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# Emotion Expressions: On Signals, Symbols, and Spandrels—A Response to Barrett (2011)

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## Abstract

We appreciate Barrett's (2011, this issue) comments and her discussion of how our two-stage model is and is not consistent with Darwin's views on the evolution of emotion expressions. Like many pioneering books, Darwin's *The Expression of Emotions in Man and Animals* represents a flurry of novel and revolutionary, yet often inconsistent, ideas, which lend themselves to different readings. However, while the historical perspective Barrett provides is useful, the scientific conversation on emotion expressions has evolved since Darwin. Here, we briefly discuss why the two alternative explanations Barrett offers for the origins of emotion expressions—expressions as cultural symbols and/or as evolutionary byproducts—are both untenable in light of existing research. We also note that although evidence for our two-stage model is currently incomplete, our goal was not to tell a complete story. Instead, we sought to offer the best emerging explanation for the existing research and provide a path for future empirical work that can test it.

## Keywords

adaptation, byproduct, emotion expressions, evolutionary psychology, nonverbal displays, signal

As most of the issues Barrett (2011, this issue) raises have been debated elsewhere (e.g. Barrett et al., 2007; Ekman, 1994; Panksepp, 2007; Russell, 1994), we here respond only to the issue central to our model: whether emotion expressions are likely to be evolved.

As Barrett notes, additional research is needed to test our argument that, through ritualization, behavioral features of early emotional responses evolved into exaggerated, prototypical, easily recognizable signals. Indeed, our primary goal was to guide future research in this “third chapter” of emotion-expression research. Nevertheless, we must also consider the theoretical plausibility of Barrett's alternative accounts: that emotion expressions are (a) culturally invented, transmitted symbols, akin to sign language; or (b) “spandrels”—evolutionary byproducts of a general-purpose meaning-inference system.

Both alternatives are difficult to reconcile with the evidence. While we agree that universality is insufficient proof of adaptation, the finding that prototypic expressions (even exaggerated, posed ones) are reliably recognized in geographically and culturally isolated populations (Boucher & Carlson, 1980; Ekman & Friesen, 1971; Ekman, Sorenson, & Friesen, 1969; Haidt & Keltner, 1999; Tracy & Robins, 2008) seriously challenges cultural-transmission accounts (although Barrett notes accurate recognition is not evidenced by *everyone* in these populations, we believe these findings should be held to the

same accepted standard of statistical significance as other empirical results). Evidence for spontaneous emotional displays by sighted and blind individuals across cultures (Matsumoto & Willingham, 2009; Tracy & Matsumoto, 2008) and emotion-specific associations between displays, feelings, and physiology across disparate cultural groups (Levenson, Ekman, & Friesen, 1990) bolsters this point, as does evidence of morphologically similar displays in closely related species (e.g. Parr, Waller, & Vick, 2007; Tomonaga et al., 2004). Unless human phylogeny split from other apes prior to the emergence of emotion expressions but humans subsequently based their own communicative symbology on ape-like expressions, evolved inheritance is the most plausible account.

Furthermore, neither of Barrett's accounts can explain why emotion expressions—be they symbols or spandrels—look the way they do. Each of the methodologically diverse third-chapter experiments we cited in our main article makes it less tenable that expressions are comprised of randomly assorted features; there are functional explanations for widened eyes in surprise and fear but not anger or disgust, and a bowed head in

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shame but not pride. It is difficult to conceive of a plausible explanation for such functionality in arbitrary symbols.

Finally, Barrett suggests that our knowledge of the brain precludes the independent evolution of discrete emotions. However, given strong evidence of special design for more specific psychological responses than emotions (e.g., situation-specific mating strategies; Gangestad & Thornhill, 2008), findings that electrical stimulation of certain brain regions in rats elicits distinct emotional responses (Panksepp & Watt, in press) and an entire subfield of research delineating independent adaptive functions for numerous emotions (see Keltner, Haidt, & Shiota, 2006), Barrett's dismissal may be premature.

Our two-stage model is not based on hard conclusions; rather our goal was to plausibly integrate extant findings and stimulate much-needed future research. Barrett's challenges confirm that there remains much work to do.

### Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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