CHAPTER 3

Ten Common Misconceptions about Psychological Construction Theories of Emotion

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Humans communicate through stories—in fictional novels and movies, in memoirs and autobiographies, and even in science. Scientists run experiments and use their data to tell stories about how the world works. Every story belongs to a family that shares foundational beliefs and assumptions. These beliefs and assumptions belong to the *metanarrative structure* of a story. For example, in Western storytelling, narratives usually have a beginning, a middle, and an end. Stories with a hero must also have a villain. There can be no redemption without a temptation or at least a conflict. And so on. Even though we might not be explicitly aware of these metanarrative elements, writers and readers use them in tacit agreement. Writers automatically rely on them to make their stories comprehensible, and listeners automatically employ them to predict where an author is going and to understand what he or she is saying. In science, a family of stories sharing a metanarrative structure can be thought of as a "scientific paradigm" (in the tradition of Thomas Kuhn) with a conventionally agreed-upon explanatory framework. Scientific revolutions (to the extent that they actually occur) might be described as one metanarrative story structure replacing another. When a story violates the expected metanarrative structure (e.g., a listener from one culture is parsing a story with a different metanarrative structure from another culture, or a scientist from a scientific paradigm is reading the work of another scientist who fundamentally challenges the assumptions of that paradigm), confusions and misunderstandings usually ensue.

The story will not be easily understood, because the listener is employing a different set of assumptions than is the storyteller. As a result, the story will seem unintuitive and needlessly complex.

As a scientific approach, psychological construction violates several elements of psychology's dominant metanarrative structure for theories about minds and brains, making it vulnerable to misconceptions and misunderstandings. The purpose of this chapter is to consider explicitly some of the misconceptions in light of the metanarrative elements that cause them. The elements considered here are, of course, broad generalizations. No one is claiming that every theory of mind or brain contains every element, or that exceptions to these generalizations can never be found. The main observation is that certain metanarrative elements within psychology make it challenging to communicate psychological construction as a testable scientific approach to emotion, because the theory itself is often misunderstood.

MISCONCEPTION 1. Emotions are creations of the human mind and therefore they are illusions. They not real, and they have no utility or function.

Two metanarrative elements contribute to the mistaken claim that psychological construction considers emotions to be functionless illusions.

Metanarrative Element: Essentialism

Modern psychology theories tend to conceive of the mind as a system of categories, each one representing an organ of computation (mental module or psychological faculty) as an individual and separable process. Each process is presumed, more or less, to be a physical type that can be localized to a specific and distinct set of physical measurements (e.g., distinct and specific brain tissue, autonomic correlates, or behaviors).[1] The physical correlates are usually treated as its essence. This essentialist view of the mind has been labeled "the greatest historical contribution to the development of theoretical psychology" (Marshall, 1984, p. 216). Progress in science typically involves the use of more fine-grained mental categories, more sophisticated measurement and computational methods, and localization of function to networks or individual neurons instead of to gross anatomical brain regions, patterns of peripheral nervous system activation, or overt behaviors. In this view, an emotion category, for example, *fear*, is assumed to be a physical type (Barrett, 2006a, 2012, 2013; Lindquist & Barrett, 2012). Subtypes of *fear* might exist (e.g., Gross & Canteras, 2012; Kreibig, 2010), becoming the mental faculties of interest and replacing *fear* because it is too broad a category.

Why Psychological Construction Is Misunderstood

Psychological construction theorists hypothesize that each emotion category is populated with a variety of instances that do not share an essence. This hypothesis, which denies the metanarrative element of essentialism, is mistakenly understood as a claim that emotion categories are arbitrary groupings of instances, or in the extreme, that emotion words do not name anything real. To my knowledge, no scientist has actually claimed that emotions are random, illusory phenomena, perhaps other than Knight Dunlap and Elizabeth Duffy. In 1932, Dunlap wrote, "The search for 'primary emotions' is as much an anachronism in psychology today as is the search for the soul; and it is a search of the same sort. We must face the fact that the 'emotions' are names to which correspond no concrete realities" (p. 573). Duffy, in 1941, wrote, " 'Emotion' as a scientific concept is worse than useless" (p. 283). Dunlap and Duffy, along with many of their contemporaries (reviewed in Gendron & Barrett, 2009), were addressing the issue that physiological and behavioral studies had, up to that point, failed to find consistent and specific physical correlates to distinguish one emotion category from another (i.e., they had failed to find what scientists of the time had presumed to be each category's biological essence). Since that time, a number of reviews have made similar empirical observations (e.g., Barrett, 2006a; Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000; Mandler, 1975; Ortony & Turner, 1990). Although these scientists often come to the conclusion that emotional faculties or modules are not real as physical (or perhaps even as universal psychological) types, this is not a claim that emotions are not real. Emotions can be real without being essentialized types.

Correction

A more modern hypothesis, typical of the psychological construction program of research, is that an emotion word such as "fear" corresponds to a conceptual category. An emotion category is not a physical type, with a physical essence, but a collection of instances that vary in their physical manifestations. These instances are not random but are functionally linked to the immediate situation or environment in which they emerge. This implies that an emotion word names a set of diverse events (or instances) that emerge from multiple causes, and not a single process that produces a set of similar instances or events. This observation also calls into question whether the traditional categories for emotion, such as *fear*, are too broad to allow for the accumulation of knowledge supporting induction and scientific generalization. This point was first made by William James (1884), and it has been echoed by several modern psychological constructionist writers (e.g., Barrett, 2006a; Russell, 2003). The point is not that instances

of fear are random, but that *fear*, an emotion category, is too heterogeneous to be a scientifically useful way to explain why people act or feel the way that they do (because across instances of fear, they feel and act in a variety of ways). As a consequence, to understand fear properly, it is necessary to (1) map the heterogeneity and (2) understand the causal processes responsible for producing this heterogeneity. The claim is that instances of fear are highly functional in a situated way, even if the category *fear* does not, itself, represent a single function. This does not mean that fear serves no functions at all; instead, it means that fear can serve several functions (see Barrett, 2012; Barrett, Wilson-Mendenhall, & Barsalou, Chapter 4, this volume). The fact that emotions do not name brain networks or circuits or body systems does not necessarily mean that emotions have no explanatory value in the economy of behavior (e.g., see work by David DeSteno). An emotion does not have to be hardwired into the mammalian nervous system to be functional.

