

CN Chapter 10

CT The Embodiment of Emotion

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In current psychological discourse, it is fashionable to talk about emotions as “embodied” phenomena. At first glance, this idea is not novel. Historically, almost all psychological theories of emotion have proposed that emotional reactions are constituted by the body in some fashion. Some suggest that changes in the body cause changes in the mind; others suggest the opposite, or that the body and mind interact to produce an emotional response. Amid theoretical differences, these theories use the common metaphor that the body and mind are separate and independent forces that can act upon one another in an emotional episode. Current embodiment theories of the mind challenge this assumption by suggesting that the body helps to constitute the mind in shaping an emotional response. This view has novel implications for understanding the structure and content of the conceptual system for emotion, as well as for defining what emotions are and how they are caused.

In the present chapter, we explore a more modern embodiment view of emotion. First, we discuss how the Cartesian “machine metaphor” underlies much theorizing about emotion, as we situate an embodied view of emotion in its historical context. Our historical review is not intended to be comprehensive but rather to illustrate how emotion theories to date have conceptualized the role of the body and mind in emotion. Next, we briefly review new theories of embodied cognition in light of accumulating findings from emotion research, which together suggest some novel hypotheses about how the conceptual system for emotion is constituted and

used. Finally, we discuss how an embodied perspective might contribute to a paradigm shift in the scientific study of emotion.

A-Head A Brief History of the Mind and the Body in Emotion Theory

B-Head Cartesian Dualism and the Machine Metaphor

According to Bloom (2004), people are born Cartesian dualists, and dualistic thinking – the notion that the body is a biological machine, whereas the mind is something separate and apart – remains firmly entrenched in our everyday reasoning about the world. Most scientists have explicitly abandoned dualist assumptions in their attempts to explain human behavior, but its residue is highly conserved in psychological theories of mind in the form of the *machine metaphor*: the idea that any psychological phenomenon can be understood to function like a machine, with processes that can be separated into definable bits and pieces that have no necessary causal relation to one another but that can interact. The machine metaphor is deeply entrenched in modern scientific thinking about how the mind and the body relate in emotion. A central tenet of emotion theories is that the body and the mind are intrinsically distinct and separate entities that can influence one another during the generation of an emotional response.

B-Head Emotion Theory: A Brief History

Three historically distinct (but often complementary) frameworks that rely on the machine metaphor can be distinguished (see Figure 10.1). One group of models has focused on how the body influences or impacts the mind. In these models, perception of a stimulus causes some change in a bodily state, which is then felt as an emotion. A second approach has focused on the ways in which the mind influences or changes the body. In these models, perception of a stimulus causes some sort of mental state, which in turn causes some bodily change. In fact, the contemporary era of emotion theory began with a debate between William James and Charles Darwin on the causal ordering of the body and the mind in the emergence of an emotional experience. A third approach sees the mind and the body as complementary forces that together generate an emotional response.¹ A common thread running through most models is the idea that the stimulus situation plays some role in generating an emotional response. In some views, the situation is considered to be the physical elements or objects that trigger a body state (James, 1884, 1894/1994, 1890/1950), whereas in others it is the event that triggers an interpretation (Schachter & Singer, 1962). What these theories have in common is that the situation, like the mind and body, are distinct parts that can be separated from one another in their causal influence without any one losing its character.

To facilitate a discussion of these models, it is necessary to devise a clear and consistent terminology. The term *mental state* is used to stand for the mental representation of a stimulus or stimulus situation that is thought to trigger an emotional response. Several theories assume that some form of mental state sets the

stage for other mental or bodily changes that constitute an emotional response. Theories have characterized mental states as “instincts” (e.g., McDougall, 1928), “psychological situations” (e.g., Young, 1943), “attitudes” (e.g., Dewey, 1894), and “motor attitudes” (e.g., Bull, 1945). The phrase *mental representation of emotion* is used to signify a consciously experienced emotion (cf. Barrett et al., 2007). Theories differ greatly in how they describe the mental representation involved in emotion. This mental representation has been characterized as a “state of mind” (Darwin, 1965), a “feeling” (e.g., Bull, 1945), “facial feedback” (Tomkins, 1962, 1963) or simply “an emotion” (e.g., James, 1884). The term *body state* refers to some physical change in the peripheral nervous system or behavior. Theorists have characterized bodily state as “vasomotor changes” (Lange, 1885/1922), “bodily perturbations” (James, 1884), “expressions” (e.g., Darwin, 1965), “organic changes” (e.g., Dewey, 1894), or “energy level” (e.g., Duffy, 1941, 1957). Finally, the term *neural representation* refers to any sort of neural activation that is specified in a theory. For example, a neural representation of a bodily state would involve activations in somatosensory and insular cortices (Craig, 2002, 2003). The neural representations that instantiate emotional responses are often ill-defined in theories of emotion, but most theories assume some sort of neural representation is necessary for an emotional response to occur.

