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# 4

## On the Automaticity of Emotion

LISA FELDMAN BARRETT, KEVIN N. OCHSNER, and  
JAMES J. GROSS

Any emotion, if it is sincere, is involuntary

Mark Twain

**T**he year is 1846. You are a stagecoach driver. All is quiet and peaceful as the red sun sets beyond the horizon, the coach rumbles contentedly along, and sagebrush cast long shadows across the lonesome prairie. Hidden in the shadows, however, is a rattlesnake. Disturbed from its slumber by the horses, the rattler suddenly strikes out, scaring the horses into a fearful, frenzied sprint. Out of control, the stagecoach careens towards the edge of a sheer cliff. First you try to soothe your steeds, but they cannot hear you. Then you try to forcibly rein them in, but their strength is too great. Life itself hangs in the balance as you grimly struggle to control the careening stagecoach.

The distinction between wild stagecoach steed and wily stagecoach driver in many ways mirrors the distinction between feeling and thinking embedded within Western Culture. Emotions are assumed to be primitive, automatic, animalistic entities dwelling within us that the more developed human part of our minds come to know about and control. The notion that feeling is first, fast, and feral traces back to biblical stories of the First Family and their misbegotten emotional impulses to taste that tempting fruit. These ideas about emotion continue in modern-day stories of lovers driven mad with jealousy, businessmen blinded by greed, and widows overcome with grief. As Plato suggested long ago in the *Phaedrus*, in each of these cases, our emotions, like wild horses, drive us to emotional places we do not deliberately choose to visit and thus must be harnessed and restrained.

In the first section of this chapter, we outline the commonsense view that emotions automatically play themselves out when we encounter certain situations. We describe how this commonsense view – with varying degrees of elaboration and complexity – forms the basis of a consensual view of emotion that pervades much of the scientific inquiry into emotion. We refer to this consensual view as “the modal model” of emotion. In the second section, we argue that although the

“modal model” has much to recommend it, mounting evidence suggests that it has several important limitations. In the third section, we argue that the field needs to move beyond a search for entities that conform neatly to our intuitions about what automatic emotions “must” be like. We call for a richer examination of the bottom-up and top-down processes that together give rise to emotion, and suggest that a constraint satisfaction approach may provide the conceptual framework that is needed in order to move beyond the modal model.

### FROM COMMON SENSE TO A “MODAL MODEL” OF EMOTION

#### *The Commonsense Approach to Emotion*

As common sense has it, emotions are triggered automatically, overcome us, and cause us to act. We yell because we are angry. We cry because we are sad. We jump because we are afraid. Anger, sadness, and fear cause and explain our behavior, just as lightning causes and explains thunder. As the pent up electrical energy of an emotion is discharged, the result is a largely inescapable set of stereotyped outputs that occur in a rapid, involuntary, and automated fashion. Prior knowledge, expectations, beliefs, or any other cognitive input have little impact on the process. You might know that lightning is about to strike, but you can't stop it from happening, and plugging your ears will not keep you from hearing the thunderous blast. As a consequence, emotions such as anger happen to you, and overcome you, rapidly overriding whatever else you might have been doing, thinking, and feeling. From a first-person perspective, the conscious experience of emotion (the feeling) is taken as clear evidence that the causal mechanism – the “emotion” – was triggered. Feeling angry is evidence that the anger mechanism has fired. What is more, anger seems to overtake others in much the same way. When observing others, expressive behavior is seen as evidence that an emotion is triggered. The given quality of our own experience, and the way that emotion seems to control others without their awareness, seems to provide proof for the automaticity of emotional responses.

This folk conception of emotion underlies our everyday construal of emotions in self and others. Because we experience instances of anger (or sadness or fear) in ourselves and in others as having a rapid onset and a more or less ballistic trajectory, we believe anger (or sadness or fear) must exist as a primitive entity lying in wait within the brain or body, ready to spring forth automatically and at a moment's notice once the appropriate triggers are present. The commonsense idea of emotions as automatic eruptions is even evident in the criminal justice code, where “passion” is seen as a justifiable defense for violent crime. In the US, the “sudden heat of passion” constitutes adequate provocation that reduces an act of intentional homicide to an offense of voluntary manslaughter (Dressler, 2001, p. 527).

