Can an Appraisal Model Be Compatible with Psychological Constructionism?

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In this chapter we argue that the account of emotion we proposed in *The Cognitive Structure of Emotions* (Ortony, Clore, & Collins, 1988) is quite compatible with the psychological constructionist approach to emotion that is the focus of this volume. And we believe this to be true even though our model (now widely referred to as the OCC model) is usually thought of as an appraisal theory. We begin with a brief overview of our model, and then present four sections whose contents relate to the four questions around which the chapters of this book are organized.

The OCC Model

At the most general level, we consider emotions to be affective reactions to significant psychological situations, and we consider affective reactions to be evaluations of any kind, including those that are implicit, automatic, and subcortical, as well as those that are explicit, conscious, and deliberative. For us, evaluation is the sine qua non of emotion. Whereas cognition concerns things such as the presence or absence of attributes, the truth or falsity of propositions, and categorization, emotion concerns the perception of the goodness or badness of things—evaluation. Thus we take it as axiomatic that where there is no (positive or negative) evaluation, there is no emotion.

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1. *If emotions are psychological events constructed from more basic ingredients, then what are the key ingredients from which emotions are constructed? Are they specific to emotion or are they general ingredients of the mind? Which, if any, are specific to humans?*

Emotional reactions differ in both quality and quantity. We have distinguished emotions from non-emotions qualitatively by noting that they are internal (as opposed to external) mental (as opposed to physical) states (as opposed to nonstates, such as actions or dispositions) that primarily focus on affect (as opposed to cognition or behavior). These elements discriminate between good and less good candidates for emotion. Crossed with the degree of affect is another factor, namely, the *kind* of affective condition. We can distinguish four major kinds: emotions and moods (both of which are temporally constrained, the former with an object, the latter without), and attitudes and temperament (both of which are temporally unconstrained, with the former focused on objects, and the latter not). (See Figure 13.2.)

Although our own approach to emotion is an example of an appraisal theory, we see it as compatible also with a constructionist view. It characterizes specific emotions as undifferentiated affect that is constrained by the interpretation of the situation to which it is a response. Moreover, we see emotions as emergent conditions arising from somatic, cognitive, motivational–behavioral, and phenomenal reactions.

2. *What brings these ingredients together in the construction of an emotion? Which combinations are emotions and which are not (and how do we know)?*

Affective reactions are evaluations that can be multiply represented, for example, as embodied, enacted, expressed, and/or experienced evaluations. Emotions are affective reactions to psychologically important situations. A specific emotion reflects the specific nature of the situation it represents. Emotions are therefore psychological events with multiple facets, and like the proverbial blind men trying to describe an elephant, different investigators have tended to focus on different facets—some on physiological events, others on motivational or behavioral events, and still others on cognitive antecedents. These constituents of emotions are not themselves emotions, but jointly they do constitute an emotion. An emotion is a condition that emerges from the co-occurrence of these affective components. Appraisal theories are attempts to specify the kinds of characteristics that make these patterns one emotion rather than another. Identifying the processes responsible for seeing situations as having particular characteristics and for evaluating them as good or bad is not, one might argue, a special problem for emotion theory. Rather, it is a psychological question whose answer should draw on general principles of perception, cognition, categorization, and evaluation.

3. ***How important is variability (across instances within an emotion category, and in the categories that exist across cultures)? Is this variance epiphenomenal or a thing to be explained? To the extent that it makes sense, it would be desirable to address issues such as universality and evolution.***

The similarity or variability across peoples (or organisms) lies in the kinds of situations that different species and individuals (ages, cultures, etc.) within species find (or are capable of finding) psychologically significant. There are, of course, some universals among the kinds of situations with which living creatures must cope, including threat, competition, access to resources, access to mates, group inclusion, nurturance of young, and so on. Whereas the elicitation of some kind of response to threat is presumably universal, group inclusion is more characteristic of some social animals than others. The hypersocial nature of humans, along with our symbolic abilities means that we experience many more (and much more differentiated) emotions than do other animals. Hence, in contrast to traditional views, humans may be more rather than less emotional than other animals. In addition, we argue that emotions are situated, varying in innumerable ways to mark the particulars of the situation represented by the emotion. At the same time, however, there should be no variation in the deep structure of these representations that make a given type of emotion distinctive, and that allow it to organize experience, motivation, memory, and action.

4. ***What constitutes strong evidence to support a psychological construction view of emotion? Point to or summarize empirical evidence that supports your model or outline what a key experiment would look like. What would falsify your model?***

Theories are generally assessed by inspecting the results of empirical tests of their predictions. In the case of constructionist theories of the appraisal variety, however, it is reasonable to ask whether they are testable in this way. The OCC account defines the emotion-eliciting situations for types of emotion, then tries to assimilate emotion tokens (words) to the specification of those psychologically important situations. The relative usefulness of such theories therefore depends on their coherence, comprehensiveness, and ease of application rather than their truth. Moreover, when appraisal theories have been tested, studies most commonly depend on responses to vignettes, which may tell us more about people's theories of emotion than about emotion itself. A problem faced in these tests also is that participants must agree on what constitutes a particular emotion. In addition to such qualitative criteria, however, the OCC model proposes sets of cognitive factors that are expected to govern the intensity of each emotion type. The virtue of such proposals is that they allow the model to be tested quantitatively, because they predict when a given emotion will be intense or mild. To date, only a limited number of empirical studies are available.

(continued)

The main source of "evidence" for the model comes from computer simulations, which serve primarily to indicate the coherence of the theory, its ease of application, and the general plausibility of its predictions and proposals. The model has been widely used as the emotion module in a great variety of games, tutoring programs, and other software involving "believable agents." The realization that artificially intelligent agents must know about and be able to act on emotion knowledge has given rise to a subarea of cognitive science known as "affective computing," within which the OCC model is prominent. None of the "evidence" unique to the theory, however, speaks to whether emotions are emergent or not.

Affective reactions can occur at various levels and in multiple modes ranging from low-level approach–avoidance impulses to complex evaluative judgments, experiences, expressions, and actions. As a result of iterative reprocessing (Cunningham, Dunfield, & Stillman, Chapter 7, this volume; Cunningham & Zelazo, 2007), the situational context and its interpretation give shape and definition to what would otherwise be amorphous, undifferentiated affective responses. Specific emotions differ from each other in terms of the psychological situations to which they are related and the extent to which and the way they are cognitively elaborated. The constellation of key elements in such a situation serves as the object of the emotion, directing and constraining emotional thought and action (Clore & Ortony, 2008).

The OCC model is an attempt to specify these key situational elements precisely, but with sufficient generality to encompass all instances of a given emotion type. That is, it seeks to characterize the structure of the situational construals—the appraisals—that are associated with one kind of emotion rather than another. The structure of the model, therefore, mirrors the structure of the construed situations associated with the different emotion types.[1] Figure 13.1 shows the important features of the model, which organizes and gives the specifications of 22 emotion types (e.g., resentment emotions, pride emotions) in six categories (e.g., fortunes-of-others' emotions, attribution emotions). Associated with each of the 22 emotion types are words (tokens) whose corresponding emotions share the same eliciting conditions. Thus, emotion types such as distress and anger (along with a set of associated tokens; e.g., depressed and sad, and irritation and fury), are evaluative states whose eliciting conditions are focused on the elements of the psychological situations they represent. Examples of such elements are whether the construed situation is about event outcomes or actions and whether such actions are perceived as being one's own or another's.