C-Head The Body Influences the Mind in Emotion

The idea that a body state causes a mental representation of emotion played an early, formative role in the history of the emotion theory. The modern version of this idea was first put forth by James (1884, 1890/1950, 1894/1994) and Lange (1885/1922), who famously suggested that experience of emotion results from the normal sensory processing of somatic, visceral, and motor (James) or vascular and motor (Lange) cues from the body that are automatically and reflexively elicited by external stimuli. The James-Lange theory was primarily concerned with explaining mental representations of emotion (e.g., the feeling of being angry). Although James (and by implication, Lange) was criticized for not dealing with emotion states per se (e.g., the state of being angry), it is commonly assumed (beginning with Dewey, 1894) that the emotion state is the change in body state that occurs in response to the stimulus, and that this change is what is perceived as the experience of emotion.

Many early theories of emotion were explicitly designed to reconcile the James-Lange view with the common-sense inspired Darwinian view that mental representations of emotion cause changes in bodily states (e.g., Dewey, 1894; Bull, 1945). One popular attempt can be found in Tomkins' (1962, 1963) theory of emotion. Tomkins scaffolded the James-Lange view (the idea that mental representations of emotion are constituted by efferent feedback from a body state) onto Darwin's idea that there are certain emotional expressions that are preserved by evolution. Replacing Darwin's idea of a "state of mind" with an "affect program," Tompkins argued that these evolutionarily preserved, inborn programs cause a body state (particularly constituted by facial muscle movements), the feedback from which

instantiates a mental representation of emotion. This view is largely re-presented in Ekman's (1972) theory of emotion, although Ekman added the idea that human beings (but not other animals) have developed the capacity to modify the link between an affect program and facial muscle movement (i.e., "display rules"). Laird (1984; Duclos, Laird, Schneider, & Sexter, 1989) also fashioned a theory reminiscent of both James' notion that mental representations of emotion stem from sensory information from the body and Tomkin's view that mental representations result from facial muscle feedback. However, Laird added Bem's (1967, 1972) ideas of self-perception, and in doing so seems to interject cognitive processing between body states and mental representations of emotion. Nonetheless, his view is grounded in the idea that facial (Laird, 1984; Duclos et al., 1989) and body (Duclos et al., 1989) muscle movements initiate a mental representation of emotion.

Another example of the Body → Mind approach can be found in Nauta's (1971) idea that efferent information from the body is integrated with sensory processing of the external world to give affective meaning or value to objects in the world. Nauta did not really have a theory of emotion as much as ideas about how the frontal cortex marshals information from the body to guide decision making about objects of value. Nonetheless, his idea is consistent with the notion that the body helps to influence mental representations (what we would now call core affective feelings; Barrett, 2006b) that are constitutive of the mind (see also Mowrer, 1960; Pribram, 1970).

C-Head The Mind Influences the Body in Emotion

The idea that the mind drives the body has also played a formative role in models of emotion. The majority of theories assume that different states of mind consistently produce different kinds of emotion embodied by distinct, coherent patterns of bodily changes. There is some variability in where the emotional reaction itself is said to be located: In some views, emotion is a mental state causing the body state; in others, emotion is the mental representation that is associated with bodily changes themselves.

One of the earliest modern examples of the Mind → Body approach can be found in Darwin (1859/1965), “The Expression of the Emotions in Man and Animals.” Darwin’s ideas about emotion were infused with the common-sense belief that certain states of mind seek expression in and therefore automatically cause behaviors. Darwin did not really craft a theory of emotion as much as make an argument for his theory of evolution and against creationism: If we are like other mammalian (particularly nonhuman primate) species with which we share a common ancestral heritage, then we should give evidence of homologous behaviors (like facial expressions) that are derived from a common origin. These behaviors become associated with certain states of mind (emotions) by force of habit. As a result, terror expresses itself as “hurried breathing,” a “wildly beating heart,” “pale skin,” “bristled hair,” secretions to kidneys, and “prostration” of the body (p. 77), whereas rage expresses itself as “labored respiration,” “flow of nerve-force to the heart,” a “reddened or deadly pale face,” and “muscular exertion” (p. 74).

Later models built directly on this mind-body causality, and further developed the idea that mental states cause changes in body states. In these models, the mental state is described as a perception or conceptualization of not just an object but an entire stimulus situation. McDougall (1908, 1928) argued that an instinct, defined in mentalistic terms (as a disposition to perceive, attend to, and understand the meaning of particular objects in a particular way), produces a particular body state, which in turn produces a mental representation (feeling), which he identified as the emotion.² Wundt et al. (1894; Wundt, 1897) argued that emotions are mental representations (affective feelings) of pleasure/displeasure and arousal (tension-relaxation and excitement-depression) combined with additional ideational content deriving from perceptions of the stimulus situation. Wundt (1897) suggests that emotions can only be differentiated by their respective ideational contents, and it is this ideational content that produces changes in body state. The physical concomitants only serve to intensify the emotion (what is felt). Titchener (1921) agreed with Wundt that emotions are mental representations (feelings) deriving from basic affective feelings, but argued that such feelings could only be characterized as pleasant or unpleasant. For Titchener, as for Wundt, changes in body state were constituents of emotion evoked by mental states, but these body states were not in any way causally linked to the core of an emotional response (affective feeling).