In this view, our emotions are rarely, if ever, the product of controlled, deliberate, and conscious thought. Although it is possible to “think ourselves” into an

emotional state, controlled processes typically serve to control, rather than to elicit, emotional responses. Any number of aphorisms admonish us to regulate our feelings either by deliberately thinking differently – “looking on the bright side,” “making a silk purse out of a sow’s ear,” “finding the silver lining in every dark cloud,” – or by acting differently – “putting on a happy face,” “putting a lid on it,” “showing some restraint,” “never letting them see you sweat,” “getting a grip,” or more generally by keeping ourselves from expressing the anger, sadness, or fear that we might feel inside. The very fact that we have to take control to regulate our emotional responses is further evidence for us that they are automatic, and it is precisely because we experience our emotions interfering with our more reasoned responses (that we identify as more essentially “human” in nature) that we experience our emotions as automatic, animalistic, and foreign.

More generally, our experiences of emotions erupting outside of our control, and our sense of agency and effort in shaping them, strongly supports our intuition that there are two fundamentally distinct forms of processing that characterize the human mind: automatic processing (which we share with other animals) and controlled processing (which is most developed in humans). As we will see, virtually every major scientific account of emotion incorporates our intuitions about dual-processing modes in the mind, and specifically our commonsense distinction between automatic elicitation and controlled regulation of emotion.

### *Two Major Scientific Approaches to Emotion*

Dual-process models pervade contemporary psychology (e.g., Barrett, Tugade, & Engle, 2004; Chaiken & Trope, 1999; Devine, 1989; Gilbert, 1991, 1998; Power & Dalgleish, 1997; Schacter, 1997; Sloman, 1996; Smith & DeCoster, 2000; Trope, 1986). A central tenet of such models is that behavior is determined by the interplay of automatic and controlled processing. Models vary in their specifics and emphasis, but all hold that responses to an event begin with the automatic (sometimes called nonconscious, implicit, or heuristic) processing of information. Such processing is assumed to be a default mode, initiated by the simple registration of sensory inputs, which in turn passively activate knowledge structures (called schemas, scripts, or concepts, or even internal goal states) that shape perception and action. Controlled (sometimes called conscious, explicit, or systematic) processing can determine, to a large extent, the degree to which automatic processing is expressed in thoughts, feelings, and behaviors. Controlled processing requires attentional resources, is volitional, is largely goal-driven, and can be used to modulate automatic processes when the outputs they produce conflict with valued goals.

As in other domains in psychology, emotion has proven hospitable ground for dual-process logic (Smith & Neumann, 2005). Indeed, in our view, a dual-process model lies at the heart of much of the scientific theorizing and research dealing with emotion for the past century. This dual-process framework can be summarized in a very simple way in Figure 4.1. Some event or goal-relevant stimulus (usually external, although it could be internal) triggers an emotion mechanism (or set of mechanisms), which, in turn, automatically produces a complex sequence of coordinated changes in the brain and body that constitute an emotional response.

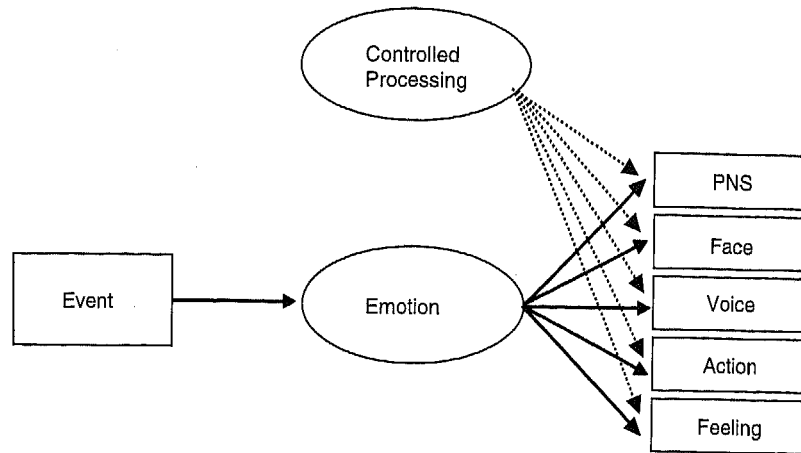


FIGURE 4.1 A dual-process view of emotion. PNS = peripheral nervous system activation.

Substitute for “emotion” any referent for a specific emotion category (“anger”, “sadness”, “fear”, and so on, in English), and you have a model of that emotion. Controlled regulation is thought to occur separately and modulate the extent to which a coordinated emotional response actually manifests in observed behavior.

