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# Breaking the World to Make It Whole Again: Attribution in the Construction of Emotion

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## Abstract

In their cognitive theory of emotion, Schachter and Singer proposed that feelings are separable from what they are about. As a test, they induced feelings of arousal by injecting epinephrine and then molded them into different emotions. They illuminated how feelings in one moment lead into the next to form a stream of conscious experience. We examine the construction of emotion in a similar spirit. We use the sensory integration process to understand how the brain combines disparate sources of information to construct both perceptual and emotional models of the world even as the world continues to change. We emphasize two processes: affect segmentation (isolating the felt component of an emotion) and affect integration (recombining this feeling with its object).

**Keywords**
affect, appraisal, emergence, emotion, misattribution, prediction

Emotions are experienced universally by people in every place, period, and culture. Where there are humans, there are emotions. They are a cornerstone of the human experience, playing a central role in how people communicate their experience ("I was upset when she left me") and explain their behavior ("I didn't answer him because I was angry"). Emotions take center stage in virtually every story ever told, regardless of whether the story is ancient or modern and whether it is a cartoon or a literary classic. Indeed, research indicates that the one key requirement for narratives to be considered stories is that they have emotional content—readers have to care about what happens (Brewer & Lichtenstein, 1982).

Investigators have long sought the biological bases of emotions, but the fruits of that search have generally been disappointing (for a review, see Cacciopo, Berntson, Larsen, Poehlmann, & Ito, 2000). In 1962 Schachter and Singer attempted to reconcile the palpable nature of emotional experiences with the lack of evidence for distinct physiological underpinnings by separating affect, the felt, evaluative component of emotion from what the emotion is about. According to Schachter and Singer's two-factor theory of emotion, physiological arousal, the visceral component, is common to all emotions, which precludes differentiating them on physiological grounds (1962). But, emotions can be distinguished, they argued, by their cognitive content, or what they are about. In this view, variation among emotions lies in the different meaning and significance attached to similar experiences of physiological arousal.

Integral to Schachter and Singer's (1962) two-factor theory of emotion are attributions, unconscious inferences about the causes of psychological states (Heider, 1958). Schachter and Singer proposed that arousal becomes an emotion when it is attributed to an event in the world. Attribution gained popularity in social psychological research in subsequent decades, where it was frequently applied to binary decisions, such as whether a behavior was attributed to a person or to the situation (e.g., Ross, 1977) or whether failure was attributed to lack of ability or lack of effort (e.g., Dweck, 1986). The subtlety, power, and beauty of Schachter and Singer's characterization of attributional processes were realized in these and many other applications. In this article, we revisit and expand upon their compelling account of how implicit attributional processes give structure and meaning to the flow of events.

## Overview

### *Minds as Instruments of Navigation*

All organisms, including people, can be understood as means for genes to survive and replicate. Survival and reproduction

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require organisms to obtain and manage a variety of resources. Organisms that remain stationary, like plants, have relatively static environments, whereas the environments of animate organisms necessarily change as they move through the world. Brains evolved because genes were too slow to accommodate real-time movement. Only species that move have brains.

The environment is rich with information that organisms can exploit to navigate the world efficiently. The simplest relationships between brains and the world are reflexive, where specific information triggers particular responses or sequences of responses known as "fixed action patterns." For example, people flinch when an object, such as a frisbee, rapidly grows in their visual field.

With increasing environmental complexity, rigid minds preprogrammed with a reflex for every situation cease to be practical. Conditioned responses afford more complicated interactions between brain and world. They may occur when two events or pieces of information repeatedly co-occur in space and time. One event can become associated with a second event so that the reactions that the first event elicits also come to be elicited by the second event. The reaction involved may be motoric, such as flinching, or psychological, such as an affective reaction.

Simple associations cease to be effective when there is no one-to-one correspondence between objects in the world and their value for a person's survival and reproduction. This is especially evident in social situations. A smile, for example, has a very different meaning in response to another's misery than in response to another's friendly wave. To afford further flexibility under these circumstances, responses are decoupled from environmental information so that similar events can be responded to differently, depending on other internal and external information. Thus, something can be edible without eliciting eating behavior until an organism needs energy; that is, until it is hungry.