It is interesting to note that essentialism, as a metanarrative element, routinely causes misunderstandings in science. Essentialist beliefs keep people from accepting the reality of evolution, or cause people who believe in evolution to misunderstand the concept of natural selection (cf. Gelman & Rhodes, 2012; Lewontin, 2000). In particular, essentialism prevents people from understanding the kind of population-based thinking that Darwin used when he reformulated the concept of a *species* (as a conceptual category of unique individuals rather than as a physical type; Mayr, 1988). Similarly, essentialism has kept people from understanding population thinking about emotion, and population thinking is a key feature of some psychological construction theories of emotion (e.g., Barrett, 2013; also see Barrett et al., Chapter 4, this volume).

The bottom line is that by denying essentialism, psychological construction is claiming that an instance of emotion is not exclusively realized in the body of the emoter, or in the brain regions that regulate the body. The very existence of an emotional episode (either the self, in emotional experience, or another person, in emotion perception) also requires participation from other parts of the brain that are involved in storing prior experience and knowledge within a perceiver. To those who rely on essentialist assumptions, however, this is sometimes understood as claiming that an emotion is entirely in the mind of a perceiver. This kind of either-or thinking (if emotion is not in your body, then it is all in your head) relates to the second metanarrative element at play here.

Metanarrative Element: Top-Down (Perceiver-Based) Influences Always Cause Illusions

Modern psychological theories (other than those explicitly about perception) still assume that top-down (perceiver-based) contributions to

perception are largely *modulatory* on veridical bottom-up readouts of the world and that when top-down influences *drive* perception this causes false impressions or misapprehensions (i.e., illusions). Psychology often delights in revealing how perceivers are mistaken, and are therefore naive, in their experiences of themselves and the world.

Why Psychological Construction Is Misunderstood

The standard view of emotions is that, as natural kind categories, emotions are *recognized* in the outputs of one's own body or in another person's actions. Psychological construction, in contrast, hypothesizes that a perceiver creates an emotion out of those mere physical changes by adding information from past experience about the psychological meaning and utility of those changes. From this perspective, then, an emotion is not recognized by a human mind in the outputs of the body or another's actions but is *constructed* by a human mind using those changes. Thus, psychological construction proposes that top-down (perception-based) contributions are necessary drivers of emotion. If one assumes that top-down influences create illusions, then it is easy to mistakenly assume that psychological construction theorists must be claiming that emotions are illusions. Of course, the construction process does not imply that the resulting perception is an illusion—the hypothesis is that perceiver-based contributions to perception occur as a normal consequence of how the human brain works.

Correction

A perceiver creates an instance of emotion without it being an illusion in the colloquial sense. In certain domains of psychology and increasingly in neuroscience, the hypothesis that perceivers actively contribute to their own perceptions and cognitions is a well-accepted story line. Within neuroscience there is increasing acceptance of the idea that the brain is a predictive organ that creates mental life by a process called "predictive coding," in which it continually generates hypotheses based on past experience in a top-down fashion and tests them against incoming data; in this view, top-down influences drive perception, they do not merely modulate it (e.g.,Adams, Shipp, & Friston, 2013; Bastos et al., 2012; Clark, 2013; Friston, 2002; Hohwy, 2013; Shipp, Adams, & Friston, 2013). Predictive coding is the way that a normally functioning brain works. The brain's wiring is even set up this way. For example, it is well-established fact that top-down (perceiver-based) processing characterizes the normal functioning of every human brain. For every neural connection that brings sensory inputs from the thalamus to the cortex, there are 10 feedback connections from the cortex to the thalamus (Golshani, Liu, & Jones, 2001). The number of

connections from visual cortex to the subcortical lateral geniculate nucleus far exceeds the number of connections from the lateral geniculate nucleus to the visual cortex (Sillito & Jones, 2002).

This driving "top-down" narrative element is not yet accepted in theories of emotion, however. Appraisal theories hypothesize top-down processes in emotion generation, but these are usually thought to react to and modulate in coming, bottom-up stimulation. The conceptual act theory of emotion, by contrast, implicitly uses ideas that are similar to the logic of predictive coding in its hypotheses about how the brain creates situated conceptualizations (which are the content of emotional episodes). As part of constructing a situated conceptualization, the brain makes predictions about what incoming interoceptive sensory input is expected (based on past experience with the rest of the immediate sensory array). This was once referred to as an "affective" prediction (Barrett & Bar, 2009) but more recently it has been called "interoceptive" prediction (Seth, 2013). Through a series of iterations, the brain compares the incoming sensory input to the prediction and corrects any prediction error, either by changing the prediction based on the exteroceptive input, or changing the sampling of sensory information (by moving the body, or by attentional shifts) to match the prediction. As a consequence, an instance of an emotion is a series of brain states that includes representations of the body and/or actions *and* the additional information that is necessary to create the new functions that make emotions real—that is, the parts that are crucial for creating the situated conceptualizations that are responsible for emotional gestalts (Barrett, 2012; Barrett et al., Chapter 4, this volume).