Within this dual-process framework, two historically distinct (but often complementary) approaches to the study of emotion can be distinguished. One approach has focused on the output side of the emotion-generative process, namely the coordinated expression of complex patterns of behavior that comprise the observable, tangible, and socially impactful component of an emotional response. This has been referred to as the *basic emotion* approach. A second approach has focused on the input side of the emotion-generative process, namely the processing of environmental stimuli that gives rise to the emotional response depicted in Figure 4.1. This has been referred to as the *appraisal* approach. Despite differences in their surface features (for a review, see Scherer et al., 2001), these two approaches share two central assumptions. First, each of these approaches assumes that there are definable kinds of emotion (defined by the brain, or by the deep structure of situations). Second, these approaches assume that emotion generation is dominated by automatic processing (with regulation usually occurring after the fact). Given its ubiquity in the field, we refer to Figure 4.1 as the “modal model” [and in the past have referred to it as the “natural kind model” (Barrett, 2006b) or the “consensual model” of emotional responding (Gross, 1998)]. In the following sections, we describe the role the “modal model” has played in each of these two major approaches.

**The Basic Emotion Approach** One of the earliest modern examples of the basic emotion approach can be found in Darwin’s (1859/1965) “The Expression of the Emotions in Man and Animals.” Darwin’s ideas about emotion were infused

with commonsense beliefs about how mental states seek expression in, and therefore automatically cause, behaviors. Facial and other behaviors (such as baring the teeth in anger) were seen as vestigial expressions of emotion mechanisms that are homologous in human and nonhuman animals. Darwin focused on a small number of emotions (many of which are now referred to as “basic” emotions), stressing the universality as well as the phylogenetic and ontogenetic continuity of their expressions.

William James (1884, 1890, 1894) famously disagreed with Darwin (and commonsense) as to the correct temporal ordering of the elements in Figure 4.1. Instead of the sequence depicted in Figure 4.1, James argued that an individual’s emotional response was best characterized by the sequence: stimulus → physiological response → experience. Notwithstanding this notable difference, James clearly retained the core notion that emotion involved an automatic release of a coordinated set of responses to relevant stimuli (with the embodiment of those responses producing the experience of emotion). As William James himself put it:

The nervous system of every living thing is but a bundle of predispositions to react in particular ways upon the contact of particular features of the environment . . . The neural machinery is but a hyphen between determinate arrangements of matter outside the body and determinate impulses to inhibition or discharge within its organs . . . Every living creature is in fact a sort of lock, whose wards and springs presuppose special forms of key – which keys however are not born attached to the locks, but are sure to be found in the world near by as life goes on. And the locks are indifferent to any but their own keys. (1884, pp. 190–191).

This quote nicely captures the modern idea of cognitive impenetrability – meaning that emotion circuits fire in an obligatory way once triggered by sensory information about a stimulus, and occur regardless of the context. Onset is rapid, involuntary, and requires little or no attention. Although James concentrated on developing the automatic elicitation side of the emotion equation, he also incorporated the commonsense notion that controlled processes may come into play, such as when we regulate emotion after-the-fact, by limiting its expression. As James saw it: “refuse to express a passion, and it dies.” (James, 1884, p. 197).

Later models built more directly on this elicitation-regulation distinction, and further developed the dual-process metaphor for emotion processing. Cannon (1927, 1931) and Bard (1928; Bard & Rioch, 1937), who proposed one of the earliest psychological models of emotion localization in the brain, argued that the emotional part of the brain (in their view, the hypothalamic circuit including the thalamus and hypothalamus) produced responses that could be down-regulated by evolutionarily more recent neocortical regions. Papez (1937) similarly argued for top-down cortical regulation of subcortical emotional responses, and MacLean (1949) continued this tradition, positing that the newer “mammalian” part of his triune brain architecture exerted top-down regulatory control of the emotional responses that issued from the older and more primitive “reptilian” and “old mammalian” parts of the brain.

Although concepts such as reptilian and mammalian are no longer part of

contemporary basic emotion models, these models have nonetheless retained an emphasis on subcortical structures in the generation of emotion (e.g., Panksepp, 1998). Perhaps the best-known example has been offered by LeDoux (1996), who demonstrated that links between sensory systems and the amygdala are necessary and sufficient for the expression of conditioned fear, but who, along with others, has shown that cortical areas (particularly medial prefrontal cortex) are involved in expressing contextual learning that inhibits the conditioned fear response (Milad & Quirk, 2002; Morgan, Romanski & LeDoux, 1993; Quirk & Gehlert, 2003; Quirk, Likhtik, Pelletier, & Paré, 2003).

