an article published in Science in 1985. This theory proposes that the facial musculature of mammals can control the temperature of the base of the brain (in particular the hypothalamus) by varying the degree of forward and backward flow through a vascular network

(a so-called rete mirabile). The theory is based on the idea that increasing the temperature of portions of the hypothalamus can produce aggressive behavior, whereas cooling can produce relaxation. Our emotional language has comparable descriptors, such as "hot-head" and "cool-breezy". The theory offers an explanation for the evolution of common facial expressions of emotion in mammals. Little experimental work has been done to extend the theory, however.

Carroll Izard, a psychologist who is known for his work with emotions, discussed gains and losses associated with the evolution of emotions. He noted that in evolution, humans gained the capability of expressing themselves with language, which contributed greatly to emotional evolution. Not only can humans articulate and share their emotions, they can use their experiences to foresee and take appropriate action in future experiences. He did, however, raise the question of whether or not humans have lost some of their empathy for one another, citing things such as murder and crime against one another as destructive.

Joseph LeDoux focuses much of his research on the emotion fear. Fear can be evoked by two systems in the brain, both involving the thalamus and the amygdala: one old, short and fast, the other more recently evolved, more circuitous and slower. In the older system, sensory information travels directly and quickly from the thalamus to the amygdala where it elicits the autonomic and motor responses we call fear. In the younger system, sensory information travels from the thalamus to the relevant cortical sensory areas (touch to the somatosensory cortex, vision to the visual cortex, etc) and on to frontal association areas, where appraisal occurs. These frontal areas communicate directly with the amygdala and, in light of appraisal, may reduce or magnify the amygdala's fear response. If you glimpse what looks like a snake, long before your younger frontal areas have had time to determine it is a stick, the old thalamus-amygdala system will have evoked fear. LeDoux hypothesizes that the old fast system persists because a behavioral response at the first hint of danger is of little consequence when mistaken but may mean the difference between life and death when appropriate.