The value of complex situations depends on the implications for an organism's resources, including their social resources. Affect is a universal evaluative currency, situated between perception and action, that represents any event, action, or object in the environment in terms of the same two dimensions. The valence dimension of affective reactions conveys information about whether something should be approached or avoided, and the arousal dimension conveys urgency. Rather than being dedicated to particular kinds of responses, affect confers value on whatever response is currently most accessible (Clore, Gasper, & Garvin, 2001). In this process, positive affect acts like a green light, or "go" sign that reinforces dominant responses, whereas negative affect functions as a red light or a "stop" sign that inhibits current inclinations. We draw heavily on the logic of the *affect-as-information* account of the role of affect in judgment and thought (e.g., Huntsinger, Isbell, & Clore, 2014; Schwarz, 2012). In this account, as in Schachter and Singer (1962), affect is separable from what it is about, and affect and its object are linked by implicit attributions. The great advantage of these frameworks is that they transform emotion from an inexorable primal force into a state that is flexible in form and impact. Affect and emotion can therefore play roles in a wide range of psychological phenomena from the deployment of attention to the generation of creative thought.

Through association and conditioned responses, people learn the values of a wide range of situations, including those they have yet to encounter (Zajonc, 1980). Such sets of associated values provide a kind of affective map of one's world. Normally, people rely on their unconscious affective map of conditioned and associative values. This map allows them to conserve resources by navigating the world on autopilot until more complicated and urgent situations arise. But, when arousal is high, affective information is likely to be represented in multiple modalities. These modalities are a diverse array of functionally independent cognitive systems for planning behavior, conscious thought, communicating affect through facial expressions, etcetera. The co-occurrence of similar affective representations in multiple modes constitutes an affective state, such as a mood or emotion and generally creates an emergent conscious experience (e.g., of happiness). Such full-blown emotional reactions can be metabolically expensive and are therefore reserved for important events signaled by high arousal.

## *A Roadmap*

> Experience, from the very first, presents us with concreted objects, vaguely continuous with the rest of the world . . . These objects we break asunder and reunite.
>
> William James, *The Principles of Psychology* (1890/1950)

To emphasize the large amount of information constantly bombarding people, William James famously referred to a baby's world as "a buzzing, blooming confusion." What sometimes gets lost is that James was interested in how ordinary people, let alone infants, make sense of their surroundings. The world contains information sampled through the senses and the constantly changing visceral sensations brought on by incoming sensory information. This sampled data is noisy and incomplete, but it makes up the totality of what people know about their immediate environment. The nature of the event, or what it is about, must be inferred from the data itself even as the world continues to change. To survive and reproduce, people have to navigate the world quickly while wasting as few precious resources as possible. James proposed that people parse their complicated, constantly changing world into manageable pieces to construct a model on which they can act. But why would one pull the world apart only to put it back together again?

When situations are too complex for reflexive action, sense data provides clues to the nature of an event. But sense data is initially uncategorized and incomplete, so the human mind must identify existing clues in a process we refer to as *segmentation*. Segmentation is imperfect, and the mind occasionally treats information from different events as parts of a single event, creating in the process an event in the mind that does not actually exist in the world, an illusion. Nevertheless, segmentation is basic to perception and understanding. But even if the relevant sensory information has been identified through segmentation, information about the nature of events that might produce that sense data is also needed in order to construct a working model of the world. We refer to this second process as

*integration*. The processes of segmentation and integration are constantly active as the mind uses the past to make sense of the present.

In summary, human minds are prediction machines that sample continuously changing information to construct a model of the world to guide action (Friston, 2010). In this article, we propose a model that highlights the roles of segmentation and integration in the construction of emotions, which are models of the resource-relevant consequences of current situations. Before introducing segmentation and integration in this novel context, we highlight these processes in a better understood domain: the perception of speech sounds.

## Perceptual Segmentation and Integration

The adaptive problems humans faced as they evolved shaped the architecture of the mind. Among these adaptive problems were identifying speech sounds and constructing emotions from incomplete, noisy, unlabeled sense data. As similar adaptive problems, identifying speech sounds and constructing emotions may be met with similar adaptive solutions. The problem posed by both these tasks is that the mind is too slow to interpret its changing surroundings from scratch in a bottom-up fashion. Instead, the mind relies on context and existing knowledge to help interpret sense data. Top-down processes therefore play an important role in both of the tasks proposed by William James in the opening quote: parsing inputs into events (segmentation) and constructing a meaningful model of the world (integration). Minds thus rely on segmentation to determine how to punctuate information from the senses to reflect events in the world, and on integration to interpret that information by drawing on knowledge structures that have been tuned by experience.