Some scientists, like myself and my co-authors (Barrett, 2012; Barrett, Wilson-Mendenhall, & Barsalou, 2014; Chapter 4, this volume) and Russell (2003), are partly responsible for the misunderstanding that emotions are illusions, because we employ visual illusions (or related phenomena) as analogies to make a point about the top-down influences in emotion construction. A visual illusion, by its nature, nicely reveals the presence of top-down influences, because the perception includes information that the perceiver supplies and that is not present in the exteroceptive stimulus. It therefore makes a good analogy for how an instance of emotion cannot exist without a perceiver. The goal, to illuminate the role of the perceiver in creating a perception, is not meant to imply that emotions are literally fictions. What a visual illusion demonstrates, such as the Müller–Lyer illusion, is that a perception is the joint product of sensory input from the world (two lines of equal length, one bounded by the inward facing arrowheads and the other bounded by outward pointing arrowheads), as well as knowledge from the perceiver (i.e., his or her prior experience with rectilinear objects and environments). No perception is solely determined by the sensory input (e.g., the lines) alone, and visual illusions are useful for

demonstrating this. (Although analogies are often helpful to make a point in science, they are almost always limited in some way.)

Psychological construction theorists make the same point about emotions: They hypothesizes that emotions are not determined solely by sensory changes in a body. Emotions are perceptions that, in part, are a function of the perceiver's prior knowledge and experience. They further hypothesize that construction processes are not unique to emotions (or to visual illusions): The processes are at play in memories, in language comprehension, in moral reasoning, and so on. To claim that emotions are illusions would be to claim that every perception occurring in every moment of waking life is an illusion.

MISCONCEPTION 2: There is no synchrony in the physiology, behaviors, or experiences during emotions. The components of an emotion fluctuate randomly.

Metanarrative Element: Essentialism

It is traditional to assume that an emotion word such as "anger" corresponds to a consistent, coordinated packet of nervous system responses, behaviors (facial actions, action tendencies) and experiences. Many papers on emotion claim this as a scientific fact. Thus, "anger," "sadness," "fear," and some other emotion words are each assumed to refer to a physical type that is observable in nature. Because this pattern is the type's essence, it is assumed that the pattern will occur during each instance of anger. In the science of emotion, essentialism is often labeled as a "straw man" argument. It is often said that no one is really expecting the pattern for a given emotion to occur each and every time in an obligatory way. There will be some degree of variation, either because of stochastic, probabilistic influences, or because other non-emotional processes (e.g., display rules or regulatory strategies) come into play. But essentialism does appear to be implied here, even though it is less overt. Although some variation around each emotion type is to be expected, a modal physical pattern for each category (i.e., a prototype) is still expected (e.g., Tracy & Randles, 2011; Roseman, 2011), and it is still assumed that each emotion can be identified by its specific pattern.

Why Psychological Construction Is Misunderstood

Psychological constructionist theorists assume that an emotion category contains a population of heterogeneous instances. It is therefore assumed that the heterogeneity is real and meaningful as an intrinsic part of what emotions are and how they work. Therefore, this heterogeneity deserves

to be understood as part of the nature of emotion in scientific terms, and should not be treated as error, or as reflecting some non-emotional process such as a display rule. Some theories, like the approach of Ortony and Clore (Chapter 13, this volume), assume that the heterogeneity is primarily in the physical manifestations of instances but hypothesize that an emotion category is a cognitive type; a variety of physical instances have the same psychological meaning. Other theories, such as my conceptual act theory, hypothesizes that heterogeneity exists even at the conceptual level within a category (e.g., Barrett, 2006b). These approaches stand in contrast, however, to what are called "basic" or traditional "appraisal" emotion theories, in which the pattern for each emotion category should either be obligatory (e.g., Ekman, 1992) or occur probabilistically (e.g., Roseman, 2011) across instances; a limited amount of variation in the observed pattern from the platonic form is acceptable, but significant deviation is treated as error, or as caused by processes outside the boundaries of the emotional response itself (e.g., display rules or regulatory mechanisms). With such assumptions, it makes sense to attempt a Linnaean-type classification of emotions. To deny the biological reality of this typology, as psychological construction does, is often considered to be synonomous with an argument for randomness, or a claim that emotions have no relationships whatsoever to facial actions or other bodily changes.

Correction

Psychological construction theorists do not deny that there are links between the body and behavior during emotions. Instead, they propose that these relationships are learned, probabilistic, produced by associative processes, and, most importantly, that there is not necessarily a single pattern of relations for each emotion category. This is another way of emphasizing that an emotion word such as "anger" refers to a conceptual category of variable instances.

In psychological construction, heterogeneity across instances within a category can manifest itself in two ways. First, it might not be possible to distinguish the instances of one category from the instances of every other category by consistent patterns of measurable changes (in the peripheral nervous system, the brain, the facial movements, or in other behaviors). That is, a given pattern (in a given experiment) might be *sufficient* to distinguish one emotion instance from another emotion instance, *but not necessary* (the pattern might not hold every time): A given instance of anger might be distinguishable from an instance of fear, but these patterns might not replicate across all instances of anger and fear. In fact, pattern classifiers that distinguish emotion categories with peripheral physiology measurements do not replicate across studies, even when exactly the

same stimuli and methods are used (e.g., Kragel & LaBar, 2013; Stephens, Christie, & Friedman, 2010). This is because pattern classifiers should be understood as a disjunction of sufficient conditions.A second possibility is that an observed pattern might *be necessary but not sufficient*: A pattern might represent features that are repeatable across all instances of an emotion, and is therefore diagnostic for the category but insufficient for representing all that is meaningful and functional about each instance within the category. Put another way, diagnosis is not explanation. While both of these possibilities are distinct from a typological approach to emotion, neither proposes that emotional instances are random, or that the changes that occur during an emotional instance are random. Both of these possibilities are examples of how population-based thinking can be applied to understanding the structure of emotion categories, and as such are made more difficult to grasp by essentialistic thinking; in biology, population-based thinking was the last of Darwin's concepts to be understood, in part because of essentialist assumptions (Mayr, 1988).