Arnold (1960) directly implicated mental states in producing both body states and mental representations of emotion. Upon perceiving a stimulus, a person judges or appraises the personal significance of the object, as well as the object's value

(good for me/bad for me) in an automatic, given fashion. The mental state (the appraisal of an object) initiates an “*action tendency that is felt as the emotion*, expressed in various bodily changes, and that eventually may lead to overt action” (p. 177, italics in the original). She also introduced the idea that the physical changes that come with an emotion are themselves sensed and appraised or evaluated as having some meaning for the person (what she called “secondary appraisal,” p. 180), and in so doing foreshadowed the idea that there is a transactional relation between mind and body in emotion.

Several modern appraisal views take their lead from Arnold’s notion that the mind produces both body states and mental representations that constitute an emotional response. Roseman (1984) and Scherer (1984) are the best examples of these views. Each type of emotion is characterized by a specific body and feeling state that is generated by a pattern of cognitive mechanisms or components (called cognitive appraisals) that make up the meaning of a situation. For example, Scherer (1984) proposed that emotions result most directly from an information processing subsystem (for basic perception and evaluation of the environment), where one of several types of stimulus appraisals – called “stimulus evaluation checks” (SEC)– cause a pattern of activity in other subsystems, such as a support subsystem (that controls neuroendocrine, somatic, and autonomic states), an executive subsystem (that plans and makes decisions), an action subsystem (that regulates neuromuscular states), and a monitoring subsystem (that is a control system that reflects on the states

of other subsystems). Distinct pattern of SECs are thought to cause discrete emotions, which can be characterized by distinct body states.

Ortony, Clore, and Collins (1988) outlined an appraisal model based on the assumption that emotions arise from certain types of cognitions or perceptions about the world. Like Roseman and Scherer, their view rests on the idea that if an individual conceptualizes the situation in a particular way, then that person experiences a certain type of emotion. Ortony et al. can be distinguished from Roseman and Scherer in that they do not prescribe particular cognitive processes that produce patterns of situational construal. Theirs is a descriptive model that outlines a set of rules for which emotions are felt when.

Finally, Frijda (1986) suggested that certain situational meanings produce certain emotions in a law-like fashion. Like Arnold, Frijda characterized emotions as states of action tendency or readiness that are motivations to achieve or maintain a particular sort of relationship with the environment rather than a readiness to perform specific behaviors per se. The actual behaviors that are performed to realize any given action tendency will vary on the basis of contextual demands and other constraints. For example, “anger” is the urge to attack, but there are many different ways to implement an attack (one can yell, hit, withdraw, or be exceedingly kind). “Fear” is the urge to separate oneself from an aversive event, but there are many behaviors that can achieve this aim (one can freeze or flee).

Since the 1930s, many models of emotion have explicitly given a role to both the body and the mind in constituting an emotional response. In such views, the body plus some mental state (most typically, some ideation about the situation) together produce both an emotional state and its mental representation. Many of these theories are striking in how they foreshadow the major tenets of modern appraisal theories of emotion (in assuming the situation has a causal role in generating an emotional response). In some cases, ideational content about the situation is used to interpret the meaning of bodily states (an interactionist view), whereas in others the content merely coincides with the bodily states (an additive view).

Duffy (1934, 1941) may have been the first to put forth an interactionist view when she proposed that a mental representation of emotion emerges from the interaction of a body state and an awareness of the stimulus situation in which that state occurred. She suggested an emotion is a physiological event that is interpreted as having personal significance. The meaning of a stimulus event, expectations about how it might change, and knowledge about what set of responses typically occur in response, all guide the interpretation of felt bodily changes (Duffy, 1941). As a consequence, a mental representation of emotion occurs when basic affective states (pleasure, displeasure, and energy level) are interpreted as discrete emotional states. By introducing the psychological situation in this fashion, Duffy foreshadows the Schachter and Singer (1962) appraisal model of emotion. Young (1943) also foreshadows Schachter and Singer (1962) by suggesting that emotional responses are characterized by changes in body state (widespread visceral changes and behavior)

that are interpreted in a “psychological situation” (i.e., a person’s understanding of his or her relation to the immediate surroundings). According to Young, a person possesses primitive patterns of physical response (in more recent years called “behavioral stances” or “prepared responses”), but these are recognized as common-sense categories of emotion (e.g., anger, sadness, fear, and so on) only when a particular pattern is experienced in a particular type of psychological situation (e.g., fear exists when escape-related visceral and behavioral changes occur in a danger-related situation, but fear does not exist when the situation is not dangerous). The assumption is that some stimulus (or set of stimuli) triggers the primitive response, but the person must experience this response in the context of a meaningful psychological situation for an emotional event to have occurred.

Bull (1945) also foreshadows modern appraisal theories of emotion, particularly Frijda’s (1986) idea that action readiness (a behavioral stance toward the environment) is a critical component in an emotional response. In Bull’s view, a stimulus triggers a mental state called a “motor-attitude” which prepares the organism to act in a certain fashion (e.g., prepares the organism to strike in anger). The preparation for action inherent in this motor attitude engenders a feeling (i.e., a mental representation of emotion), which in turn leads to a behavior. Together, the motor attitude (i.e., a mental state), associated feelings (i.e., the mental representation of emotion) and actual bodily changes (i.e., body state), as well as an interpretation of the eliciting stimulus (i.e., ideation regarding a stimulus’ meaning), produce an emotion state.