### *The Perceptual Segmentation Problem*

When trying to identify a speech sound, people use every bit of relevant information at their disposal to compensate for the noisy and incomplete signal available to them. For example, people glean information from speakers' faces as they talk (MacDonald & McGurk, 1978). But, to combine sources of information, the brain needs to solve the segmentation problem: determining which auditory signal goes with which visual signal. In other words, one must determine which sources of information correspond to the same speech sound.

### *An Accessible Perceptual Segmentation Principle*

Under ideal circumstances, people would match incoming auditory and visual information to stored representations of speech sounds and select the closest match. But segmentation must occur quickly, because the speaker may continue to speak. This requires a decision rule for segmenting based on features of the auditory and visual input that are readily accessible. By "readily accessible" we mean that the information is available with minimal additional processing, making its use computationally efficient and therefore metabolically cheap. One such cue concerns timing. A sound and a visual input are treated as originating from the same event if they occur within 250 milliseconds of each other (van Wassenhove, Grant, & Poeppel, 2005). This temporal window serves as a rule for determining which streams go together and which do not. Electrophysiological studies suggest that integration occurs as early as the onset of cortical processing (Molholm et al., 2002). That means that minds combine information before identifying the auditory and visual inputs. Such quick, top-down processing allows brains to stay ahead of the world, but it is also a source of error.

### *Errors in Segmentation Produce Illusions*

When auditory and visual information from different events are combined, which can be understood as attributing one of these sources to the wrong speech event, illusory experiences can occur following integration. One such illusion, which has been induced in experimental settings, is the McGurk effect (McGurk & MacDonald, 1976). When people speak, different speech sounds are created by obstructing airflow at different locations to varying degrees. The McGurk effect occurs when someone hears a bilabial sound, for example, "B," where air is obstructed at the lips, but sees a video of an individual making a velar sound, for example, "G," which is much further back. If the video of the "G" and the sound of the "B" both occur within 250 milliseconds, one hears a new percept, a "D," that does not correspond to either the auditory or the visual input, but is instead a fusion of the two (van Wassenhove et al., 2005). Illusions such as the McGurk effect shed light on the segmentation principles people employ. When we discuss affective reactions, we argue that, like the McGurk illusion, affect misattribution is an error in segmentation.

### *Integration of Past and Present*

To identify a sound, people compare representations of what they just saw and heard to existing knowledge structures in the brain. Because auditory and visual information are sourced from different aspects of the world and are therefore incommensurate, the knowledge structures are represented in terms of the motoric aspects of producing a sound. These knowledge structures, shaped by evolution and constrained by learning from personal and cultural experiences, limit the space of possible sounds, allowing people to categorize sounds quickly and hence to communicate.

### *Summary*

The structure of our speech perception system was shaped by the challenges of recognizing speech in a noisy natural environment. Since people rarely hear perfect examples of speech sounds, they recruit visual areas of the brain to disambiguate and identify speech sounds. Visual and auditory information from the same event are not self-identifying so people rely on rules of thumb, including timing and location, in order to decide

when particular sets of auditory and visual information correspond to a single event. These decision rules for solving the segmentation problem rely on superficial features for speed, and so create room for error including illusory experiences, when combining different sources. The McGurk effect, where people hear a sound that was neither seen nor heard, is an example of such a phenomenon. Once people know which sounds and visuals to combine, the inputs are integrated by mapping both sources of input onto existing knowledge structures enabling quick identification of speech sounds (Hickok & Poeppel, 2000). We believe that the emotion construction process recruits similar mechanisms to solve a similar kind of problem, as we see next.