The OCC model posits three different sources of value on which appraisals are based, and it views the structure of emotional space in terms
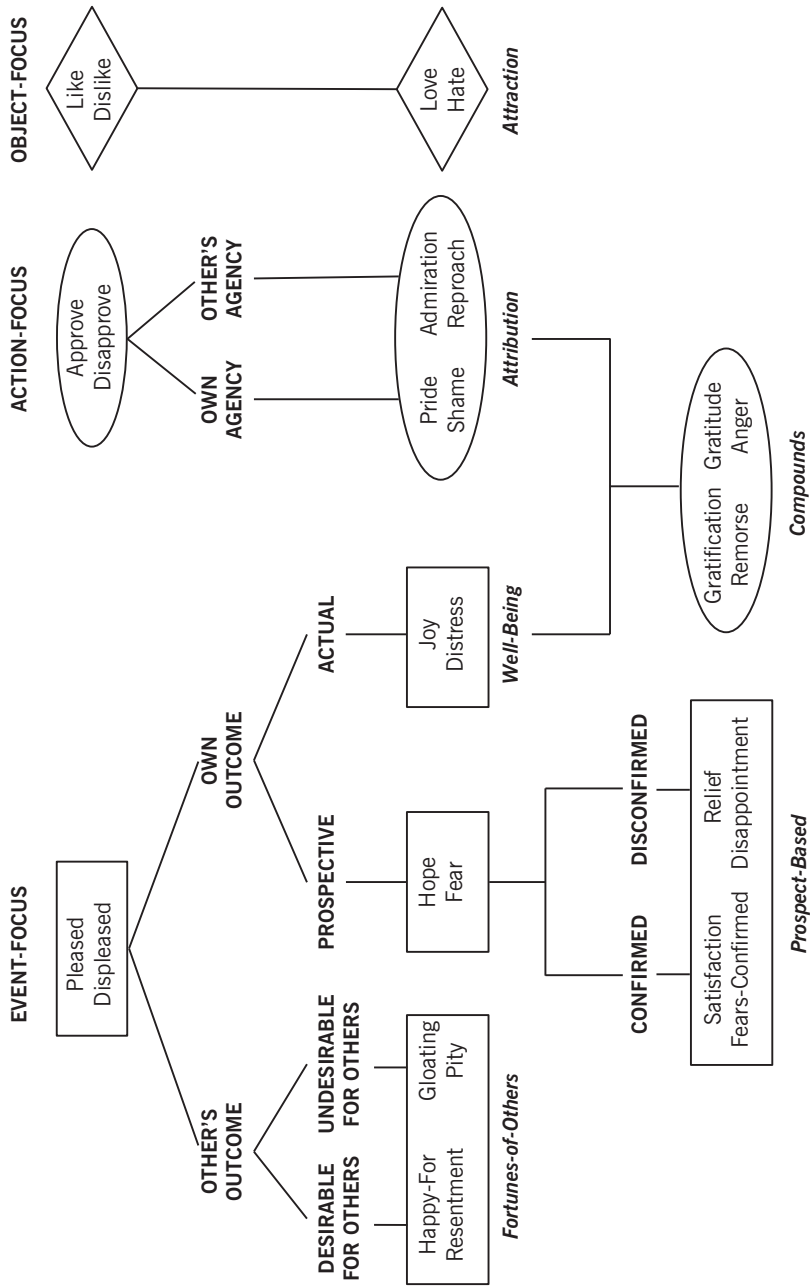
FIGURE 13.1. The OCC model specifies three kinds of affective reactions (in rectangular, oval, or diamond boxes), qualified by attributes of situations (bold type), to form 22 emotions grouped into six families (italic type).

of these sources of value. The most obvious of these sources are goals, including what we have called "active pursuit goals" and "interest goals" (Ortony, et al., 1988, pp. 39–44). However, goals are not the only kinds of value underlying emotions. Emotions are also driven by standards and by tastes. For example, moral outrage concerns not goals but standards, and beauty concerns neither goals nor standards, but tastes. When works of art or pieces of music move us, it is not because they further our goals, but because we find them (and similarly with a variety of more mundane pleasures) satisfying in themselves. In the final analysis, we simply find them appealing. Which of the three kinds of value is involved in a given emotional episode depends on the kind of situation and the focus of one's attention. Depending on the situation, one can attend to the outcomes of events, the actions of agents, the attributes of objects, or some combination of these.

We believe that these three domains of attention are comprehensive, covering anything to which one can attend. Appraisals can therefore concern the *outcomes of events* evaluated as *desirable* (or not) in terms of goals, the *actions of agents* evaluated as *praiseworthy or blameworthy* relative to one or another kind of standard, or the *attributes of objects* evaluated as *appealing* (or not) as a function of one's tastes. These three sources of evaluation yield three kinds of affect that contribute to the distinctiveness of various classes of emotion, namely, being *pleased or displeased* about event outcomes, *approving or disapproving* of the actions of agents, and *liking or disliking* (the attributes of) objects.

The idea that there are different sources of value has been, we believe, a missing piece in the emotion puzzle in most theories of emotion. Being displeased about an event outcome is quite different in experience and implication than disapproving of an action that led to the outcome. And, being displeased about an outcome while disapproving of the action that gave rise to it is different from disliking the person who committed that action. In everyday life, one might feel all of these things in a jumble and perhaps be at a loss to know exactly what one was feeling other than generally negative. One benefit of talking to someone else about how one feels is that one must make some basic distinctions in order to communicate, distinctions that may help one disentangle the various strands of feeling.

Specific emotions are particular forms of these affective reactions. Whether one responds to an outcome with sadness or fear, for example, depends on whether one attends to a known outcome (sadness) or a prospective outcome (fear), and whether one feels sadness or pity depends on whether the undesirable outcome is one's own (sadness) or another's (pity). These qualifying conditions are sometimes referred to as *appraisal dimensions*, but that seems to us a misnomer. They are not dimensions of evaluation but perceived situational qualifications on evaluations. One appraises something by reference to some source of value, although often

not consciously. The qualifying conditions serve to specify the precise object being appraised (Clore & Ortony, 2008).

With this introduction to the OCC account of emotions as a background, in the remainder of this chapter we discuss issues relating to the four questions that were raised by the editors (roughly):

1. Are emotions psychological events constructed from more basic ingredients?
2. If there are such ingredients, which combinations of them are emotions and which are not?
3. Is there variability across and within emotions and people(s)?
4. What sort of evidence can support constructionist (and our own) accounts?

Are Emotions Constructed from Elements?

The question of whether emotions are psychological events constructed from more basic elements has two major parts. The first concerns whether emotions are events as opposed, presumably, to states. We discuss this aspect of the question in the next main section. What we discuss here is the implicit part of the question having to do with what the elements might be. There are several kinds of answers to this, depending on the perspective one takes. As will become apparent as we proceed, there are many ways to cut the pie, but for now we focus on one of the most widely held views, namely, that there exists a small set of privileged emotions, the "basic" or "primary" emotions, which constitutes the foundation of the emotion system.

Could Basic Emotions Be the Elements?

There are many variants of the basic emotion view, but the general idea is that a few emotions—typically, happiness, sadness, fear, disgust, anger, and surprise—have evolved as tightly organized, biological programs for mobilizing adaptive action and, when triggered by distinctive stimuli, they preempt attention and elicit stereotypical feelings, facial expressions, and action tendencies. Most proponents of this position claim that since similar reactions can be seen in not only animals but also quite elemental organisms, these emotions are primitive automatic reactions to eliciting stimuli that are specific to particular species. And since human facial expressions of these emotions are alleged to be recognized the world over, the corresponding emotions are assumed to be basic and universal.

The basic emotions view has been criticized on several grounds (e.g., Ortony & Turner, 1990). For example, there is no plausible account of how

proposed basic emotions relate to the other, "nonbasic," emotions. Another objection is that there is no agreed-upon criterion for deciding which emotions are basic and why, which explains the wide range of basic emotions that have been proposed. For many decades, a favorite criterion of "basicness" has been the universality of associated unique facial expressions (e.g., Ekman, Friesen, & Ellsworth, 1982). However, recent evidence (e.g., Jack, Garrod, Yu, Caldara, & Schyns, 2012) challenges the universality criterion, because even though Westerners do indeed have common mental representations of the facial expressions associated with the six "basic" emotions, Easterners do not. A second, more general problem with the universality criterion is that of a double dissociation: on the one hand, some alleged basic emotions (e.g., Izard, 1977, lists both guilt and shame) are not associated with any universally recognizable facial expressions; on the other hand, some universally recognizable facial expressions are associated with conditions whose status as emotions can be challenged, with surprise being a good example.

As we have already indicated, emotions are quintessentially about evaluation—about goodness or badness. The problem with surprise is that even if we acknowledge that it has a universally recognizable facial expression, surprise is not about the goodness or badness of something. One can have an affectively neutral surprise—something unexpected happens, and one does not care. It is, of course, true that one can have a pleasant or unpleasant surprise, but then it is the pleasant or unpleasantness that makes it emotional, not the surprise itself. Thus, contrary to many of our colleagues and to accepted wisdom in emotion theory, our view is that despite its important and undeniable contribution to emotional intensity (which makes it a good candidate for a constituent of emotions), because surprise is not inherently good or bad, it is not itself an emotion, let alone a basic emotion. It violates the principle we mentioned at the outset, namely, that where there is no evaluation, there is no emotion.