Schachter and Singer's famous (1962) theory of emotion proposes that mental representations of emotion arise from the interaction of cognitive interpretations (ideation) and perceived bodily arousal (bodily representation). An emotional episode occurs when a person attributes the cause of perceived arousal to some stimulus event. Attributing perceived arousal to a cause gives it meaning and transforms it into an intensional state. Mandler (1975) articulated a similar view, suggesting that a mental representation of emotion is an interaction between ideational processes and perceived bodily states. In Mandler's (1975) view, an individual performs a meaning analysis on feelings of arousal. The representation of this meaning analysis in consciousness is the emotion.

Finally, Brenner (1974) also outlined a theory whereby mental representation of emotion results from an interaction of bodily states and ideation. Brenner characterized emotions as complex mental phenomena that result from sensations of pleasure and displeasure and associated ideational content (i.e., beliefs, thoughts, memories). Unlike his predecessors, he specifically defined the physiological substrate of emotion to be feelings of pleasure or displeasure. Because pleasure and displeasure exist on a continuum, mental representations of emotion are really "constellations" of coordinated feelings and ideas. An emotion can be distinguished from another emotion in terms of the intensity of the pleasure or displeasure it involves and the ideas associated with it.

A-Head A Modern Embodiment View of Body and Mind in Emotion

A modern embodiment view of the mind assumes a transactional, recursive relation between the body and the mind and, in so doing, does not rely on the Cartesian reductionism that treats the mind and the body as separable and independent causes of emotion, each with their own unique properties, structure and function. Put simply: in a modern embodiment view the body helps to constitute the mind.

Although the mind-body relationship is presumably recursive, for the purposes of this chapter, we focus on one direction in this dynamic relationship – where the body helps to constitute the mind. Specifically, we examine how the body might help to constitute the conceptual system for emotion, that is, which emotion categories we have concepts for, and how conceptual knowledge is constituted.

Modern embodiment views are based on three grounding assumptions. First, cognitive events derive from the types of experiences that come from having a body with particular sensorimotor capacities. As a result, the body allows the conceptual system to develop in relation to how the world is experienced. This is the idea of embodied realism (Lakoff & Johnson, 1999, p. 44): Concepts are not a mind-free, direct window on the external world because our own bodies, and our experience, have a hand in constructing them. The structure of the conceptual system for emotion

would then be grounded in the structure of the physical events associated with emotion.

Second, the body helps to implement the mind in that the conceptual system (for emotion or for any set of categories) relies on sensorimotor simulations. An embodiment view of the mind assumes that knowledge, such as knowledge about categories of emotion like *anger*, *sadness*, and *fear*, is instantiated as modality specific sensorimotor (rather than abstract propositional) representations of prior events (Gallese, 2005), called *perceptual symbols* (Barsalou, 1999). Neurons in different modalities (e.g., vision, audition, interoception, motor behavior) capture different sensory and motor elements of a perceptual event, and neural representations accumulate to produce a “simulator” that serves as a toolbox for creating any future conceptual representation of a category. For example, a simulator for a category of knowledge, like *anger*, will develop as sensory, motor, and somatovisceral features that are integrated across contexts and settings where instances of anger are labeled. Sensory information about the object that is in the focus of attention (e.g., visual information about an interaction partner, auditory information about his or her voice), somatovisceral information about the emoter’s internal state, motor programs for regulating the partner’s and the emoter’s own behavior, as well as the label “anger,” and so on, would bind together (via conjunctive neurons; Simmons & Barsalou, 2003) to form an instance of *anger*. As instances of *anger* accumulate, and information is integrated across instances, a simulator for *anger* develops and conceptual knowledge about *anger* accrues. The

resulting conceptual system is a distributed collection of modality-specific memories captured across all instances of a category. These establish the conceptual content for the basic-level category *anger*, and can be retrieved for later simulations of *anger*.

Not only does the body help to constitute the mind but so does the situation (for a review, see Robbins & Aydede, in press). In fact, an embodiment view of the mind assumes that cognition is situated. Perceptions of occurrences both inside and outside the body are captured by simulators and are seamlessly bound, so that perceptual symbols are situation-specific inferences for behavior that are tailored to a given situation. Context is particularly important in representing exemplars of abstract concepts (Barsalou & Weimer-Hastings, 2005) such as *anger*, *sadness*, *fear*, and so on. As a result, perceiving the situation in a particular way helps to constitute, not cause, a conceptualization of emotion.

A-Head The Conceptual System for Emotion

If the body and the situation help to constitute the mind, then the structure and content of the conceptual system for emotion should be grounded in the structure and content of emotional events as they naturally occur. A brief look at the scientific evidence on the structure and content of emotional responding provides a clear, but perhaps non-intuitive, set of hypotheses about the structure and content of the conceptual system for emotion.