## Segmentation and Integration in Emotion

Minds are structured by the recurrent problems that organisms face during the struggle to survive and reproduce. Because interpretations of emotional situations and perceptions of speech sounds present similar adaptive challenges, we use speech perception as a model for understanding the construction of emotions. People rely on a segmentation principle to determine which fluctuations in feeling correspond to the situation to be evaluated. Sometimes they parse the world incorrectly and attribute their affect to the wrong source, a kind of affective illusion. To integrate the past with the present, people rely on cognitive structures shaped by evolutionarily recurrent situations and tuned by the environment in which they live. The newly constructed representation is composed of responses from disparate systems, but is experienced as a single unified experience of emotion. We refer to these ideas collectively as the "FORM" model of emotion, which specifies the tasks the mind has to complete. The mind *fragments* the world, *organizes* its relationship with the world, and *represents* that relationship in multiple bodily and cognitive subsystems in the service of *movement* or action. This multilevel representation is consciously experienced as an emotion. We also review some of the misattribution literature, including the now classic work of Schachter and Singer (1962), to show how this framework can organize existing findings and suggest fruitful avenues for research. As indicated earlier, minds are prediction devices designed to flexibly produce appropriate actions for particular situations. Instead of being guided by a series of production rules that specify what to do in different circumstances, human minds operate from a working model of the world that allows the person to anticipate the next moment. Importantly, these models generally include affect. Consistent with the affect-as-information account of affective influence (Schwarz & Clore, 1983), we view valence and arousal as value and urgency information, which allow affect to serve as a common currency for representing value in multiple, otherwise disparate cognitive domains.

To predict the present from the past, two processes have to take place: segmentation and integration. As situations unfold, people parse their constantly changing stream of feelings in terms of its relevance to a particular event—the affect segmentation problem. The complement of affective segmentation is affective integration in which affective information is integrated into an emotional model of the situation that affords action. The affective significance of the situation is represented in multiple modalities (e.g., facial expressions, posture, thoughts, sympathetic nervous system activity, etc.). Like visual and auditory inputs, these modalities are incommensurate, but the need for mutually intelligible representational formats is circumvented because each subsystem responds to situations independently and represents affective meaning differently. Although conscious experience tends to unfold serially, many unconscious processes operate concurrently. Since there is a premium on responding to the world quickly, segmentation and integration frequently occur concurrently.

### *The Affect Segmentation Problem*

The first step in constructing an evaluative judgment is identifying the affective reaction a situation caused. Because extraneous factors, including wakefulness and physical exertion, can obscure the arousal produced by the attended situation, the mind relies on changes in affect rather than its absolute magnitude. However, people cannot summarily ignore the feelings they bring to a situation. Affective segmentation processes, then, determine how much of any recent change in affect is a reaction to the event being evaluated. From constantly changing feelings in response to an environment that is itself in a state of flux, people construct discrete emotional events, which then guide behavior. What segmentation rule does the unconscious mind use to determine which experiences go together and which do not?

### *The Segmentation Principle and Its Role in the Misattribution of Arousal*

Segmentation in the affective domain is subject to the same temporal and resource constraints as segmentation in the context of speech perception: as people try to make sense of the world, the present quickly becomes the past and new events occur. Because of the protracted nature of events, the previous moment is the best guide for understanding the present. The default assumption is that the present moment is a continuation of the previous moment unless there is evidence to the contrary. Thus, mistakes are unlikely when two consecutive events are actually parts of a single larger event. But how are unrelated situations separated?

Careful comparisons of temporally proximal situations would be costly and too slow to enable rapid decision-making. Minds therefore rely on readily accessible features to distinguish situations. Misattribution stems from a failure to distinguish an event from the event that preceded it. An affective response to the amalgamated events would constitute an affective illusion not unlike the McGurk effect.

### *Instantiating the Segmentation Principle*

The segmentation principle can potentially be instantiated neurologically as various combinations of accessible features, each

corresponding to a different decision rule that could have evolved. Ortony, Clore, and Collins (1988) proposed a model that distinguishes emotions based on the type of situation they represent. Their framework provides potential decision rules, because it separates different emotions in terms of simple, accessible features, such as whether an outcome is one's own or someone else's, whether it occurred in the past or has not yet occurred, and so on. If two feelings occur in response to different kinds of events, they would then be treated as separate, each requiring its own emotional representation. Suppose, for example, that someone meets a close friend at his aunt's funeral. If the individual is upset, but feels a little better upon seeing the friend, the mind would not treat the reaction to the funeral as a part of the reaction to the friend because representations of objects are distinguished from representations of persons.

While such rules are specific enough for distinguishing different emotions, they may not be sufficiently nuanced to distinguish instances of the same emotion, such as whether two experiences of anger are a part of a single protracted emotion. To the extent that patterns of error reflect the structure of the cognitive system, a failure to distinguish instances of the same emotion might provide ways of testing relevant predictions, including which "mistakes" people make and how well a hypothesized decision rule identifies situations in which misattribution occurs. In the succeeding sections, we describe a series of predictions made by the FORM model and highlight relevant findings.