The basic emotions view is part of a long tradition in psychology of attempting to frame explanations solely in bottom-up terms (Clore & Ortony, 2008). We believe, however, that cognitive, social, linguistic, and cultural factors (e.g., Jack et al., 2012) must be seen not merely as domains in which emotions are expressed but as formative parts of emotions. If so, solely bottom-up views will not suffice. We now know that higher processes are not simply the flowering of low-level processes. They also regulate what happens at early stages of processing (e.g., Phelps, Ling, & Carrasco, 2006; Ochsner & Gross, 2005), and such processes are iterative and constructive over time (Cunningham & Zelazo, 2007). Nevertheless, in spite of the various difficulties confronting the basic emotion view, and in spite of the skepticism expressed by several theorists (e.g., Barrett, 2006a), a recent special issue of *Emotion Review* devoted to basic emotions indicates that the idea is still alive and well. However, partly, but not just for the kinds of

reasons discussed earlier, we see no prospect of basic emotions serving as the elements out of which all (other) emotions are constructed. Basic emotions cannot serve the constructionist enterprise.

Given our reservations about the whole idea of basic emotions, and therefore about their candidacy as the building blocks of all other emotions, might not emotions have other, "nonbasic" emotions as constituents? Leaving aside the fact that this would have no explanatory value because it leads to an infinite regress, what raises this possibility is the fact that an emotion can sometimes be the object of another emotion. For example, one might feel ashamed (or even angry) that one had been angry. However, most of the time, emotions do not have other emotions as their objects, and even when they do, being the object of an emotion is not the same thing as being a constituent of an emotion. In fact, more often than not, it is not a "whole" emotion that is the object, but the fact that one outwardly expressed or revealed an emotion. Furthermore, there are constraints on which emotions can be the object of other emotions—a topic that to the best of our knowledge has not been seriously studied. In any event, the fact that an emotion can sometimes be the object of another emotion does not invalidate our claim that emotions do not have other emotions as constituents.

At first blush, our denial that some of the fundamental constituents of emotions are themselves emotions might seem problematic, because in OCC we had discussed a class of emotions that we characterize as "compound emotions." These involve an amalgam of the eliciting conditions of two other emotions. But, again, we did not claim that these compound emotions have emotions as *constituents*. Our claim was, and is, that these emotions, which can be roughly characterized using the words *gratitude, anger, gratification*, and *remorse*, are actually the emotions that arise from the conjunction of two kinds of eliciting conditions, not the mixing of two distinct emotions wherein one emotion has the other emotion as a constituent.

Constructionism

Although ours is an appraisal approach, we are certainly committed to the idea that emotions are emergent interactions of various (non-emotional) constituents, and this we see as the hallmark of the constructionist view of emotions (e.g., Gross & Barrett, 2011). Thus, from our perspective, the two views are perfectly compatible. However, Gendron and Barrett (2009) distinguish between a constructionist view, which they embrace, and an appraisal view, which they do not. One explanation for why they see the two views as being at odds with each other is that they view appraisal theories as characterizing the *causes* of emotions, which to them implies that emotions exist as *entities*—entities that can be triggered or activated

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by the appraisals that precede them. We share their reluctance to embrace this position, but we are nevertheless comfortable with the appraisal label, because our version of appraisal theory does not assume that appraisals are causal antecedents of emotions but that appraisals are constituents of emotions (Clore & Ortony, 2008). Instead of viewing emotions as tightly organized, evolved modules, as do basic emotion theorists, we, like Barrett, Russell, and their colleagues (e.g., Barrett, 2009; Barrett, Wilson-Mendenhall, & Barsalou, Chapter 4, this volume; Russell, 2003; Chapter 8, this volume) subscribe to a componential constructionist view. And while we are happy to consider ours to be an appraisal theory, we note that Russell (and Barrett, too, notwithstanding her rejection of it by implication) is in fact committed to the appraisal theory idea, at least insofar as it holds that specific emotions can be distinguished from each other on the basis of the psychological situations in which they arise.

We have argued that our appraisal view is quite compatible with a psychological construction approach to emotion. However, just as there are many variants of the basic emotions view and many variants of appraisal theories, so too are there many variants of constructionist approaches. In order to assess more carefully the relationship between the two approaches, we have chosen to take Russell's (2003) seminal article "Core Affect and the Psychological Construction of Emotion" as a paradigmatic example of the constructionist approach. The gist of Russell's version of the constructionist approach is that affective conditions of all kinds (see Clore, Ortony & Foss, 1987; Ortony, Clore & Foss, 1987) are rooted in simple feelings of pleasure and displeasure. This "valence" dimension, when crossed with an "activation" dimension (ranging from excited to sleepy) yields a space that Russell refers to as "core affect"—a consciously accessible neuropsychological feeling state.

What makes Russell's view one of psychological construction of (specific) emotions is the fact that additional ingredients need to be entered into the mix. In the case of a "full-fledged" emotion, Russell identifies these additional ingredients as *perception of affective quality, attribution to the object* (of the emotion), *appraisal, action, emotional meta-experience*, and *emotion regulation*. One might argue about whether this is overkill—about whether emotion regulation, for example, is an ingredient of a prototypical emotion—but the general idea that in addition to core affect, emotions have constituents that are not themselves emotional or affective is one that we share. In fact, although we have never proposed an analysis of core affect that comes close to the level of detail that Russell provided, we have nevertheless championed a similar idea in several places. For example, in Ortony et al. (1988, p. 20, emphasis added), we wrote,"The particular words 'pleased' and 'displeased' represent the best we can do to find . . . English words that refer (only) to the *undifferentiated affective reactions*." Similarly, Ortony and Turner (1990), in their critique of basic emotions,

observed that specific emotions are best thought of as specializations of more amorphous affective states resulting from the involvement of different combinations of elements that are not themselves emotions. And more recently, Ortony, Norman, and Revelle (2005) argued that full-fledged emotions are cognitively elaborated and interpreted feelings, and that at rock bottom, these feelings comprise simple unelaborated affect, which they called "proto-affect," and which is restricted to the here and now.

Finally, to see the similarity between Russell's elements and our own view, we should mention that we have in various places (e.g., Clore & Ortony, 2000; Ortony, 2009) proposed a general model in which a typical emotion is an affective condition having four major components—an interpretive–cognitive, a motivational–behavioral, a somatic, and a subjective–experiential component. The cognitive component involves representations (sometimes consciously accessible and sometimes not) of the emotional meaning and personal significance of emotion-relevant situations. The motivational–behavioral component involves desires and inclinations to act (or not) relating to the interpretations of such situations. The somatic component concerns autonomic and central nervous system activity and their visceral and musculoskeletal effects, including changes in body-centered feelings (Damasio, 1994), as well as the neurochemical and neuroanatomical processes involved in emotions. And finally, the subjective–experiential component involves the subjective feelings of emotion—a component that is probably especially elaborate in humans, generally involving an awareness of an amalgam of feelings, beliefs, desires, and bodily sensations, as well as efforts to label the emotion. We refer to these four as components rather than as effects of emotion, because we consider emotion to emerge from these separate reactions to psychologically important situations rather than being caused by (or causing) them (Clore & Ortony, 2008).

Thus, it seems to us that we have long held the essence of the psychological construction view, namely, that emotions are made up of, or are the emergent result of (Coan, 2010; Coan & Gonzalez, Chapter 9, this volume) the interaction of various non-emotion components. To be sure, Russell has his constituents and we have ours, but they are not entirely mutually exclusive. For example, Russell proposes an action component, which in spirit is similar to our motivational–behavioral component, and his emotional meta-experience is in many ways similar to our subjective–experiential component. On the other hand, Russell seems to view appraisal theories as subscribing to some sort of temporal sequencing of events. For example, he claims that appraisal theories often take appraisal to be a "cognitive computation that occurs after the antecedent and before the emotion" (Russell, 2003, p. 161). Our view is that the emotion is the *ongoing interaction* of its constituents rather than a process that unfolds in a particular temporal order.