At the very least, psychological construction offers an antidote for the emotion paradox (Barrett, 2006b): People routinely experience and perceive emotions, yet for over 100 years scientists have been trying unsuccessfully to find the unique biological substrates for each emotion. We have failed, despite having more sophisticated methods and improved experimental control at our disposal. So rather than assume that the biological signatures are there but we cannot find them, perhaps our starting position should be more neutral: Perhaps we should assume that our goal is to map the heterogeneity. Naturalistic observation and comparison is an important part of the scientific paradigm in biology (cf. Mayr, 1988) but it has largely been underutilized in psychology because it is expensive, impractical, and computationally difficult. But new methods and technologies make such observations possible. And who knows? We might just discover those illusive biological substrates for each emotion. One very real possibility is that we might discover idiographic regularities for each emotion category (i.e., a given person might have a repertoire of repeatable instances for *anger*, or *sadness*, or any emotion category).

The issue of whether there are *consistent* patterns of response that are sufficiently repeatable to distinguish all instances of one emotion category from all instances of another is a completely different issue than whether the various changes during a given instance of emotion are *synchronous* with one another (e.g., whether the autonomic nervous system, the brain activations, behaviors, etc., are coordinated with each other to produce a functional response in a given instance). Confusing coherence across instances of a category with synchrony within a given instance, again, reveals the metanarrative element of essentialism. Psychological construction approaches typically assume that various responses are synchronous

during an individual emotional episode, because such coordination is part and parcel of healthy functioning. Every moment of life requires such synchronization—emotional episodes are not special in this regard. For example, psychological construction views are completely consistent with Obrist's hypothesis that autonomic nervous system activity is mobilized in response to the metabolic demands associated with an actual behavior (cardiosomatic coupling; Obrist, Wedd, Sutterer, & Howard, 1970) or an expected behavior (suprametabolic coupling; Obrist, 1981; cf. Barrett, 2006a, 2006b). Since limbic tissue in the brain is largely responsible for coordinating visceral and motor responses, thereby regulating the autonomic nervous system, hormonal, and metabolic functions in a way that meets immediate or predicted energy needs, it is reasonable to predict that brain activation patterns might also be situation or behavior specific.

Because psychological construction approaches emphasize that individual instances of an emotion category can vary in the ways that bodies, faces, and brain activation typically vary, some critics claim that psychological constructionists believe that there are no hardwired processes in the body and brain whatsoever. This is an error. Psychological constructionist views acknowledge that certain behavioral adaptations (freezing, fleeing, fighting, etc.) have been identified across a variety of mammalian species, including humans, and are caused by specific neural circuits (e.g., Barrett, 2012, 2013; Barrett et al., Chapter 4, this volume). But these adaptations do not have a one-to-one correspondence to a given emotion category, and they cannot be named with an emotion word, meaning that the circuit for freezing is not the circuit for fear, and the circuit for defensive aggression is not the circuit for anger.[2]

Similarly, because psychological construction emphasizes variability in the measureable outcomes during an emotion, is sometimes claimed that these theories are nonfalsifiable. This is also a mistake. Rather, psychological construction theories are not falsifiable by the standards of traditional emotion theories. Standard emotion theories that propose reliable and specific patterns of measured physiology, facial actions, and brain activations will be supported if they such patterns are found or falsified if they are not found. Psychological construction theories make no claims about specific patterns for each emotion category, so their validity does not rise or fall based on finding them. Psychological construction theories provide an alternative explanation to basic emotion and appraisal theories in the event that such patterns are found (which would have to be ruled out for those theories to be correct), but psychological construction also can explain why such patterns rarely, if ever, materialize. The validity of a psychological construction theory depends on the proposed mechanisms or processes that cause physical changes to be perceived as emotions. Different psychological construction theories propose different mechanisms or processes. If these processes cannot be verified empirically, then the theory is falsified.

MISCONCEPTION 3. True emotions are conflated with emotion schemas. An emotion, as the object of perception, should not be confused with the concept for an emotion.

Metanarrative Element: Essentialism

This is yet another misconception rooted in the metanarrative element of essentialism. Each emotion word is supposed to correspond to a specific pattern of physical (biological or behavioral) response that is observable in an objective (perceiver-independent) way.

Why Psychological Construction Is Misunderstood

From the traditional perspective, a concept for an emotion such as anger is separate from the thing itself (i.e., the perceiver-independent anger response), in the same way that a tree or a plant exists in the real world separately from our concepts of them. As a result, it seems to be a grave error to confuse the two.

Correction

Psychological construction proposes that emotions are not perceiver-independent objects in the physical world like trees and plants. Instead, emotion categories are more like conceptual categories for *flowers* and *weeds*. There is nothing in the physical world that indicates whether a plant is serving as a flower or a weed in a given instance. A plant's status as one or the other is determined by the perceiver's categorization. Flowers and weeds are *perceiver-dependent categories*, because they depend on human perceivers for their existence. Perceiver-dependent categories are not imaginary; they are very real. For example, flowers and weeds *prescribe actions* that mere plants cannot: Flowers are to be cultivated, and weeds are to be pulled from the ground. Flowers and weeds allow people to *communicate* with one another in a relational way: Receiving a dandelion from one's gardener, ragged with its root system attached, communicates an entirely different meaning than when receiving it from one's 5-year-old child. Flowers and weeds are also a form of *social influence*, in that they are a bid to control the mental state and actions of another person in a way that a mere plant cannot achieve.

According to the philosopher John Searle (1995, 2010), humans create ontologically subjective things as part of social reality by imposing functions on physical objects and events that are not based solely on the nature of their physical properties. Searle states this as a general rule: An object or instance (*X*) counts as having a certain status (*Y*) in a particular context (*C*). This status allows *X* to perform a particular function (or functions) not inherent to its physical structure. Plants (*X*) become flowers or weeds

(*Y*) when they are categorized as such by a human mind (*C*) that exists in consensus with other human minds that also possess categories for flowers and weeds, and agree on the categories' functions (i.e., perceiver-based categories depend on *collective intentionality* for their reality). Of course, flowers and weeds (or any subjectively real objects or events) are not absent from the physical world. A flower or a weed cannot be brought into existence without a plant. A flower or a weed is not a mirage. Rather, the point is that, in a given instance, the physical nature of a flower or a weed (*Y*) goes beyond just the plant (*X*) itself—it also involves the top-down, conceptual machinery responsible for human perception available inside the brain of the perceiver (which, for our purposes, can be thought of as *C*). Understanding how the human brain (in certain instances, *C*) creates a flower or a weed (*Y*) from a mere plant (*X*) is really the question of how flowers and weeds come into existence (because without the perceiver, there is only a plant).