## *Misattribution Frequently Occurs When Affect Lacks an Object*

The brain's default operating principle is to combine affect when the decision rule is not precise enough to differentiate two situations. As a result, feelings of arousal or mood alone should be susceptible to misattribution. Examples include the arousal manipulations used by Schachter and Singer (1962) and the mood effects reported by Schwarz and Clore (1983), in which people reported being more satisfied with their lives when nice weather enhanced mood.

## *Affect Can Be Misattributed Indefinitely*

Studies such as the Schwarz and Clore (1983) well-being study have shown that attributing moods to judgment-irrelevant causes can prevent mood from influencing judgment. Thus, asking about the effects of a sound-proof experimental room (Experiment 1) or of nasty weather (Experiment 2) turned the diffuse feelings of mood into specific reactions to the room or the weather. When participants were then asked about their life satisfaction, that affect was irrelevant, in that it was experienced as an evaluation of a sound-proof room or the weather. In contrast, when judgments were made before affective segmentation had occurred, participants misattributed their affect as their degree of life satisfaction. Our account predicts such misattribution as long as the segmentation rule is not specific enough to differentiate potential objects of affective reactions.

For example, if an unfortunate child is pushed out of a lunch line by another child, then has his lunch money stolen by a second child, and then is punished for some small rule infraction, the child might fail to parse the resulting anger into separate parts, instead attributing all of the anger to whichever event happens to be in focus at the time.

The segmentation rule also fails to separate two unrelated events when the first event is temporally distal enough for one's emotional reaction to have dissipated into a mood.

## *Misattribution in the Real World*

***Mood and anxiety disorders.*** Misattribution might also be responsible for some of the symptoms of mood disorders. Anxiety, depression, and bipolar disorder, for example, are characterized by fluctuations in feeling and mood that are partially independent of events in the world. Manic individuals sometimes engage in problematic behaviors involving money management and risk-taking, and such behaviors may reflect misattribution processes. Because moods lack features that could separate mood-based feelings from judgment-relevant feelings, misattribution is likely.

In addition to their contribution to symptoms, misattributions might also play a role in alleviating symptoms by wicking away problematic affect. Misattribution has been shown to reduce the symptoms of anxiety disorders. In a study by Brodt and Zimbardo, shy women were encouraged to attribute their anxious feelings to a high-frequency noise (1981). Evidence of the effectiveness of the procedure was that independent observers rated them as being more fluent and assertive in a subsequent social interaction.

***Misattribution and attraction.*** To make themselves more attractive to their partners, individuals on dates sometimes engage in arousing activities so that the arousal may be misunderstood as interpersonal attraction. White, Fishbein, and Rutsein (1981) reported that male participants found a female confederate more attractive after engaging in physically arousing exercise. Other common dating behaviors, such as making jokes and eating at romantic restaurants may similarly rely on affect misattribution. Such strategies may backfire if partners make the correct attribution for their enjoyment and overcorrect, such that all the affect generated, including that from genuine attraction, gets attributed to the situation rather than the person.

While discussion so far suggests that misattribution in the real world might lead to inaccurate impressions and bad decisions, the effects of occasional misattribution should be limited by the law of large numbers, so that random misattributions should cancel out over time. Chronic inclinations to make particular kinds of misattributions, on the other hand, may be more problematic.

## *Integrating Past and Present to Build a World*

Minds evolved for efficient, adaptive interactions with the environment. As the world unfolds, the key function of minds is to predict the consequences of actions. As environmental complexity increases, however, there ceases to be a one-to-one

mapping between events and their consequences. Adaptive behavior in the complex social worlds that people inhabit is therefore aided by representing situations in terms of their psychological value rather than their surface characteristics.

Determining the value and importance of events requires both affect segmentation and affect integration. Whereas affective segmentation occurs when the mind identifies the affect that is being caused by an event, affective integration occurs when affect and the event giving rise to it are represented together in multiple subsystems. What emerges from the integration process is an emotional model through which people can interact with their world. In the remainder of this section, we discuss integration further to elaborate the process by which the mind constructs a model of the world that changes in successive moments. We begin by suggesting that the diffuse nature of emotions is a source of efficiency and flexibility when modeling situations. Next we shift our attention to appraisals, which reflect the different kinds of relationships individuals can have with the world, depending on their focus of attention. From a discussion of emotional categories, we turn to individual differences in emotional responses. While much of the apparent coherence of emotions stems from their situational causes, persistent patterns of coactivation among responses to similar events over time can lead to increasingly reliable patterns within individuals.