As we said earlier, there are many ways in which one can cut the pie—the OCC model cuts it one way and our four-components view cuts it another (and in the next section we reveal yet another). Nevertheless, provided that it is always the same pie, each way of cutting it is as legitimate as any other, just as is the perspective of each proverbial blind man describing the proverbial elephant. In summary, we should reiterate that notwithstanding some minor concerns, we are in substantial agreement with the psychological construction view advocated by Barrett and Russell and colleagues. In fact, we consider our own position to exemplify that view.

Constituent Combinations

Emotions versus Non-Emotions

If we ask which combinations of constituents are emotions and which are not, we are essentially addressing the question of what are the boundary conditions of emotions. The need to do this should be obvious, but in our case it is particularly important, because of our claim that some purported emotions, such as surprise, are not emotions at all, let alone basic ones. A theory of emotion, and indeed of emotion constituents, that does not (need to) include a state such as surprise in its coverage is likely to differ in important ways from a theory that does. This being the case, if we are to address the question of the relation between element combinations and emotions, it would seem wise to have some idea about how to distinguish emotions from non-emotions, which amounts to asking the age-old question (James, 1884) "What is an emotion?"

An early project of ours (Clore & Ortony, 1988; Clore et al., 1987; Ortony et al., 1987) involved using both theoretical and empirical methods to examine the referential status of some 500 English affective terms that had appeared in discussions of emotions in much of the then extant literature (e.g., Averill, 1975; Bush, 1973; Dahl & Stengel, 1978; Russell, 1980). Troubled by the fact that many of the terms in such discussions seemed not to refer to emotions at all, we sought to determine which words in what we called the "affective lexicon" were examples of emotions (e.g., *afraid, angry, happy*) and which were not (e.g., *tearful, sleepy*), and why. Furthermore, we were leery about committing ourselves to the view that all words in our corpus referred to states, so we chose to think in terms of the less constrained superordinate concept of *conditions*, some of which (e.g., *confident, exasperated, gratified*) are easily seen as states, whereas others (e.g., *attractive, despicable*) are not. The results of our efforts led us to conclude that good examples of emotion terms all refer to internal mental as opposed to physical (e.g., *breathless, jittery*) or external (e.g., *ridiculous, alone*) conditions. Of the mental conditions, some, such as *interested* and *perplexed*, that we referred to as cognitive conditions, and others,

such as *argumentative, careful*, and *submissive*, that we called cognitive-behavioral conditions, we deemed to be devoid of any significant affect. This left us with three main groups of conditions that had clear affective content: affective-behavioral conditions (e.g., *cheerful*), affective-cognitive conditions (e.g., *encouraged*), and affective states (e.g., *grateful, disappointed*). Of these, it seemed clear that the best emotion terms shared a primary focus on affect or evaluation, rather than on cognition or behavior[2]—they were the "pure" affective states, and the best examples of emotions. A focus on affect means that as opposed to being simply evaluative in one way or another, the focus is on different kinds of goodness and badness.

While we concluded that good examples of emotion are states that focus primarily on affect, with less-good examples being tinged with cognition or behavior, there are three other important affective conditions—moods, attitudes, and temperaments—that can be differentiated from emotions and each other in terms of two sets of constraints (see Figure 13.2). Specifically, moods are object-diffuse, undifferentiated affective states (e.g., Clore & Ortony, 2000; Ortony et al., 2005)—they are not cognitively elaborated, and they lack a salient object. Affective conditions become mood-like to the extent that they are about things in general rather than about whatever might have been their original cause. So emotions tend to have salient objects, and moods do not, but both are relatively short-lived. By contrast, attitudes and temperaments are generally much more enduring. But like emotions, attitudes have specific objects, whereas temperaments, like moods, are not about anything in particular and hence have broad rather than targeted effects. It is interesting to note (although beyond the scope of this chapter) that many emotion words (e.g., *happy, angry, sad*) refer not only to emotional states but also to traits (which contribute to temperament) and to moods.

	Affective Conditions	
	States (temporary conditions)	Dispositions (enduring conditions)
Object Salient (i.e., intentional)	**Emotions**	**Attitudes**
Object Diffuse (i.e., nonintentional)	**Moods**	**Temperament**

FIGURE 13.2. The temporal and object constraints on four affective conditions. Note: The sense of *intentionality* in this figure refers to the notion of *aboutness* (i.e., the object that the mental condition is about).

Where Does Affect Come From?

Given our view that the foundation of emotions is not other emotions, we have to deal with the question of where affect comes from. It has to come from somewhere. Our basic answer is that the source of affect is always one of the three kinds of value identified in OCC, namely, goals, standards, and tastes. These three taken together are reminiscent of what Nico Frijda (e.g., 1986) refers to as "concerns," although he believes (personal communication, August 22, 2011) that the notion is "one of the worst elaborated and investigated notions that we have." On the other hand, he goes on to say that concerns are "what others describe as 'major goals,' as 'values,' as 'instincts,' or 'needs.'" So we are quite willing to refer to our goals, standards, and tastes, as concerns. As we go about our daily lives, many, but not all, of the experiences we encounter touch our concerns, some directly and some indirectly, some powerfully and some weakly. We might see a parent inappropriately smacking his or her child and feel a little uncomfortable. Why? Perhaps because what we see conflicts with our standards about decent and reasonable ways to treat children. We might get caught in an unexpected downpour and get soaked to the skin on a cool and windy day, and this might cause us to feel irritated and upset because our latent desire (goal) to stay comfortable is thwarted. Depending on who we are, and the details of the two situations just described, the intensities of the emotional responses to these situations are likely to be different, but both are emotional responses.

Central to the OCC model is the idea that these different kinds of value subserve different classes of emotions. Each source of value, when engaged, often leads rapidly and automatically to one of the three corresponding kinds of undifferentiated affect, because it is already part of our perception and comprehension of what we experience. Just as when we perceive one line in the Müller–Lyer illusion as being longer than the other, we see it *as* being longer—directly and immediately—and thus directly perceive what, in a sense, is an already (mis)interpreted reality, so too the affective reaction to a personally relevant object can be simple, direct, and immediate. So, for example, consider how one might react to the taste of rancid butter. It is quite simple; if it tastes rancid—spit it out! We do not have to taste it as bad and subsequently elaborate it as a rancid bad (even though that is indeed possible). We taste it *as* rancid, and experience disgust immediately and without inference (see, e.g., Zajonc, 1980). Something's tasting rancid is a particular way of that thing tasting bad. One might say that it is directly perceived as elaborated badness.

As with tastes, goals and standards can participate in emotions directly. We are not saying that it is impossible to get into a particular emotional state by doing a great deal of cognitive work first, but we are saying that undifferentiated affect routinely finds itself elaborated by ongoing

perceptual and cognitive processes. We express it in this rather awkward way in an attempt to avoid the implication that we are talking about sequential processing. To repeat, when we speak of undifferentiated affect being cognitively (and perceptually) elaborated, we do not mean that the elaboration follows (although sometimes it can); we mean that the undifferentiated affect is augmented with details. To understand what we have in mind, imagine a color picture of a rustic scene. If we were to describe it as a picture of a rustic scene elaborated with color (clumsy, but not incorrect), we would not mean that first there was a picture that was subsequently colored; we would mean that the color was *part of* the picture. This is the sense of "elaborated" that we have in mind when we speak of elaborated undifferentiated affect. Another way of putting all of this is to say that different emotions are different and more or less detailed ways of feeling good or bad. Fear, shame, and disappointment are simply different ways of feeling bad, and pride, joy, and relief are different ways of feeling good.

Whereas we locate the sources of affect in the three kinds of values, Russell (2003), grappling with this problem in the context of tastes, came to a rather different conclusion. His position is that what he calls affective quality (valence) is *inherent in the object*. Affective quality is, he wrote, "a property of the thing perceived. It is the garden that is lovely, the stench that is offensive, and the tune that is joyous" (p. 157). We, on the other hand, view the perception of the smell and taste as rapid forms of appraisal. It cannot be that the badness of the smell is inherent in the object—the odor it emits can be, but its badness cannot, because its badness presupposes a perceiver. It must somehow have been evaluated—appraised. Russell's view is that the perception of affective quality is a "cold" process, whereas we view it as simply a matter of the degree to which the object is evaluated or appraised as being positive or negative. To use an analogy, a joke is not intrinsically funny. To be funny, a joke has to be perceived as such by someone. Similarly, a foul taste is not intrinsically foul. It is foul to those who dislike it, but not to those who do not. Infants dislike bitter tastes; many adults do not. The bitterness is not intrinsically negative.