A dual-process metaphor can also be clearly seen in the family of models that comprise the modern-day “basic emotion” approach to emotion. Like Darwin and James, basic emotion models focus more on the ways in which emotional responses are automatically elicited. Boiled down to their essential ingredients, these views posit that each kind of “basic” emotion issues from a neural program or circuit, hardwired at birth, homologous with circuits found in nonhuman mammals, that is responsible for an automatic syndrome of hormonal, muscular, and autonomic effects that constitutes the distinctive signature of an emotional response. Although the specific set of “basic” emotions varies somewhat across emotion theorists, there is agreement that specific “basic” emotion mechanisms correspond to English emotion categories (e.g., “fear,” “sadness,” “disgust,” “anger,” or happiness”). This small set of stereotyped, automatic emotion responses are regulated after the fact, usually by means of controlled attentional processes shaped by epigenetic influences, such as context and learning history.

Perhaps the best-known example is Ekman’s neurocultural model (Ekman, 1972), which describes emotions as issuing from “affect programs” (Tomkins, 1962) that, once triggered by an eliciting stimulus, direct a complex pattern of coordinated outputs to produce a stereotyped emotional response. Panksepp’s (1998; Panksepp et al., 2000) neurobiological model takes its lead more directly from MacLean’s (1949) triune brain concept, but is similar, in principle, to the neurocultural model. Panksepp argues for different “basic” emotion systems (seeking/expectancy, rage/anger, fear/anxiety, lust/sexuality, care/nurturance, panic/separation, and play/joy). Each kind of emotion is a separate, inherited, complex reflex that is hardwired at birth and causes a distinctive syndrome of hormonal, muscular, and autonomic effects.

At the core of both Ekman’s (1972) and Panksepp’s (1998; Panksepp et al., 2000) models is the idea that there is a hardwired set of emotion-specific mechanisms that fire automatically and thereby generate a suite of emotional responses. Over time, however, there has been softening of the emphasis on fixed, hardwired programs that govern emotions from birth. For example, both Ekman and Panksepp acknowledge that there is a greater range of human emotional responding than can be accounted for by a set of basic emotions. Recent developments in the neurocultural model have attempted to account for the complexity and subtlety of emotional life by arguing for families of emotion response (Ekman, 1992), or by suggesting a distinction between “primordial” and “elaborated” emotions (Keltner & Haidt, 2001), where the former are “basic” emotions that produce a stereotyped response signature, and the latter are responses that are more shaped by the

norms and social practices within a culture. Both also allow controlled processing to enter the picture, although primarily as a way of regulating the emotion-generative process. In the neurocultural model, culture not only influences the stimuli that trigger emotion programs, it also specifies display rules and regulatory outcomes, so that observed emotional responses display considerable cultural variation, even as the causal mechanisms are hardwired into the brain. Panksepp (1998) also allows for the environment to modulate emotional outputs in the form of cortical control of the basic emotion systems once they have been triggered.

**The Appraisal Approach** The dual-process metaphor can also be found in a second family of emotion models, which we refer to collectively as the *appraisal* approach. Appraisal models have been concerned with patterns of cognition that trigger an emotional response. Like the basic emotion approach, many models within the appraisal approach retain the commonsense distinction between automatic elicitation and controlled regulation, although they also incorporate the idea that automatic and controlled cognitive processes (or steps) can interact and give rise to emotional responses. Thus, when appraisal models unpack the input side of Figure 4.1, they typically describe a cognitive logic that involves both automatic and controlled components, although once the emotion is elicited, it is assumed to run automatically to completion.

In these models, emotions are a consequence of how people construe situations. Frijda (1988), one of the best-known and most influential appraisal theorists, calls this the “law of situational meaning.” Instead of assuming that a stimulus situation automatically triggers or releases a fixed emotional response (as William James had), appraisal models hold that intervening cognitive processes automatically elicit and determine the quality and intensity of emotional responses. Input an event with a particular meaning, and the result is an emotion of a particular kind. The cognitive processes that compute this meaning, formally known as appraisals, link the external world (an individual’s immediate situation) to the internal world (the individual’s goals, needs, and concerns). Appraisals diagnose whether the situation in question is relevant to the person’s well-being, and if so, identify the nature of that relevance, and trigger an emotion that will maximize the likelihood of producing a functionally effective response consistent with the organism’s most central concerns (Kappas, 2001; Smith & Kirby, 2001).

Appraisal models vary in terms of the logic and content of the cognitive judgments that are held to be necessary and sufficient to produce emotional responses. In some models, appraisals describe the way that a situation is experienced, and constitute a descriptive structure of which emotions are felt when; they do not, in and of themselves, indicate the processes by which the meaning is made or arrived at (e.g., Ortony, Clore, & Collins, 1988; Smith & Ellsworth, 1985). In this view, sadness occurs when a situation’s meaning involves loss, and fear when the meaning involves danger. Situational analysis, or appraisals, can be determined in any number of ways. A situation’s meaning can be determined with associative processing by reinstating an appraisal that derives from a similar situation experienced