## *Emotions as Models*

Emotions are evaluative models of psychological situations. They provide a kind of way station between perception and action that enables greater flexibility of response than is afforded by fixed actions patterns (Scherer, 1984). To be effective, such models must represent both the central emotional meaning of a situation and its important local features. Suppose, for example, that someone rudely bumps into you on your way home from work and fails to apologize. While the situation may induce anger regardless of the rude person's identity, one would be less motivated to react in a hostile manner if the person were physically imposing or perhaps physically attractive. The presence or absence of friendly observers might also shape one's response. Thus, demanding an apology might seem more appealing when friends are present as backup. More generally, each aspect of one's response needs to be tuned to the demands of the situation.

Although emotions may be experienced as unitary, coherent states, the underlying evaluative model of the situation is distributed across multiple response modalities that do not share the same representational format. The language of facial expressions does not map onto the language of psychophysiological responses or of behavioral inclinations. However, to the extent that these separate evaluative representations converge on the same underlying meaning, they will emerge as a unitary emotional state. Such an emergent model is both robust and flexible by virtue of its distributed nature.

In keeping with this view, we sometimes characterize emotions as affective "constellations," a conception that emphasizes their lack of internal structure (see Russell, 2003). As with celestial constellations, the structure that people see in emotions is really in the eye of the beholder. Indeed, much of the coherence of emotional responses reflects, not the inner structure of an emotion module, but simply the common psychological situation to which they are reactions. But if emotional experiences are largely unstructured, from where do the universal categories of emotional experiences such as sadness and jealousy originate?

## *Appraisals as Relationships Between Organism and World*

Being emergent, emotions cannot be tied to a particular location in the brain (for a review see Lindquist, Wager, Kober, Bliss-Moreau, & Barrett, 2012). In what sense then do different emotions exist, and why is it important to distinguish them as we do? Since emotions are evident in just about every aspect of life, they seem as though they must point to some underlying biological entity. In this article, however, we reverse that logic and suggest that although biological processes are crucial aspects of emotions, it is the variety of psychological situations that define the human condition that is the actual source of emotional variety, and no additional infrastructure is required to account for it. Thus, although we focus on emotional experiences, we reject the notion that they are *caused by* emotions, because that would imply that emotions exist apart from their constituents, rather than emerging *from* them, as we assume (see also Coan, 2010).

We suggest that experiences of anger, sadness, fear, and other emotions are universal simply because they reflect the human condition, including all of the predictable situations that arise when individuals and groups of sentient beings interact in the world. The recurring nature of such situations was noted by the Mamoulian Collection (Polti, Ray, and Rouben, 1940), who argued that the entire history of drama contains about 36 situations. And more recently, a Jungian author proposed that all stories ever told fall under one of seven basic plots (Booker, 2004). These same situations are also repeatedly found in human thought and art.

***Appraisals require sources of value.*** If affect serves as embodied information about the value of its object, what is the source of that value? Against what criterion is emotional value computed? There are three sources of value, according to the account of emotion proposed by Ortony et al. (1988). These include goals, standards, and tastes or attitudes. The outcomes of events are deemed desirable or undesirable on the basis of one's goals and concerns, giving rise to such emotions as joy, fear, and sadness. The actions of agents are seen as praise or blameworthy on the basis of applicable standards, giving rise to such emotions as pride, shame, admiration, and reproach. The attributes of objects are evaluated as appealing or unappealing on the basis of a person's tastes or attitudes, giving rise to such emotions as love, hate, and disgust. What emotion is felt, therefore, depends partly on whether one is focused on outcomes, actions, or objects. A change of focus also brings with it a change in the form of the affective reaction. In this view, one of the important distinctions among emotions, then, is that they

reflect different points of attentional focus, which implicate different sources of value and different kinds of affect.