Are Emotions States or Events?

In discussing our work on the affective lexicon, we were careful to talk of "conditions" rather than "states," even though our conclusion about genuine emotion terms was that they referred to (purely) affective *states*. Given the linguistic perspective that we were taking in that work, characterizing emotions as states seems to us to be a perfectly defensible position, but from the psychological, experiential perspective, we perhaps need to be a little careful in this regard, even though in everyday language we generally talk about emotions as states. The problem is that *state* implies a static entity, which in turn makes it easier to think in terms of stable constituents. It is

true that thinking of emotions as states does indeed capture some aspects of emotion, but only at the cost of failing to capture others, the most important of which is the fact that emotions change over time (Frijda, Ortony, Sonnemans & Clore, 1992), not only with respect to their intensity, but also, concomitantly, in the role and nature of their facets. This fact tends to get lost if we conceptualize emotions as states. Consider a case of anger in which a person has been annoyed by someone but over time grows less angry. In this case, the motivation somehow to harm the offending person diminishes, and the accompanying somatic aspects of the emotion change. This suggests that there is utility in thinking of emotions as mental *events*. It may still make sense to think of them as states, but before explaining why we think this is so, it is perhaps worth considering what it means to construe emotions as events (see also Barrett, 2006b).

We like to think of emotions as one thinks of earthquakes. In the case of an earthquake, there is some initiating event—the movement of tectonic plates of sufficient significance to have some measurable consequences. In the case of an emotion, the initiating event is the construal of something in one's world of sufficient significance to have perceptible (affective) consequences.[3] The earthquake itself might last only a few seconds, but we do not think of it as a state. Apart from its magnitude, it has various (other) facets—changes in geological and geographical morphology; changes in the behavior of animals, before, during, and after the movement of the plates; and implications for lives and property. And finally, earthquakes usually have aftershocks, which, in the case of emotions, are equivalent to emotion-initiating events having emotional consequences after a period of quiescence. Presumably we do not need to spell out further the parallels in order to make the case that it is easy to think of emotions as events unfolding in time.

There are two clear advantages of not losing sight of the time course of emotions. First, it encourages serious attention to the sources of changes in emotional intensity. This is an issue we took very seriously in the OCC model, where we devoted an entire chapter to an analysis of the variables that can influence intensity. Many of these variables (e.g., arousal, unexpectedness, proximity) are also candidates, albeit again from a different perspective, for constituents of emotions. A second advantage of taking the dynamic quality of emotions into account is that it allows us to better understand the effects of emotions on behavior. An emotion involves responses to some situation in the world perceived to be relevant to the experiencer's concerns. The rise time of these reactions can be fast or slow; the experienced feelings may persist for a long time or a short time, even while changing from moment to moment; and they can dissipate quickly or slowly. And, importantly, the effect on the behavior of the experiencer or on others interacting with the experiencer will be influenced by where the emotion is in its temporal trajectory at the moment a decision is made

or an action is taken. Imagine a woman becoming increasingly frustrated with her uncooperative employee. The employee, seeing this, might well refrain from defending herself, because she believes that to do so would probably make matters worse. On the other hand, if the employee views her boss as calming down, she might be more willing to risk putting forward her explanation or defense. In such situations, the employee is taking into account her (possibly implicit) beliefs about whether the anger of her boss is waxing or waning, and using this information to make a decision about what to say or do, and when and how. Thinking of the emotion only as a stable uniform state would not help us understand how it might contribute to decision making in this way. All this means that if one is trying to model the effects of emotion on behavior, the model should take into account the effect of timing on behavior, including the point in, and the recent history of, the temporal course of the emotion—that is, whether the emotion is waxing, waning, or relatively stable.

So, when we think of emotions as states, we need to remember that we are restricting ourselves to a relatively stable portion of an emotional event. Of course, we can always talk meaningfully about an emotional state if we think in terms of a momentary snapshot of an event in much the same way as a single frame in a film strip is a representation of a frozen moment, although, as we have just seen, the danger here is that the "snapshot" loses the temporal context. In any event, whichever way one looks at it, it is worth bearing in mind that when we talk of emotional states, the "whole thing" is not static; it changes over time (cf. Cunningham & Zelazo, 2007). Sometimes this can be important, since it has implications for behavior.

Another Analogy

We mentioned earlier that there are many ways to cut the emotion pie, and have subsequently discussed various kinds of constituents as we moved from one perspective to another. In the context of the OCC model, we have touched on the issue from both the structural and the intensity perspectives. From the former we get a more course-grained view of constituents than we get when we consider intensity. The broader, structural perspective gives us one of the three kinds of value, augmented by cognitive and perceptual constituents that represent details of the psychological situation, such as whether a standards-violating action is construed as being one's own or another's. Meanwhile, thinking of candidate constituents from the point of view of intensity variables gives us more specific candidates to explore. But then we also discussed our four-components view in which, under normal circumstances, every emotion is undifferentiated affect augmented with not only perception and cognition but also three other interacting components (somatic, behavioral–motivational, and subjective–experiential). And from a linguistic perspective we again saw a distinction between pure affect and

cognition and behavior. This perspective allows us to see how the different components get reflected and emphasized or deemphasized in language. None of these different perspectives are at odds with one another; they merely *are* different perspectives, and whichever perspective we take, we generally arrive at the same point, namely, that different components are constantly interacting with each other to give the emergent subjective experience of an emotion—the way it feels—but this, too, we regard as a component, because it can feed back into the entire system and change it. For us, it is these interactions that constitute the process of element "combination."

Traditionally emotion has been viewed as an entity that *causes* the various emotional indicators such as expressions, feelings, and thoughts. However, the failure to find much coherence among them (e.g., Barrett, 2006a; Lang, 1968; Mauss & Robinson, 2009) suggests that this view is inadequate. Our view is that the most profitable way of thinking about the relation between emotions and their various manifestations is to adopt the kind of syndrome approach that is used to think about diseases. In the case of a disease, multiple events constitute the disease, rather than the disease existing separately and causing its symptoms. Similarly, an important psychological event occasions multiple reactions, which together constitute the emotion; the emotion has no separate existence. It all boils down to whether one focuses on some biopsychological representation of a situation as the emotion, which then causes other manifestations or, alternatively, whether one focuses, as we do, on the psychological situation itself, to which many subsystems respond and jointly constitute the emotion. Thus, the question is whether an important situation causes emotions, which then causes symptoms of that emotion, or whether an important situation causes multiple representations of the importance of that situation, which jointly constitute the emotion. On this latter view—our view—rather than a threat causing an emotion, which in turn causes threat-related thoughts, threat-related feelings, and threat-related physiology, to perceive something as a threat is to have some complex of threat-related thoughts, feelings, and physiology, the co-occurrence of which constitutes fear (Clore & Ortony, 2008).

Emotion Variability

In contrast to the basic emotions view, we assume that of the infinite number of emotions, none are basic in the sense of being the basis of all others.[4] In our view, emotions are representations of the value and urgency of significant psychological situations. Such representations are multimodal, potentially involving experience, expression, cognition, action, and other affective representations. The reactions that comprise emotions play an

important role in regulating perception, thought, and behavior, all helping the individual to cope with or otherwise manage the situation represented.

Unlike the traditional view, ours locates the major constancies that distinguish one emotion from another in the kind of psychological situation that each represents, rather than in the feelings, expressions, thoughts, and actions that might be involved. Threats of loss are marked by fear-like states, and in that we see no variation. Thus, in the OCC account, fear-like reactions involve being *displeased at the prospect of an undesirable event* (Ortony et al., 1988). How one reacts to such prospects should vary with the precise nature of the event deemed undesirable. Fearing that one's savings will be wiped out in a serious economic recession will elicit different thoughts, feelings, and actions than fearing injury from a bear in the woods. We, of course, are a species for whom worrying about losing life savings is a possibility, whereas for other species it is not. From our perspective, what this means in terms of emotion variability is that which emotions can be experienced by a species (or by an individual for that matter) depends on what situations can be perceived as being psychologically important; in the particular case of fear (or anxiety),[5] it depends on what counts as the prospect of an undesirable event.