Psychological construction approaches ask the same questions about emotions. Understanding how the human brain (in certain instances, *C*) creates an emotion (*Y*) from mere physical changes in the body (*X*) is really the question of how emotions come into existence (because without the perceiver, there are only changes in heart rate, breathing, actions, etc.). The hypothesis is that the status of these physical changes as instances of anger, sadness, or fear (or even as instances of some other psychological category such as a cognition or a perception) is created in the same way that a plant becomes a flower or a weed: with a human mind making meaning of physical events. Via this meaning, physical changes acquire the ability to perform functions that they do not have on their own (creating social meaning, prescribing actions, allowing communication, and aiding social influence). A body state or an action has a certain physical function (e.g., changes in respiration might regulate autonomic reactivity or widened eyes increase the size of the visual field), but these events do not intrinsically have certain functions *as an emotion*; events are assigned those functions in the act of categorizing them as emotion during categorization. Physical changes (*X*) *becomes* anger (*Y*) by *representing* it as anger. From this perspective, then, emotion categories may be folk psychology categories, but they are more than mere "explanatory fictions" (to use Skinner's words; Skinner, 1971, p. 199).

So from the psychological construction standpoint, it does not make sense to claim that concepts for emotion are separable from emotions "themselves." The hypothesis is that emotion concepts play a role in creating perceptions of bodily states as emotions in the moment. They are necessary to the phenomenon of emotion. Furthermore, some psychological construction theories hypothesize that instances of emotion contribute to constituting emotion concepts (discussed in Barrett et al., Chapter 4, this volume). As a consequence, the psychological construction hypothesis does

not conflate emotion and emotion concepts —it explicitly hypothesizes that one (the psychological events to which people refer with emotion words) cannot exist as we typically conceive of it without the other (conceptual knowledge for emotion). For another analogy (color), see Barrett, Mesquita, Ochsner, & Gross, 2007).

MISCONCEPTION 4. Psychological construction theories have just recycled Schachter and Singer (1962), who hypothesized that emotions are ambiguous changes in arousal that are subsequently labeled using emotion words. This interpretation process is conscious and deliberate.

Few ideas in science are completely new. Many ideas linked to psychological construction existed before now in some form or another, particularly as critiques of faculty psychology/mental module approaches to emotion. For example, starting as early as the 19th century and continuing into the mid-20th century, literature reviews or commentaries highlighted the fact that physical measurements of the body and behavior do not respect emotion categories as primitive, natural, or modular types (see Gendron & Barrett, 2009). The roots of psychological construction can also be found in the criticism of faculty psychology within the mental philosophy of the 17th century. In fact, criticisms of mental typologies stretch back to pre-Socratic times. Almost all of these proposals suggest what might be considered the unifying assumption of psychological construction approaches to emotions: that anger, sadness, fear, etc. are not the basic building blocks of the mind (i.e., they are not psychological primitives), but instead are emergent products within the mind's system of more basic processes. Unlike earlier psychological construction approaches, which mainly described the gist of psychological construction principles (e.g., see Gendron & Barrett, 2009), the contributors to this volume offer more detailed and nuanced accounts of the psychological construction of emotion, and in certain cases provide specific computational and/or brain-based hypotheses about the mechanisms that allow for psychological construction. The main point is that psychological construction is not one theory—it is a family of theories that share common assumptions (see Barrett & Russell, Chapter 1, this volume) and not all of them are reducible to Schachter and Singer.

If psychological construction ideas have been around for a long time, why is Schachter and Singer (1962) often considered the standard against which all newer theories are evaluated for their novelty and incremental validity? The answer is that the Schachter and Singer's theory employs metanarrative elements that are common in mainstream psychology. This not only makes the Schachter and Singer's version of psychological construction easy to understand, but it also makes other psychological construction

theories ripe for misunderstanding when they violate these metanarrative elements.

Metanarrative Element: The Mind Is "Perturbed" by a Stimulus and Issues a "Response"

Perturbation models of the mind are very common in psychology. They usually go something like this: A stimulus (usually defined by the experimenter and exogenous to the person) triggers a hypothetical psychological process within the participant (or the organism) that in turn produces a measurable response in behavior, all in a linear sequence over time. The S → O → R structure is a description of how a single experimental trial is organized, but it is more than that: It is also the dominant story for how the mind and brain work in many theories in psychology (and particularly in the science of emotion). The roots of this narrative element can be found in the physiology experiments of the 19th century that motivated the first psychology experiments. Just like a muscle cell, the mind is assumed to lie dormant until stimulated, and upon stimulation, a response is assumed to issue reflexively and automatically. The descriptions of psychological events in terms of the stimuli that that provoke them and the effects they produce are so pervasive and deeply rooted in the narrative structure of psychological theories that they invisibly influence how we actually do science (Danziger, 1997, p. 54). For example, trials are assumed to be independent and can therefore be aggregated across conditions of an experiment (because the state of the mind before the stimulus is thought to be irrelevant); when variance across trials is estimated, it is usually modeled as error (rather than part of the phenomenon itself). Chains of these S → O → R sequences might be linked together to imply that a phenomenon is recursive (see, e.g., Dewey, 1896; Scherer, 2009), but the general structure of causation remains the same. Schachter and Singer (1962) assumed that a stimulus produces a change in arousal that is inherently ambiguous to the experiencer, who then makes an effort to understand it; the experiencer then uses whatever available information is handy to make the ambiguous arousal meaningful, thereby creating an emotional experience.