The majority of the theories described previously, several of which serve as the most influential scientific models in the study of emotion, assume that emotions are biological categories imposed by nature, so that emotion categories are recognized, rather than constructed, by the human mind. This assumption is represented in the hypothesis that *anger*, *sadness*, and *fear*, as well as several other emotion words, reflect “natural kinds” of emotion that have distinctively coherent and consistent clusters of measurable properties, such as facial movements, autonomic activity, instrumental behavior, and so on (see Barrett, 2006a). Any two emotions (e.g., *anger* and *fear*) may have some overlap in one output or another (e.g., increased heart rate) but the patterns of outputs are presumed to be distinctive. Instances of *anger* must be sufficiently similar to one another in their profile of correlated properties, but sufficiently different from instances of *fear* so that people can clearly distinguish between the two, thereby “cutting nature at its joints.” In this view, people would acquire simulators for *anger*, *sadness*, *fear*, and so on, that preserve the real, biological distinctiveness for these emotional responses. There are several recent embodiment models of emotion that rely explicitly on this assumption of distinctiveness (e.g., Damasio, Grabowski, Bechara, Damasio, Ponto, Parvizi, & Hichwa, 2000; Prinz, 2004).

A series of reviews spanning the course of the psychological literature call into question the idea that each emotion (e.g., *fear*) is a biologically distinct entity that can be distinguished from other emotions (e.g., happiness, sadness, etc) in some real and biologically observable way (Barrett, 2006a; Duffy, 1934, 1941; Hunt, 1941;

Mandler, 1975; Ortony & Turner, 1990; Russell, 2003). In every domain of emotion research, studies finding biological distinctiveness between different emotions can be set against a larger backdrop of findings that fail to find it (for a review and discussion, see Barrett, 2006a). Mammals do many things in instances that are called “fear” – they freeze, they withdraw, they approach, they attack. What they do depends largely on the situation. Fear can occur in many different situations populated by many different objects. As a result, fear has yet to clearly and consistently reveal itself in the data on feelings, facial and vocal behaviors, peripheral nervous system responses, instrumental behaviors, and even neural correlates. The same can be said for instances called “anger” and “sadness,” and for instances of other emotion categories that are typically considered to be biologically basic.

The implication of such findings is clear: the actual events that we call “fear” are really a heterogeneous set of instances that, thus far, seem not have a single, biological core that distinguishes them from instances of, say, “anger.” Each instance called “fear” can vary in the physiological changes that occur, in facial and instrumental behaviors, in the objects that the response is attributed to, and so on. Such heterogeneity is very consistent with ideas originally proposed by William James, who argued that instances within each emotion category vary considerably, both across people and within a single person over time. According to James, there are variable sets of bodily symptoms associated with a single category of emotion, making each a distinct feeling state and therefore a distinct emotion. By the term *emotion*, James was referring to particular instances of feeling, not to discrete

emotion categories. Different instances of an emotion, even if within the same category, will feel different if the somatovisceral activations are different. These observations suggest the hypothesis that the conceptual system for fear, or for any emotion category, will reflect this heterogeneity.

Amidst the variability in instances both within and across emotion categories, there exists elemental or core features of all emotional responses. Literally hundreds of studies point to *affect* as a fundamental element that occurs in every emotional response, be it experienced or observed. This is consistent with Wundt's idea, also present in interactionist theories, that emotions can be decomposed into more fundamental, psychologically basic elements (albeit, perhaps not in a linear fashion). Observations of subjective reports of emotion experience (e.g., Barrett, 2004; Barrett & Russell, 1999; Russell & Barrett, 1999), peripheral nervous system activation (Bradley & Lang, 2000; Cacioppo et al., 1997, 2000), facial muscle movements (Cacioppo et al., 1997, 2000; Messinger, 2002), vocal cues (Bachorowski, 1999) expressive behavior (Cacioppo & Gardner, 1999), and neural activations (Wager, Phan, Liberzon, & Taylor, 2003) are consistent in giving evidence of a general affect system (for a review, see Barrett, 2006b; Russell, 2003). Perceptions of other people's emotional states also contain inferences about affect (Russell, Bachorowski, Fernandez-Dols, & 2003).

There are debates over the most scientifically viable way to represent this affective system (Cacioppo & Gardner, 1999; Russell & Barrett, 1999; Watson et al., 1999), but one candidate is a recently defined affective substrate called *core affect*

(Barrett, 2006b, 2006c; Russell, 2003; Russell & Barrett, 1999). Core affect can be characterized as a neurophysiological state with the properties of pleasure/displeasure and activation/deactivation.³ The fact that core affective changes occur in all instances of emotion suggests that representations of pleasure and displeasure should be a fundamental feature in the conceptual system for emotion.

However, core affect does not give a sufficient account of the instances that we call “anger,” “sadness,” and “fear.” As the brief historical analysis shows us, emotions are intensional states, meaning that they are about something in particular. People become angry *with* someone, afraid *of* something, sad *about* something. Core affective states become intensional, or about something, when they are linked to the perception and interpretation of an object (be it an event, a situation, or a person). Just as people interpret or imbue behavioral actions with “aboutness” by parsing them into discrete behavioral acts (Gilbert, 1998), so do they imbue core affect with intension or emotional “aboutness” when parsing it into discrete emotions (Barrett, 2006b). This observation suggests that object representations would also be a core feature of the conceptual system for emotion.