Presumably, organisms with similar biology represent common problems in similar ways. Just as the eye of the frog is adapted to its unique mode of feeding, so the approach and avoidance tendencies of different species are adapted to the relation between their basic biologies and the different kinds of stimuli likely to be encountered in their environments. Unlike the dung beetle, humans are repelled by rather than attracted to bodily waste. But attraction and repulsion are presumably basic dimensions of motivation for all behaving organisms, and the things that are attractive are usually also the stimuli that afford a species sustenance and safety as opposed to depletion and danger. Addressing animal emotions, LeDoux (2012) has recently proposed that a more fruitful strategy than trying to find human emotions in animals would be to look in humans for the basic survival circuits of animals that contribute to distinctively human emotions. In the process, he proposes an approach to emotion that is compatible with a constructionist view.

Although the similarity or variability in emotions across organisms (and people) lies in the kinds of situations that different species (and individuals within species) find psychologically significant, there are, of course, some universals among the kinds of situations with which living creatures must cope, including things such as threat, competition, access to resources, access to mates, group inclusion, nurturance of young, and so on. These are elements of the kinds of situations that elicit approach–avoidance motivation, affective reactions, and emotions. It is the obstacles and opportunities relative to these kinds of important situations that are universal and stable in affective reactions and emotions. There is, however, considerable

variability across species, cultures, and individuals in how they respond to them.

For some creatures, important stimuli are innately "valued" in that they are reliably approached or avoided (e.g., amoebas approach light). As organisms become more complex, they exhibit fewer such tropisms or built-in evaluations. Despite the fact that human adults everywhere tend to respond negatively to snakes and spiders, neither humans nor other primates fear them innately (LoBue & DeLoache, 2008; Mineka, Davidson, Cook, & Keir, 1984). Accordingly, there is variation across individuals and groups in what humans find good and bad. Such variation is apparent both in reactions to stimuli that are concrete (e.g., whether dogs, cockroaches, snails, or pigs are good to eat) and to those that are abstract (e.g., what is considered holy, heretical, or blasphemous). There is, then, some variation among cultures and individual humans in the stimuli that elicit particular emotional reactions.

At another level, however, we expect all instances of a particular emotion type, such as fear, to be similar. The appraisal theorists of the 1980s sought to capture those similarities by writing elicitation rules for each of the common emotions (e.g., Ortony et al, 1988; Roseman, 1984; Smith & Ellsworth, 1985). There is some disagreement about whether such elicitation conditions are best thought of as "causes" (e.g., Roseman, 1984) or characterizations of emotions (Ortony et al., 1988). In the OCC model of emotion, for example, we specify the eliciting conditions of fear as *the prospect of an undesirable event*, and the emotion type, fear, as *displeasure at the prospect of an undesirable event*. These statements might suggest that perception of threat comes first and that fear then emerges as one becomes displeased, but as indicated earlier, we see no substantive difference between the perception of a threat with its different components and the emotion of fear. To us, it seems reasonable to say that something akin to the prospect of an undesirable event outcome (or the detection of threat) is a part of what we mean by fear, rather than a separable cause of fear. In any case, OCC is an account of the *structure* of emotions, not the *process* of emotion elicitation.

In a related way, and to return to our disease analogy, *amoebic dysentery* refers to the presence of a pathogen and its attendant bodily symptoms, not to either the pathogen or the symptoms by themselves. *Disease* can be defined as a change away from a normal state of health to an abnormal state in which health is diminished. Both normality and health, like emotions, are emergent conditions. Health is not some "thing" that can be caused by or that can cause other things. It is not an agent or an entity but an emergent condition. If the major biological systems are functioning in the normal range and a person experiences no symptoms and shows no signs of disease, he or she is healthy. But if he or she develops a fever, digestive problems, and particular amoebas are detected in the blood, then

the person is no longer healthy—he or she has amoebic dysentery. Did that cause the loss of health? No. Rather than being a separate entity that might cause the loss of health, the fact of dysentery *is* the loss of health. And so it is with emotions; when someone with a furrowed brow reports feeling tense and having ruminative thoughts, that person is worried or afraid.

Emotion Specificity

In contrast to the idea that emotions such as fear, shame, and sadness have universal and fixed attributes, including distinctive expressions, feelings, cognitions, and behaviors, we assume that specific instances of these reactions are likely to be somewhat variable in their components and manifestations, not only across individuals but sometimes even within individuals. This conclusion follows from our view of emotions as situated affective reactions. They are situated in that each instance of a given emotion necessarily occurs in some particular situation at some particular point in time, so that however similar to other occurrences, each is nevertheless unique. Beyond its logical necessity, such a seemingly mundane claim about the particularity of emotions has important consequences.

As discussed earlier, moods are affective conditions with few cognitive, perceptual, or situational constraints. One feels positive or negative or irritable, but a mood is not necessarily about the situation in which one finds oneself, and sometimes it is not *about* much of anything. Specific emotions, on the other hand, have cognitive, perceptual, and (therefore) situational content. So emotions of sadness have to do with displeasure about undesirable event outcomes, whereas fear-like emotions involve displeasure over the prospect of an undesirable outcome, and disappointment is displeasure about the nonoccurrence of an anticipated desirable outcome, and so on. That is, each emotion can be thought of as an affective reaction (e.g., displeasure) occasioned by a different kind of situation. But more than that, each instance of an emotion type is situated, in that it has a specific object—it is about something; it is intentional (in the philosophical sense).

Because emotions are affective states occurring at specific times with specific objects, they can direct attention, thought, and action in ways that moods and other undifferentiated affective states cannot. So when one feels uneasy or anxious, one does not know exactly what to do. Full-fledged emotions, on the other hand, because they reflect the particulars of the situations in which they occur, motivate more specific thoughts and actions. Psychologists have never been terribly successful at specifying the motivations involved in specific emotions. Fear in general involves an inclination to withdraw or escape, but beyond that, not much can be said. But fear of one's investments losing value has motivational and behavioral implications that can be better specified. Emotions do not exist in the abstract. They occur in specific situations, at specific times, in people with specific

histories, expectations, desires, and so on. It is this limitless specificity that makes each emotion and each emotional moment different from the next, and it is this difference that makes the specificity impactful and consequential. So if we ask, "What does fear do to people?", our answer is that it depends on who they are, where they are coming from, and of what they are afraid. The important, impactful, consequential aspects of emotion—the reason we care one way or the other about understanding emotions—is that they are emergent from lives lived in situations in real time, in moments that are rarely, if ever, repeated. And when the moment is gone, and the ephemeral constituents of an emotion are gone, the emotion is gone as well. With reference to the current question, such considerations argue that instances of a given emotion type are likely to be quite varied, especially in humans.

Theory Validation

Appraisal and Testability

One criterion for assessing the value of a theory is whether it is testable and generates research. The claims of various appraisal theories, including those of Frijda, Roseman, Scherer, and Smith and Ellsworth, have been subjected to empirical tests. A common approach to testing such theories has been to compute correlations between potentially important factors and self-reported emotions. Much of this research, however, has been based on emotion vignettes in which participants indicate how they think they would respond under specified, imagined conditions or how they remember (or misremember) past situations and their emotions. Such research can be rightly criticized for saying more about people's concepts of various emotions than about the actual conditions for emotion elicitation. More fundamentally, however, one can ask questions about whether theories focused on emotional appraisal really have much empirical content at all (Smedslund, 1991). The OCC account, for example, proposes eliciting conditions of classes of emotion types that are essentially abstract but systematic statements of the necessary, but not necessarily sufficient, conditions for the associated emotions to occur. Thus, the OCC account says that emotions of, for example, the relief type involve being *pleased at the disconfirmation of the prospect of an undesirable event*, which is a large part of what is meant by the term *relief*. Therefore, one might complain that research aimed at determining whether people really do report relief when they are pleased that an anticipated bad outcome did not come to pass would be as uninformative as research aimed at seeing whether all bachelors really are unmarried. On the other hand, failures of predictions from appraisal theories sometimes do lead to changes in emotion characterizations (e.g., Roseman, Antoniou, & Jose, 1996). Even formulations that are essentially

definitional can be shown to be inadequate by finding conditions that are seen as valid instances of a given emotion but that fall outside the characterization.