***Appraisals afford anticipation and choice.*** Earlier we suggested that minds are prediction machines for producing adaptive behavior. Predicting which behaviors will be adaptive presents a special challenge in the physical and social environments that people occupy, because similar events can have different adaptive consequences and different events can have similar adaptive consequences. Adaptive choices therefore require comparing present and past situations in terms of their likely affective consequences. In that regard, Baumeister, Vohs, DeWall, and Zhang (2007) propose that the prime function of conscious emotional experience is to mark the important aspects of a situation so that as one contemplates a new situation that is similar, fractional parts of the earlier emotional reactions can signal its value and importance to motivate appropriate behavior. It is worth noting that Freud (1923/1949) hit upon the same basic idea when he reformulated his understanding of anxiety. He came to think of anxiety as a fractional part of previously experienced trauma capable of motivating avoidance of related thought and action. Having small doses of feelings similar to the full-blown experience from a past situation provides a way for the past to shed light on the present. Such fractional emotional experiences then allow emotion to play an adaptive role in decision-making in that decisions can then be made on the basis of anticipated emotions (Baumeister et al., 2007).

***Similar emotions emerge from different responses.*** The primary distinction among emotions lies in the situations which each represents, rather than in fixed patterns of response. Indeed, the same emotion may involve very different responses. But these different responses can nevertheless result in similar emergent experiences, because each modality of response expresses an affective message of that emotion. Thus, anger might be realized in a variety of ways, depending on the local context, but every instance of anger involves a focus on undesirable outcomes and blameworthy agency. To the extent that such displeasure and disapproval are represented in multiple modalities (expressive, cognitive, behavioral, and so on), then a unified emotional experience emerges.

The process of emergence can be appreciated by an analogy with three-dimensional vision, which occurs when the two eyes provide different but highly overlapping images of the same thing. In a similar way, a sad state emerges when a loss is represented not only in thought, but also in expression, posture, loss of motivation, and so on. When multiple modalities represent the same reality at the same time, individuals experience their sadness as a compelling, multidimensional reality.

***Emotional responses.*** Emotionally significant situations cluster together in part because of the demands they place on individuals. Within limits, then, similar psychological situations may also give rise to similar patterns of response. For example, situations involving loss may elicit activation in corrugator (or frowning) muscles of the face, especially when others are present with whom to communicate one's displeasure. Situations of loss may also be accompanied by a cluster of other responses, which might include a slumped posture, a desire to reconnect with others, and so on. Reviews of research show much less consistency in such responses than our stereotypic conceptions of emotions lead us to expect. But in interaction with commonly held goals, standards, and tastes, the situations represented in specific emotions should constrain likely responses.

## *Culture and Individual Differences in Emotional Responses*

While the challenges and demands of the situations represented by a given emotion are similar, the same situation may be responded to differently, depending on a variety of factors, including the biology of temperament, the culturally given options for interpretation, and the personalities and experiences of individuals. We know from research on causal attribution, for example, that reactions to failure and defeat are not dictated by the observable facts, but depend on the interpretation made of them. Culture can also change how a situation is appraised and whether it is even noticed. For example, in some cultures where the manual labor of multiple men is needed to survive, multiple brothers sometimes take on a single wife (Goldstein, 1987). Becoming socialized means in part learning to use appraisals appropriately for simplifying and encoding the complex and otherwise confusing experiences of self and others. Becoming acculturated means learning to do these things appropriately in a given culture.

## *Individual Differences and Affective Styles*

The absence of emotion programs in the human mind does not imply that there are no constraints on emotional responses. We previously mentioned that the human experience consists in a limited number of situations that repeat themselves throughout people's lives, and that similar situations place similar demands on people, which may therefore elicit similar kinds of responses. For example, threats of bodily harm may elicit fight or flight responses, including amygdala activity, increased heart rates, and the formulation of plans to escape, whereas threats to relationships might motivate reconnection and increased attention to smiles. To the extent that similar situations elicit similar patterns of response, these responses may become associated with one another in relevant contexts and be activated concurrently. The increase in connectivity over time between brain regions that are coactivated is known as Hebbian learning. By this process, response patterns to similar situations may become more closely associated with one another, and people's emotions may become increasingly stereotyped and coherent, including in extreme cases anxiety disorders and phobias. Despite a lack of dedicated emotion circuitry, emotions may thus become structured over time within the minds and bodies of individuals. Because no two individuals have the exact same environment, this increase in connectivity gives rise to an emotion style unique to each individual.