B-Head Hypotheses Regarding the Conceptual System for Emotion

When viewed in light of an embodiment view of the mind, research on emotion suggests a distributed, flexible conceptual system for emotion that contains several distinctive properties.

C-Head Core Affect

Situated conceptualizations of any emotion category will contain some neural representation of pleasure or displeasure and activation or deactivation. Because both core affect and conceptual representations share a representational format, they could be seamlessly integrated during an instance of perception. This may be especially true because emotion categories are abstract, and introspective state information is particularly important to abstract concepts (Barsalou & Wiemer-Hastings, 2005). The implication then is that conceptualizations of emotion should evoke the same neural circuitry as that involved with establishing an affective state and therefore have the potential to change a person's affective state.

A distributed set of functional circuits in the ventral portion of the human brain are thought to be involved with establishing a person's core affective state (Barrett et al., 2007). One functional circuit, involving the basolateral (BL) complex of the amygdala, the central and lateral aspects of orbitofrontal cortex (OFC), and the anterior insula, establishes the sensory-based aspects of core affect. A second circuit, involving reciprocal connections between the ventromedial prefrontal cortex (VMPFC) (including the closely related subgenual anterior cingulate cortex, or ACC) and the central nucleus of the amygdala guides visceromotor control (i.e., autonomic, chemical, and behavioral). By virtue of a series of cascading routes, this ventral circuitry projects directly and indirectly (via ventral striatum) to hypothalamus and brainstem areas to quickly and efficiently influence the autonomic, chemical, and behavioral states in the body. Together, the resulting perturbations of

the organism's somatovisceral state (or internal milieu) are integrated with information about the external world into an internal affective code or representation. These representations make up a person's core affective reaction to an object or stimulus, influencing a person's core affective state to resemble that which has resulted from prior experiences with the object and directing the body to prepare for some behavioral response toward that object. This view has elements in common with the somatic marker hypothesis (e.g., Bechara et al., 2000), with the view that the sensorimotor system is involved with emotion perception in others (Adolphs, 2002, 2003), and with recent findings that both producing facial depictions of emotion and watching them in others activates the amygdala, insula, and aspects of ventral premotor cortex (Carr et al., 2003).

C-Head Object Representations

At its core, every situated conceptualization of emotion will also contain a representation of an object (what the emotion is perceived to be about). The ventral circuitry involved with establishing a core affective state not only musters attention toward an object (via the brainstem and basal forebrain; Mesulam 2000; Parvizi & Damasio, 2001) but also enhances visual processing of the object (Amaral et al., 2003; Freese & Amaral, 2005). Via re-entrant processing (Edelman & Tononi, 2000), the sensory features associated with an object, along with the associated affective state and motor consequences, will be perceptually bound together in a conceptualization of emotion. The implication is that perception of an object is

instantiated, in part, by establishing an affective and behavioral stance toward the object.

In addition, object perception may be one way to prime emotion category knowledge in a bottom-up fashion (such that a simulation for the category will be launched). This hypothesis is consistent with the view that simulations can be embedded in one another (Barsalou et al., 2003) so that object representations (that is, simulations of physical objects) very likely contain inferences about the mental states likely to arise in conjunction with the object (Barsalou, 2003).

C-Head Representations of Context

Situated conceptualizations will contain a representation of the psychological situation. Category instances are never represented in isolation. Tight couplings between object representations and situations have been observed (Yeh & Barsalou, 2006), and contextual information is even more important in simulating representations for abstract concepts (Barsalou & Wiemer-Hastings, 2005), like emotion concepts. Information about the relational context (Lazarus, 1991) or a situation's meaning to a person at a particular point in time (Clore & Ortony, 2000) may constitute some of the background information contained in situated conceptualizations of an emotion category that, like objects, may serve to launch a simulation. As a result, the psychological situation does not cause an emotion to be conceptualized – rather, it helps to constitute that conceptualization.

C-Head Inferences about Behavior

Situated conceptualizations will also contain inferences about situated action (i.e., the actions that are needed in a given situation), making it possible, even likely, that conceptual knowledge about emotion can direct behavioral responses. Barsalou (2003) argues that “simulating is for doing,” where “doing” might involve acting on the perceived cause of the emotion, or acting on your own body to manage your internal states and subsequent behaviors. For example, people may have learned that there are a host of different actions that have been associated with the category *anger*. Sometimes it works to yell, sometimes to pound a fist, sometimes to cry or walk away, sometimes to hit. Situated conceptualizations may be thought of as an inference about what will make for successful self-regulation or goal achievement. This is generally consistent with several existing ideas about emotion, including the idea that conceptual knowledge about emotion contains information about appropriate or effective forms of emotion regulation (Barrett & Gross, 2001), as well as the idea that emotions are functional for social behavior (Frijda, 1986; Keltner & Haidt, 1999).