Having said this, we should mention that the OCC approach does make some genuine empirical claims. One large-scale attempt to test aspects of the account involved an examination of the emotions of fans of college basketball (Clore, Ortony, & Brand, 2006). We collected data from fans during a whole season before, during, and after games, asking a variety of questions about the quality of play, predictions about whether the team would win, and participants' specific emotions at the time of their occurrence. Data from wins and losses were analyzed separately, but both produced analyses of postgame emotions that clustered into three groups, including (goal-based) event-focused emotions, a separate set of (standards-based) emotions in response to the quality of play of the team, and (taste-based) emotions having to do with the degree of liking or disliking of the coach. The results were encouraging, since the theory specifies these three different sources of value based on these same categories of outcomes, actions, and objects. Moreover, the same result was obtained independently in both win and loss data.

Another problem is that adequate testing of appraisal theories is often limited by the need for research participants to understand and agree on the qualitative distinctions between such related states as resentment and anger, or sympathy and pity. One way around this limitation is to focus research on intensity, a quantitative rather than a qualitative aspect of emotion (Frijda et al., 1992). The OCC approach makes predictions about the variables that govern the intensity of emotions, in addition to the conditions that constitute them. It hypothesizes that emotions with a common set of cognitive and situational specifications should be governed by a common set of intensity variables. The theory therefore makes intensity predictions that allow quantitative comparisons that are inherently less ambiguous than the solely qualitative comparisons typical of many appraisal theories. For example, questions about *how much* anxiety or guilt is experienced in one situation compared to another are more empirically tractable than questions about whether the experience is one of anxiety or guilt.

Observations about emotional intensity can also provide a quantitative basis for assessing hypotheses about the structural relationships among different emotions. For example, suppose research designed to identify determinants of intensity finds that the intensity of anger is best predicted by people's perceptions of both the severity of a bad outcome and how much some agent was deemed responsible for that outcome. Finding that the intensity of anger is determined by both of these factors would support structural claims that typical cases of anger involve a joint focus on outcomes (appraised as undesirable) and actions (appraised as blameworthy). Hypotheses about emotional intensity therefore put some empirical meat

on the theoretical bones of the OCC account. And, of course, evidence that different combinations of elements yield different emotions also supports a constructionist account of emotion.

Computational Modeling

Although the OCC model could serve as the basis for many predictions relating to element combinations and emotion intensity, disappointingly few have been examined in psychology. Instead, most of the "evidence" for the model comes from computer science. The cognitive revolution of the 1970s and 1980s broadened the horizons of psychologists, allowing them to examine the mental processes involved in thought and behavior. But even at the beginning, Herbert Simon (1967) argued that a cold cognitive approach would not be adequate. He noted that emotions play a pivotal role in regulating cognitive processing by altering one's processing agenda.

Subsequently, Donald Norman (1981) proposed that 12 major challenges would have to be met for the new cognitive science to be a success, and he included emotion as one of those challenges. About this same time, we began working on the OCC model, and one of our goals was to develop an account of emotion that, at least in principle, would be implementable on a computer. The idea was not to have computers feel emotions, of course, but for intelligent computational agents to be able to reason and make appropriate inferences about emotional situations (e.g., O'Rorke & Ortony, 1994).

In the intervening years, computer scientists have sought to develop "believable agents" (e.g., Ortony, 2003) that can display emotions and respond appropriately to the emotions of others. *Affective computing* (Picard, 2000) has become an umbrella term for these and other efforts to include emotion-relevant capabilities in artificially intelligent systems. The idea is to build computer systems that can recognize emotion in text, speech, and behavior, and to endow virtual characters with some emotional competence to help them interact with humans and other agents more successfully.

The field has now reached a point where emotion generation and recognition models are regularly used to enhance the emotional, social, and practical intelligence of autonomous virtual characters in all kinds of domains, but perhaps most notably in video games—a domain that now constitute a multibillion dollar industry.[6] To be effective, a working model of emotion must allow virtual agents to make plausible inferences about the emotions, desires, and intentions of others during social interactions. Many virtual agents have been fashioned not only to act but also to look somewhat life-like, and big increases in computing power have opened up new possibilities. Since emotions and their detection and expression are important in regulating decision, thought, actions, and interactions for

real humans, they are also important for virtual humans and for human–computer interaction.

In conclusion, just as collecting theory-supporting data from psychological experiments cannot establish the veracity of a theory, neither can embedding a psychological theory in a computational model. However, embedding a theory into working models can be a strong test of a theory, and indeed this is a well-accepted principle in cognitive science. There are two general reasons why computational modeling of a theory like OCC is a powerful test. First, if the theory is precise and formalizable, it is at the very least coherent, and one test of whether a theory is precise and formalizable is that it can be implemented. Then, barring major weakness in these respects, failures offer the prospect of improving the theory, as has happened with OCC (e.g., Steunebrink, Dastani, & Meyer, 2009). Second, if the emotion-related behavior exhibited by a computational device or virtual agent in which a theory is embedded is plausible and consonant with people's intuitions, it is reasonable to conclude that at least in some important respects, and at some reasonable level of description, the theory is doing a good job of accounting for (and predicting) behavior. In this respect we believe that the OCC model has been a success. It has clearly resonated with computer scientists, and it is by far the most cited psychological work in the field of affective computing. As Bartneck and Lyons (2009) put it:

> the OCC model . . . has established itself as the standard model for emotion synthesis. A large number of studies [have] employed the OCC model to generate emotions. . . . Many developers of [embodied] characters believe that this model will be all they ever need to add emotions to their character (pp. 36–37).

And indeed, the OCC model has been used by hundreds of researchers in affective computing and in hundreds of applications ranging from modeling students' emotions while they learn (e.g., Katsionis & Virvou, 2005) to simulating agents in agent-based combat scenarios (Van Dyke Parunak, Bisson, Brueckner, Matthews, & Sauter, 2006), to giving emotional comfort to victims of cyberbullying (van der Zwaan, Dignum, & Jonker, 2010), to sentiment analysis in text (e.g., Shaikh, Prendinger, & Ishizuka, 2009). Its widespread adoption and apparent success in computational modeling contexts leads us to believe that, at least in some respects, the OCC model is on the right track.

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NOTES

1. The reason we speak of emotion "types" is that we think it important to acknowledge differences between various tokens of the same emotion type. For example, the fear or anxiety one might experience at thinking one might have made a bad investment is likely to be qualitatively (as well as quantitatively) different from the fear or anxiety one might experience when anticipating a biopsy result that might portend cancer. Nevertheless, both are tokens of the type "fear."

2. The three groups are roughly isomorphic with the classical trilogy of affection, conation, and cognition (e.g., Hilgard, 1980).

3. This raises the question of perceptible to whom (e.g., when a person observes that another is angry without the other acknowledging or even recognizing his or her anger). This is a complicated issue. Unfortunately, a proper discussion of it is beyond the scope of this chapter.

4. In fact, we would be willing to ascribe some sort of special, "basic" status to the two forms, one positive the other negative, of what we have referred to as undifferentiated affect (for a detailed discussion, see Ortony, Norman, & Revelle, 2005).

5. Although OCC makes no distinction between fear and anxiety (and at the level of granularity of being displeased at the prospect of an undesirable event, justifiably so), we think it important to note that from a biological perspective there are good reasons to believe that they are distinct (e.g., Gray & McNaughton, 2000). They have distinct neural substrates and are modulated by distinct classes of drugs (McNaughton & Corr, 2004).

6. According to the Entertainment Software Association website (*www.theesa.com*), consumers spent almost $20.77 billion on video games, hardware, and accessories in 2012.

REFERENCES

Averill, J. R. (1975). A semantic atlas of emotion concepts. *JSAS Catalog of Selected Documents in Psychology, 5*, 330 (Manuscript 421).

Barrett, L. F. (2009). The future of psychology: Connecting mind to brain. *Perspectives on Psychological Science, 4(4)*, 326–339.

Barrett, L. F. (2006a). Emotions as natural kinds? *Perspectives on Psychological Science, 1*, 28–58.

Barrett, L. F. (2006b). Solving the emotion paradox: Categorization and the experience of emotion. *Personality and Social Psychology Review, 10*(1), 20–46.

Bartneck, C., & Lyons, M. J. (2009). Facial expression analysis, modeling and synthesis: Overcoming the limitations of artificial intelligence with the art of the soluble. In J. Vallverdu & D. Casacuberta (Eds.), *Handbook of research on synthetic emotions and sociable robotics: New applications in affective computing and artificial intelligence* (pp. 33–53). Hershey, PA: IGI Global.