Why Psychological Construction Is Misunderstood

Using an experimental paradigm that was common at the time, Schachter and Singer (1962) injected participants with epinephrine to create an increase in sympathetic nervous system arousal. Some participants were aware that they were receiving epinephrine and others were not. Schachter and Singer then demonstrated that those participants who experienced ambiguous and unexplained arousal used information from other people (what Schachter [1959] referred to as "social affiliation") to transform their

feelings of arousal into an experience of emotion (either euphoria or anger depending on the verbal and nonverbal cues that were being depicted by confederates in the experiment). Although this experiment subsequently failed to replicate, its heuristic value for the science of emotion has been remarkable: It crystalized the hypothesis that an emotion is produced as unexplained arousal erupts, then is subsequently interpreted via a meaning analysis involving the context and emotion words. The typical assumption is that if Schachter and Singer (1962) is a psychological construction theory, and it uses an S → O → R metanarrative structure, then other theories with the same label (i.e., other psychological construction theories) must also use this structure. This assumption is in error.

Correction

Not all psychological construction theories rely on this S → O → R metanarrative element. While some theories do propose a linear causal sequence, where affective changes come first, followed by meaning making (e.g., Russell, 2003, Chapter 8, this volume; Wundt, 1897), others do not (see, in this volume, Barrett et al., Chapter 4; Thagard & Schröder, Chapter 6; Cunningham, Dunfield, & Stillman, Chapter 7; Coan & Gonzalez, Chapter 9). For example, the conceptual act theory is more consistent with concept of predictive coding (e.g., Adams et al., 2013; Bastos et al., 2012; Clark, 2013; Friston, 2002; Hohwy, 2013; Shipp et al., 2013) to hypothesize how emotions are constructed as situated conceptualizations within the brain's functional architecture (for a similar view, see Seth, 2013; Seth, Suzuki, & Critchley, 2012). As a consequence, most psychological construction views cannot be depicted with a sequence of boxes joined by arrows (i.e., the favorite way for psychologists to depict a psychological process). Even more complex "box and arrow" diagrams with recursive elements do not capture the dynamics of emotion as proposed in many psychological construction theories (see also Misconception 6). The point, in fact, is that a bottom-up, stimulus-driven model of the mind is incorrect (possibly a holdover from the dawn of psychology, when psychological experiments used laboratory methods fashioned after those used in physiology laboratories of the time, where an S → R model might more appropriate; see Danziger, 1997).

Not only is it an error to assume that all psychological construction models hypothesize that affective changes initiate an emotional sequence, but it is an error to assume that the affective changes themselves must have similarly linear and punctate discrete causes (i.e., that affective changes must be driven by conventionally defined stimuli). In S → O → R models of the mind, an embedded assumption is that the relevant process within the mind or brain is "off" until stimulated and then switches to "off" again until the next stimulus appears. When put in such stark terms, this statement might evoke a "straw man" criticism, but it is this mechanistic assumption that allows

scientists to treat trials as independent of one another, to aggregate responses across trials, and to assume dependencies across trials or that intertrial variation should be modeled as error. This S → O → R logic leads scientists to ask what causes affect to "turn on." This question reveals a clear misunderstanding of the concept of affective changes within a psychological construction framework. Many psychological construction theories consider affect to be continually changing feelings that are a property of consciousness resulting from the ongoing changes in homeostasis. A body is always "on," requiring energy and sending sensory input to the brain (except during sleep, when this sensory input is somewhat diminished). Any "perturbation" that influences homeostasis (changes in blood glucose levels, hormones, physical activity, etc.) or that the brain *predicts* will change homeostasis, could conceivably produce changes in affect that are meaningfully constructed as emotions.

It is also worth noting that a quick survey of the chapters in this volume, as well as the published literature on psychological construction, reveals that the psychological ingredients of emotion are not always identical to what Schachter and Singer (1962) proposed. Some theories, like that of Schachter and Singer, focus on autonomic arousal as the key bodily component that is interpreted and labeled as emotion (e.g., Duffy, 1957; Mandler, 1975). Others propose raw somatic, visceral, vascular and motor cues (Duffy, 1941; James, 1884) or the mental counterpart of those internal cues as affective feelings characterized by valence and arousal (Harlow & Stagner, 1932, 1933; Hunt, 1941; Wundt, 1897).

Metanarrative Element: Automatic versus Controlled Processes

Many modern psychological theories still rely on a dual-process logic, in which some processes are considered to be automatic and others are controlled and deliberate. Automatic processes are assumed to be more stimulus driven (or bottom-up), whereas controlled processes are assumed to be perceiver driven (or top-down). One guiding assumption has been that the subjective experience of having control over thoughts and actions is the best way of indicating that controlled processing is under way. This idea began with James (1950/1890), and it was elaborated on by Helmholtz (1910/1925), and later by Bargh (1994). Controlled processing is typically defined by the subjective experience of awareness (one is able to self-reflect on one's processing attempts), agency (one experiences oneself as the agent of one's own behavior), effort (one experiences processing as effortful), and control (one is aware that automatic processes may be occurring and motivated and able to counteract them). Varieties of automatic process, in contrast, are defined by the absence of any feeling of awareness, intention, effort, or control. Dual-process theories are alive and well in psychology (cf. Barrett, Tugade, & Engle, 2004). Indeed, some of the most popular psychological theories employ this metanarrative element (e.g., Greene, 2013; Kahneman, 2011). Even the law and economics employ dual-process

logic. This is because dual-processes theories embody one of the most cherished metanarrative elements in the Western philosophy of mind: the planful, cognitive, uniquely human aspects of the mind are separate from (and often triumph over) its more reflexive, emotional, and animalistic aspects.

Why Psychological Construction Is Misunderstood

If affective changes occur first, followed by meaningful interpretation of those changes (as proposed by Schachter & Singer, 1962), then a reasonable assumption might be that those meaning-based changes are deliberate and willful. This assumption makes even more sense when Schachter and Singer's experimental method is considered: Injected participants were exposed to a confederate who was explicitly providing them with an interpretive frame for their arousal. Participants were likely searching for an explanation and were aware of the framing provided to them. A related observation is that psychological theories of the mind still tend to reify emotion, cognition, and perception as separate processes in the mind, and as separable networks in the brain. For example, the idea that cognition and emotion interact to produce behavior is still one of the most cherished narratives within a Western philosophy of mind.