C-Head Emotion Words

Language most likely drives the acquisition of conceptual knowledge about emotion, and may therefore be a crucial element in any conceptualization of emotion. It is possible that people learn to represent emotion in the way that they learn about other abstract concepts for which there are no biological bases. Children acquire emotion categories that conform to their culture, not because there is some natural, biological

reality to *anger* (or *fear*, or *sadness*) but because this level of categorization is socially functional. People may integrate in long-term memory two representations from the same emotion category, even when their surface similarities differ (see Barsalou, Simmons, Barbey & Wilson, 2003) because the label for the emotion links them in memory (see Gelman & Markman, 1987). The emotion words for *anger* (e.g., “angry,” “hostile,” “irritated,” and so on) serve as the glue that integrates a variety of different sensorimotor states into one simulator for *anger*. This generative feature of situated conceptualizations may help to explain why people perceive prototypical emotion episodes even though they seem impossible to capture with the use of scientific instruments.

C-Head Heterogeneity

Finally, situated conceptualizations for any emotion category, such as *anger*, will be heterogeneous, such that packets of conceptual knowledge will vary within a person over instances, as context and situated action demand. No single situated conceptualization for *anger* need give a complete account of the category *anger*. There is not one script for *anger*, but many. On any given occasion, the content of a situated conceptualization for *anger* will be constructed to contain mainly those properties of *anger* that are contextually relevant, and it therefore contains only a small subset of the knowledge available in long-term memory about the category *anger*. Heterogeneity in the perceptual symbols that issue from any emotion simulator will be further enhanced by the production of novel simulations, that is,

representations of things that have never been encountered together (Barsalou, 2003). This is similar to what James (1884) originally proposed.

Heterogeneity in the conceptual system for emotion may explain why consistency and coherence is so difficult to find in actual instances of emotion. In the form of a perceptual symbol or simulation, the mind very likely helps to instantiate bodily responses. Once a simulator for an emotion category, such as *anger*, is established, it is available to re-enact subsets of its content when the conceptualization of anger is needed. All the experienced content for *anger* resides within the simulator for *anger*, so that different combinations can be simulated in a way that is tailored to the specific situation. The *anger* simulator might simulate a conceptualization of yelling on one occasion, running on another, and crying on yet another. In so doing, the conceptual system for emotion (as an aspect of the mind) will yield a partial reenactment of sensorimotor events associated with some prior episode (or episodes) of anger, thereby changing the person's body state. In this account, observed heterogeneity in *anger* responses (or instances of any emotion category) may be a feature of the system, rather than a consequence of imprecise experimental methods or crude measurement tools.

A-Head A Change in Scientific Paradigm for the Study of Emotion

Much of scientific thinking in the 19th and 20th centuries was grounded in Descartes' machine metaphor. The computer analogy that launched the great cognitive revolution within psychology in the middle of the 20th century derived much of its explanatory power from the machine metaphor with great effect, but perhaps also with unfortunate constraints. Embodiment views of the mind relax some of these constraints, allowing us to question whether it is scientifically viable to reify boundaries between the mind and the body, and between what goes on inside a person's skull and what goes on outside. Furthermore, these views intrinsically question the notion that discrete emotions are preformed, stereotyped responses that are triggered within the individual and recognized from without. They allow for the possibility that emotion categories are constructed, not recognized, by the human mind, and that each conceptualization of emotion emerges from an intrinsic interplay between mind, body, and situation. Whether experienced in oneself or perceived in others, emotions may be conceptual acts, so that understanding the structure, content, and function of the conceptual system for emotion is central to understanding what emotions are and how they work.

Despite their Cartesian overtones, several older models of emotion, especially those published in the 1930s, 1940s, and 1950s (rarely cited anymore), contain insights that can be harvested to support such a view (e.g., Duffy, Young, Brenner). One insight is that any instance of emotion can be decomposed into more basic psychological elements (although the elements probably have a dynamic, interdependent relationship as opposed to a linear one). Like Wundt, many of these

theorists specified affect (what some would now call “core affect”) as one such component. A second insight is that ideational content proceeds in concert with the body, and may be what distinguishes an instance of one emotion category from an instance of another. Unlike these models (as well as the appraisal models they spawned), our suggestion is that ideational states help constitute, not cause, an emotional event, and that conventional notions of linear cause and effect are not useful for understanding emotion.

The view that we have outlined here, termed the *conceptual-act model*, is that discrete emotions are perceptual events that emerge in consciousness when core affect is conceptualized as an instance of (what English speakers call) fear, anger, sadness, etc. (Barrett, 2006b; Barrett, Lindquist, Bliss-Moreau, Duncan et al, 2007). Specifically, the experience of feeling an emotion, or the experience of seeing emotion in another person, occurs when conceptual knowledge about emotion is brought to bear to conceptualize a person’s ongoing, momentary state of core affect. The conceptual knowledge that is called forth to conceptualize affect is thought to be tailored to the immediate situation, represented in sensorimotor terms, acquired from prior experience and supported by language. Conceptualizing the flux and flow of core affect as a discrete experience of emotion corresponds to the colloquial idea of “having an emotion.”

Bodily states (as experienced in oneself or observed in others) and representations of psychological situations are very likely perceptually categorized and experienced as a single unified percept, much like color, depth, and shape are

experienced together in object perception. In essence, a conceptualization of emotion may be an example of what Edelman (1989) calls “the remembered present.” In this view, memory is not a neural representation that is stored someplace; it is the re-instantiation of a neural representation that has occurred in the past, so as to allow some replication of behavior or experience. Situated conceptualizations derive from a highly diversified and flexible conceptual system so that any instance of conceptualizing an emotion such as *anger* will entail a highly flexible package of conceptual knowledge that is tailored to the needs of the person in a given situation and is designed for action (Barsalou, Niedenthal et al., 2003; Niedenthal et al., 2005). It is the content of these acts of conceptualization that allow one to see anger or fear in another person, or that make one feeling of anger distinct from another feeling of anger, or different from any feeling of fear.