Bush, L. E. (1973). Individual differences multidimensional scaling of adjectives denoting feelings. *Journal of Personality and Social Psychology, 35*, 50–57.

Clore, G. L., & Ortony, A. (1988). The semantics of the affective lexicon. In V. Hamilton, G. H. Bower, & N. H. Frijda (Eds.), *Cognitive perspectives on emotion and motivation* (pp. 367–397). Dordrecht, The Netherlands: Kluwer.

Clore, G. L., & Ortony, A. (2000). Cognition in emotion: Always, sometimes, or never? In L. Nadel, R. Lane, & G. L. Ahern (Eds.), *The cognitive neuroscience of emotion* (pp. 24–61). New York: Oxford University Press.

Clore, G. L., & Ortony, A. (2008). Appraisal theories: How cognition shapes affect into emotion. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 628–642). New York: Guilford Press.

Clore, G. L., Ortony, A., & Brand, S. (2006). *The joy of victory and the agony of defeat: The emotions of sports fans*. Unpublished manuscript, University of Virginia, Charlottesville, VA.

Clore, G. L., Ortony, A., & Foss, M. A. (1987). The psychological foundations of the affective lexicon. *Journal of Personality and Social Psychology, 53*, 751–766.

Coan, J. A. (2010). Emergent ghosts of the emotion machine. *Emotion Review, 2*, 274–285.

Cunningham, W. A., & Zelazo, P. D. (2007). Attitudes and evaluations: A social cognitive neuroscience perspective. *Trends in Cognitive Science, 11*, 97–104.

Dahl, H., & Stengel, B. (1978). A classification of emotion words: A modification and partial test of de Rivera's decision theory of emotion. *Psychoanalysis and Contemporary Thought, 1*, 261–312.

Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain.* New York: Avon Books.

Ekman, P., Friesen, W. V., & Ellsworth, P. (1982). What emotion categories or dimensions can observers judge from facial behavior? In P. Ekman (Ed.), *Emotion in the human face* (pp. 39–55). New York: Cambridge University Press.

Frijda, N. H. (1986). *The emotions*. Cambridge, UK: Cambridge University Press.

Frijda, N. H., Ortony, A., Sonnemans, J., & Clore, G. (1992). The complexity of intensity: Issues concerning the structure of emotion intensity. *Review of Personality and Social Psychology, 13*, 60–89.

Gendron, M., & Barrett, L. F. (2009). Reconstructing the past: A century of ideas about emotion in psychology. *Emotion Review, 1*, 1–24.

Gray, J., & McNaughton, N. (2000). *The neuropsychology of anxiety.* Oxford, UK: Oxford University Press.

Gross, J. J., & Barrett, L. F. (2011). Emotion generation and emotion regulation: One or two depends on your point of view. *Emotion Review, 3*, 8–16.

Hilgard, E. R. (1980). The trilogy of mind: Cognition, affection, and conation. *Journal of the History of the Behavioral Sciences, 16*, 107–117.

Izard, C. E. (1977). *Human emotions*. New York: Plenum Press.

Jack, R. E., Garrod, O. G. B., Yu, H., Caldara, R., & Schyns, P. G. (2012). Facial expressions of emotion are not culturally universal. *Proceedings of the National Academy of Sciences, 109*, 7241–7244.

James, W. (1884). What is an emotion? *Mind, 9*, 188–205.

Katsionis, G., & Virvou, M. (2005). Adapting OCC theory for affect perception in educational software. In *Proceedings of the 11th International Conference on Human–Computer Interaction*, Mahwah, NJ: Erlbaum.

Lang, P. J. (1968). Fear reduction and fear behavior: Problems in treating a construct. In J. M. Shlien (Ed.), *Research in psychotherapy* (Vol. 3, pp. 90–102). Washington, DC: American Psychological Association.

LeDoux, J. (2012). Rethinking the emotional brain. *Neuron, 73*, 653–676.

LoBue, V., & DeLoache, J. S. (2008). Detecting the snake in the grass: Attention to fear-relevant stimuli by adults and young children. *Psychological Science, 19*, 284–289.

Mauss, I. B., & Robinson, M. D. (2009). Measures of emotion: A review. *Cognition and Emotion, 23*, 209–237.

McNaughton, N., & Corr, P. J. (2004). A two-dimensional neuropsychology of defense: Fear/anxiety and defensive distance. *Neuroscience and Biobehavioral Reviews, 28*, 285–305.

Mineka, S., Davidson, M., Cook, M., & Keir, R. (1984). Observational conditioning of snake fear in rhesus monkeys. *Journal of Abnormal Psychology, 93*, 355–372.

Norman, D. A. (1981). Twelve issues for cognitive science. In D. A. Norman (Ed.), *Perspectives on cognitive science* (pp. 265–295). Hillsdale, NJ: Erlbaum.

Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in Cognitive Sciences, 9*, 242–249.

O'Rorke, P., & Ortony, A. (1994). Explaining emotions. *Cognitive Science, 18*, 283–323.

Ortony, A. (2003). On making believable emotional agents believable. In R. Trappl, P. Petta, & S. Payr (Eds.), *Emotions in humans and artifacts* (pp. 189–211). Cambridge, MA: MIT Press.

Ortony, A. (2008). Affect and emotions in intelligent agents: Why and how? In J. Tao & T. Tan (Eds.), *Affective information processing* (pp. 11–21). Berlin: Springer.

Ortony, A., Clore, G. L., & Collins, A. (1988). *The cognitive structure of emotions*. New York: Cambridge University Press.

Ortony, A., Clore, G. L., & Foss, M. A. (1987). The referential structure of the affective lexicon. *Cognitive Science, 11*, 341–364.

Ortony, A., Norman, D. A., & Revelle, W. (2005). Affect and proto-affect in effective functioning. In J. M. Fellous & M. A. Arbib (Eds.), *Who needs emotions: The brain meets the robot* (pp. 173–202). New York: Oxford University Press.

Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions? *Psychological Review, 97*, 315–331.

Phelps, E. A., Ling, S., & Carrasco, M. (2006). Emotion facilitates perception and potentiates the perceptual benefits of attention. *Psychological Science, 17*, 292–299.

Picard, R. W. (2000). *Affective computing*. Cambridge, MA: MIT Press.

Roseman, I. J. (1984). Cognitive determinants of emotion: A structural theory. In P. Shaver (Ed.), *Review of personality and social psychology: Vol. 5. Emotions, relationships, and health* (pp. 11–36). Beverly Hills, CA: Sage.

Roseman, I. J., Antoniou, A. A., & Jose, P. J. (1996). Appraisal determinants of emotions: Constructing a more accurate and comprehensive theory. *Cognition and Emotion, 10*, 241–277.

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161–1178.

Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review, 110*, 145–172.

Shaikh, M. A. M., Prendinger, H., & Ishizuka, M. (2009). In J. Tao & T. Tan (Eds.), *Affective information processing.* (pp. 45–73). Berlin: Springer.

Simon, H. A. (1967). Motivational and emotional controls of cognition. *Psychological Review, 74*, 29–39.

Smedslund, J. (1991). The pseudoempirical in psychology and the case for psychologic. *Psychological Inquiry, 2*, 325–338.

Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal. *Journal of Personality and Social Psychology, 48*, 813–838.

Steunebrink, B. R., Dastani, M. M., & Meyer, J.-J. C. (2009). The OCC model revisited. In D. Reichardt (Ed.), *Proceedings of the 4th KI Workshop on Emotion and Computing: Current research and future impact* (pp. 40–47). Paderborn, Germany: Kuenstliche-intelligenz Society.

van der Zwaan, J., Dignum, V., & Jonker, C. (2010). Simulating peer support for victims of cyberbullying. In *Proceedings of the 22nd Benelux Conference on Artificial Intelligence* (pp. 1–8). Luxemburg: University of Luxembourg.

Van Dyke Parunak, H., Bisson, R., Brueckner, S., Matthews, R., & Sauter, J. (2006). A model of emotions for situated agents. In H. Nakashima, M. P. Wellman, G. Weiss, & P. Stone (Eds.), *Proceedings of the 5th International Joint Conference on Autonomous Agents and Multiagent Systems* (pp. 993–995). New York: ACM Digital Library.

Zajonc, R. (1980). Feelings and thinking: Preferences need no inferences. *American Psychologist, 35*(2), 151–175.