Correction

For the most part, psychological construction theories eschew the idea that some processes are automatic and others are controlled. For example, as previously discussed, perceiver-based, top-down influences are not always deliberate or willful. Psychological construction assumes that, typically, all processes involved in creating emotions are automatic and often obligatory, but can be controlled depending on goals, effort, and resources. For example, in the conceptual act theory, categorization is not deliberate or effortful—it occurs as part of the normal functioning of the brain's efforts to make meaning from the changing sensory array (where sensory information is coming both from within the body and from the outside world). Executive control is a necessary ingredient to the construction of emotion, but executive control is not synonymous with deliberate and willful processing (Barrett et al., 2004).

MISCONCEPTION 5. Psychological constructionism has nothing to add above and beyond appraisal theory.

Metanarrative Element: The "Perturbation" Model of the Mind

Most theories in psychology are information-processing theories inspired by or modified from the cognitive revolution and employing the S → O → R metanarrative element. Top-down (perceiver-based) influences, to the

extent that they occur, are prompted by bottom-up stimulus driven influences, and merely modulate those influences.

Why Psychological Construction Is Misunderstood

Appraisal theories use this metanarrative element: A stimulus (S) is interpreted by a perceiver using a certain sequence of evaluations (O) that in turn triggers an emotional response or components of that response (R) (e.g., Scherer, 2009). Schachter and Singer (1962) use a similar approach: Ambiguous arousal (S) is interpreted by the perceiver (O), who in turn creates an emotional response (R). Because both consider emotion to be an act of meaning making (the "O"), both are classified as appraisal theories (and the theory of Schachter and Singer is sometimes understood as an appraisal theory of emotion). The shifting classification of Schachter and Singer reflects a basic confusion over how psychological construction theories are distinct from appraisal theories of emotion.

Correction

Many appraisal theories (i.e., the causal appraisal theories; cf. Barrett et al., 2007; Gross & Barrett, 2011) hypothesize that meaning making (via cognitive processes called cognitive appraisals) is applied to a stimulus and an emotion results (as a unified response, or different appraisals are hypothesized to control different elements in the eventual response). The process is usually linear, but recursive. Psychological construction theories, by contrast, assume that changes in a body (experienced in the self or observed in others) are made meaningful by relating them to the surrounding context (resulting in an experience of emotion or a perception of emotion, respectively). Emotions are situated representations of bodily changes. The hypothesized processes are usually not linear, but unfold via constraint satisfaction or dynamical systems. In most psychological constructionist theories, then, the emphasis is on making an internal sensory or affective information meaningful: An emotion emerges when a person's internal state changes are understood in some way as being related to or caused by the situation. In appraisal theories, in contrast, it is the situation, not the internal state of the body, that is the target of the meaning analysis; internal state changes are assumed to result from and reflect this meaning analysis. The conceptual act theory (Barrett et al., Chapter 4, this volume), for example, proposes that the entire sensory array (sensations from the body and from the world) is subject to a meaning analysis. The processes that contribute to this analysis are not specific to the domain of emotion or special in any way; they are just the normal meaning-making processes that the brain uses to construct perceptions, memories, and the many mental events that constitute the human mind. This is in contrast to most appraisal

theories which assume that appraisal processes are specific to the domain of emotion, psychological In summary, then, causal appraisal theories differ from psychological construction theories in three ways: (1) the meaning-making mechanisms that are involved in creating emotions; (2) the target of meaning making (the situation vs. the whole stimulus array of body in context); and (3) the causal flow (linear and recursive vs. nonlinear and emergent).

It should be noted, however, that some appraisal theories are strongly consistent with psychological construction theories (e.g., the Ortony, Clore, and Collins (OCC) model, outlined in Ortony & Clore, Chapter 13, this volume; also see Barrett, 2013; Clore & Ortony, 2008). In the OCC appraisal model, for example, appraisals are descriptions of how the world is experienced during emotions, rather than the literal cognitive mechanisms that produced those experiences. Emotion categories are conceived of as cognitive types that reflect the structure of recurring situations that people find important and meaningful within their own cultural context. Emotions are "embodied, enacted, and experienced representations of situations" (Clore & Ortony, 2013, p. 337). They are situated affective states. Until now, the OCC model focused mainly on describing the whole (emphasizing emergentism), whereas psychological construction theories, like the conceptual act theory, for example, concentrate on describing how interacting systems produce the emergent emotional instances (emphasizing holism); but really the two approaches are more productively considered as two sides of the same emotional coin (cf. Barrett, Mesquita, et al., 2007).

Metanarrative Element: Essentialism

If two phenomena are labeled by the same word, then they are the same thing.

Why Psychological Construction Is Misunderstood

The term "appraisal" has a common-sense meaning: an evaluation or estimation of something's value or nature. It also has several scientific meanings (as a specific set of cognitive mechanisms: e.g., Scherer [2009], Frijda [1986], Roseman [2011]; or as a description of how situations are experienced during emotions: Ortony & Clore, Chapter 13, this volume). Not all meaning-making processes are "appraisal" processes.

Correction

Different psychological constructionist theories hypothesize that internal sensory or affective cues become meaningful as emotions using a variety of different meaning-making mechanisms. Those who propose that this

meaning analysis is the result of ideas (Wundt, 1897) or of social affiliation or referencing (Schachter & Singer, 1962) seem to be implying a more deliberate and conscious attempt at meaning making. Those who hypothesize that the meaning analysis results from categorization (Barrett, 2006b), from attribution (Russell, 2003), or from perceptions of the stimulating situation (Harlow & Stanger, 1932, 1933) as situations that are important to the perceiver (Dunlap, 1932; Duffy, 1941) imply that the meaning-making process is automatic. These different constructs are not meant as mere redescriptions of appraisal processes—they represent very different hypotheses about how sensory input from the body is made meaningful by binding it to events and objects in the world.