Together, core affect and conceptual knowledge about emotion constitute a highly flexible system that can account for the full richness and range of experience that makes up human emotional life. The ability to categorize confers some adaptive advantage, and so is likely evolutionarily preserved even if the specific categories are not. Many cultures have similar basic-level emotion concepts (such as anger, sadness, fear, and so on in Western culture), not because these categories have some biological priority but because these concepts are optimal tools for communicating in the type of social environment that humans typically occupy (living in large groups with complicated relational rules).

This view – that an experience of emotion is a state of mind whose content is at once affective and conceptual – is consistent with recent theoretical insights in the neurobiology of consciousness. There is a growing consensus that a conscious experience (e.g., seeing another person as angry, or feeling angry yourself) emerges when a selection of neuronal groups, coding for specific perceptual properties, fire together to form a temporary coalition or assembly of synchronous (“re-entrant”) neural activity (Crick & Koch, 2004; Dehaene & Changeux, 2004; Edelman & Tononi, 2000; Engel & Singer, 2001; Llinas et al., 1998). Reverberating, globally coordinated neural activity of sufficient intensity and duration allows different sensorial features such as color, shape, sound, smell, interoceptive cues, and, as we now suggest, core affect, as well as other cognitive contents like beliefs or memories, to bind together into a single experience (but for a dissenting view, see Dennett, 1991; Zeki, 2003).

Neurobiological models of consciousness also imply that incoming sensory information (such as that which entails a core affective state) modulates a preexisting conscious field rather than generating it anew (Llinas et al., 1998). This stream of core affect can be a background or central feature (ground or figure) of consciousness, depending on where attention is applied. When people focus on some object or situation, they form a mental representation of something in the outside world. In such cases, core affect may be experienced as a property of the object (rather than as one’s reaction to it), but presumably with the potential to influence behavior implicitly (Berridge & Winkielman, 2003; Winkielman et al., 2005). When

core affect is foregrounded, pleasure or displeasure and sensory information from the world are bound in a meaningful way, yielding a mental representation of emotion. This mental event stands for a person's inference about how psychologically meaningful events in the world are causally linked to perceptions of affective feeling. Thus, we suggest that coordinated re-entrant neural activity of sufficient intensity and duration produces a unified conscious content, one type of which is the experience of seeing an emotion in another person, or "having" an emotion yourself.

Finally, an embodiment view not only questions the distinctions between body, mind, and situation, but between cognition and emotion more broadly. Although scientists are very used to thinking about cognitive events (such as thoughts, memories, and beliefs) as separate from emotional events, this distinction is probably phenomenological rather than causal, and may not be respected by the brain (for a discussion see Duncan & Barrett, in press; Duncan & Barrett, 2007). No one would ever mistake seeing for hearing (although one sensory representation might trigger another), but the same cannot be said for feeling and thinking, or even feeling and seeing.

A-Head References

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A-Head Figure Caption

Figure 10.1. A brief history of the role of the body and the mind in emotion.

Footnotes

¹ A fourth approach, involving models that deny a role of the mind in constituting emotion (e.g., behaviorist views; LeDoux, 1996; Watson, 1924; Cannon, 1927), where body states and mental representations of emotion are viewed as spuriously related via their shared cause in the brain (see also Bard, 1928; MacLean, 1949, 1993; Panksepp, 1998), and theories that do not give a role to the body in constituting emotion (i.e., some cognitive views; Ortony, Clore, & Collins, 1988; Smith & Ellsworth, 1985) are not included in the present review.

² In a sense, McDougall's view is similar to James, except that James describes body states as resulting reflexively from the mere identification of a stimulus, whereas McDougall sees them as the result of a more interpretation-infused mental state.

³ The term *core* signifies a form of affective responding that functions as a type of core knowledge (Spelke, 2000) about one's relation to the world that is supported by hardwiring that is present at birth (Bridges, 1932; Emde, Gaensbauer, & Harmon,

1976; Spitz, 1965; Sroufe, 1979), homologous in other mammalian species (Cardinal, Parkinson, Hall, & Everitt, 2002; Schneirla, 1959), and available to consciousness, where it is experienced as feeling good or bad (valence) and, to a lesser extent, as feeling activated or deactivated (arousal; for a review, see Russell & Barrett, 1999). The capacity to experience pleasure and displeasure is universal to all humans (Mesquita, 2003; Russell, 1983; Scherer, 1997). Core affect functions as a neurophysiological barometer of the individual's relation to an environment at a given point in time, with self-reported feelings as the barometer readings (Nauta, 1971). It may also form the core of experience more generally by selecting the contents of consciousness at any given point in time (for discussions, see Barrett, et al, 2007; Duncan & Barrett, 2007; Edelman & Tononi, 2000).