Affect can reinforce or inhibit anything from attentional scope to specific goals to facial expressions. These reinforcement

effects are especially pronounced during development when a child's brain is more plastic, but they continue throughout an individual's life. Over time as a child interacts with the world, he/she gets feedback from the physical and social environment. Others may react positively or negatively to displays of emotion, and particular kinds of approach and avoidance behavior may get reinforced or punished. Individual variability exists in part because the pattern of reinforcement from the environment varies across individuals. For example, when resources are scarce and easily lost, violent retribution may be an effective means for protecting one's possessions, making aggressive responses more likely in certain contexts, as when one's honor is threatened (Nisbett & Cohen, 1996). As this behavior becomes more widespread, socialization may promote similar patterns of behavior in response to threats to one's honor.

The boot-strapping process involved in the development of an individual's affective style may also be responsible for the symptoms of phobias and anxiety disorders. For example, a phobic individual's response to spiders may be more stereotyped due to additional connectivity between different mechanisms involved in the fear response when confronting the object of his/her fear. Imagine that two individuals, one of whom has arachnophobia, see a spider in a cage. While the nonphobic individual might feel uneasy upon seeing the spider, she would not experience the sympathetic nervous activity that would be helpful for quickly escaping the situation. In contrast, the phobic individual might have a more elaborate fear response that includes avoidance behaviors, for example, backing away from the cage, greater activation in the amygdala, increased heart rate, etcetera, because these responses, despite their irrelevance when the spider is caged, are more closely bound together, leading to their coactivation.

### *Summary*

We have presented a view of emotions in which events, actions, and objects are appraised in terms of multiple sources of value, including goals, standards, and tastes. We proposed that emotions are distinguished primarily by the kinds of psychological situations they represent. The universal nature of emotions, we suggested, reflects recurring psychological situations that constitute the human condition. We emphasized that evaluative meaning is constructed on the fly and the appraised meaning of the situation is distributed across an array of modalities, including facial expression, cognition, physiology, and so on. Emotion then is a psychological state emerging from distributed representations of the value and urgency (Clore & Robinson, 2012; Coan, 2010). In contrast to a view of emotions as structured modules, we assume that the apparent structure comes from multiple modalities representing the same affective meaning. The distributed nature of these representations and the lack of internal structure create a frugal but flexible model of the moment.

Although we propose that emotions are relatively unstructured, people may nevertheless experience discrete emotions. But this distinctiveness may reflect the context in which the reaction occurs. Thus, negative affect in response to a threat feels different from that induced by loss, but the distinctiveness of the feelings owes a lot to the distinctiveness of the context. Similarly, research shows that the apparent distinctiveness of a pet cat's meow when wanting to be fed versus wanting to go outside actually reduces to whether the cat is nearer the food bowl or the door (Bachorowski & Owren, 2002).

Although we emphasized the role of situations in distinguishing emotions, we also noted that different emotional situations involve different demands on the person, which constrains the cluster of responses likely to occur. To the extent that the variability within the cluster of responses to one class of emotional situations is smaller than the variability between clusters of responses to other emotions, they should feel different. Situations of loss and fear may feel distinct because each has a different distribution of likely responses. Finally, we suggested that in addition to differences among individuals in their interpretation of their worlds, differences in the distributions of responses to similar situations give individuals unique affective styles.

## Closing Remarks

The impact of Schachter and Singer's pivotal article (1962) has been variable over the more than 50 years since it appeared. Although distinctly unpopular while affective scientists were focused on basic emotions, from more recent constructionist perspectives, it now seems prescient. Rather than describing their insights in detail, however, we have attempted to commemorate their contribution by building on it with the proposal of a compatible view of emotions.

According to the FORM framework that we proposed, two processes, segmentation and integration, operate to break down the flow of experience and then reform it into a model of the world. During segmentation, the mind *fragments* a constantly changing stream of feelings and sensations by matching accessible features of the present moment to those from the prior moment. Occasionally, when features of different situations happen to align, proper segmentation fails and misattributions occur, in which feelings about one object are experienced as reactions to another. The integration process then *organizes* one's relationship with the emotionally significant aspects of the situation as bodily and cognitive systems *represent* the situation and enable the person to *move* through the world. The distributed nature of the model of the situation across multiple modalities makes it flexible and efficient and allows for variation by person and context. When Schachter and Singer (1962) proposed the two-factor theory of emotion, they created new possibilities for thinking about the relationship between visceral feelings and emotions. Their work also brought us a step closer to understanding conscious emotional experience. Their view of attribution and misattribution clarified how one moment of human experience flows into the next. Their fluid view of moment-to-moment experience has helped us understand how emotions, so often seen as snapshots frozen in time, melt into a stream of consciousness.

## Declaration of Conflicting Interests

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