MISCONCEPTION 6. Emotions are nothing more than "core affect." All emotions can be explained with just two dimensions (valence and arousal).

Metanarrative Element: Reductionism.

Psychological theories are, for the most part, reductionistic. A mental event or a behavior is nothing more than the sum of its parts and therefore can be redefined as (or ontologically reduced to) its parts. Each part can be studied separately from every other part in a contextless way. The assumption is that reductionism will lead to a better and more complete scientific understanding of any phenomenon.

Why Psychological Construction Is Misunderstood

From a reductionistic stance, the psychological construction hypothesis that emotions are created as the interpretation of affective changes is misunderstood as the goal to decompose emotions and redefine them as their most basic elements: valence and arousal. Standard emotion theories (e.g., basic emotion theories) are reductionist, and there is historical precedent for reinterpreting psychological construction theories through a reductionist lens (e.g., Dewey's [1895] reinterpretation of James).

Correction

As far as I know, no psychological constructionist theories (except perhaps Dewey's reinterpretation of James and Titchener's theory) have suggested that emotions should be ontologically reduced to their parts (i.e., that physical sensations or affect alone provides a sufficient characterization for emotion). Instead, most psychological construction theories characterize emotions as phenomena that *emerge* from the interaction of

more basic ingredients. Emergence implies that the product (the emotional instance as a whole) is more than the sum of its parts, and has properties that the core systems (the individual contributing parts) do not, making reductionism impossible. (A further implication is that each system cannot be manipulated and studied independently, because the state of any one system depends on the state of the whole. Therefore, the workings of each system cannot be studied alone, like bits and pieces of a machine, but must be holistically understood within the momentary state of the brain, body, and the surrounding context.) As a consequence, most psychological construction theories are not "dimensional" theories per se. Instead, they integrate traditional dimensional and categorical perspectives. The dimensional aspect can be found in the suggestion that all emotional events, at their core, can be described as having psychologically primitive affective properties. The categorical aspect can be found in the suggestion that people automatically and effortlessly use some type of meaning analysis to bind these affective changes to objects and events in the world, and in so doing create the experience of a discrete emotional event.

It is probably also important to point out that affective circumplex (Barrett, 2004; Russell, 1980; Russell & Barrett, 1999) is not an explanatory model of emotion and was never intended as one. It is a low dimensional, descriptive map that represents two properties or common features of emotional experiences. Since these are properties or features of experience, valence and arousal, themselves, cannot be mechanistically reduced either, and are most likely emergent properties of more basic processes.

MISCONCEPTION 7. Emotions are not products of evolution.

Metanarrative Element: Nature versus Nurture

By and large, psychological theories still tend to assume that psychological events (a mental state or a behavior) are either biologically caused or experientially learned. Of course, every act of learning cannot occur without some biological event supporting it, so this is a false dichotomy. A more subtle distinction is between biological endowment and learning (e.g., what wiring and chemistry is an organism born with and what is acquired through experience; although some experience is acquired in-utero so even this is a false dichotomy to some extent). Although every one acknowledges that nervous systems show plasticity, this insight has not yet dislodged the idea that "nature" can be equated with biology and "nurture," with learning. Scientists still ask questions about whether a phenomenon or process is "hardwired", by which they mean endowed, without realizing that learning also "hardwires" a brain. They still ask how learning modifies evolutionary endowments, without realizing that the ability to engage in certain kinds of learning is itself an evolutionary endowment.

Why Psychological Construction Is Misunderstood

Basic emotion theories propose that emotions are evolved adaptations that are homologous in all mammalian species. Because they explicitly label themselves as "evolutionary" theories, to deny their validity, as psychological construction theories do, is mistakenly seen as rejecting evolution altogether. The nature versus nurture dichotomy is largely responsible for the mistaken assumption that psychological construction theories either ignore or deny evolutionary considerations. This metanarrative element is also responsible for pitting cultural and social constructionist views against evolutionary considerations, as if they are competing explanations for behavior.

Correction

Many books and articles have been written about how the nature versus nurture dichotomy is false. It is now well accepted that culture is a major adaptive advantage in the evolution of hominids, that environmental conditions turn gene expression and protein transcription on and off, and that learning wires the brain. This means that many universal phenomena are hardwired into the brain via learning (e.g., face perception, language, and certain visual illusions). With these findings in mind, then, it should not be difficult to entertain the idea that hypotheses about the psychological construction of emotions can also be hypotheses about emotions as the products of evolution.

So, to be very clear, psychological construction does not deny an evolutionary explanation for emotions—it just *denies a certain type of evolutionary explanation* for emotion. Natural kind theories of emotion (like basic emotion theories) assume that natural selection sculpted one domain-specific mechanism corresponding to each emotion word, presumably to deal with specific, recurring environmental challenges to surivival and fitness (Shariff & Tracy, 2011), and that these mechanisms endow human and nonhuman animals alike with emotional capacities. This evolutionary story, which suffers from the weaknesses of the "adaptationist programme" (discussed by Gould & Lewontin, 1979), is not the only evolutionary game in town, however. For example, the conceptual act theory (Barrett et al., Chapter 4, this volume) hypothesizes that the brain's functional architecture contains domain-general processes that interact and from which emotions emerge. In principle, domain-general processes are favored by evolution for their efficiency and flexibility (Laland & Brown, 2002). This theory hypothesizes that emotional episodes can contain species-general elements (actions that all species share; e.g., behavioral adaptations such as freezing, fleeing, or fighting), but that these are neither necessary nor sufficient for an emotion to be constructed. They are not necessary, because there is no

one-to-one mapping between a specific behavioral adaptation (e.g., freezing) and an emotion category (e.g., *fear*) (Barrett, 2012; see also Gross & Canteras, 2012). Species-general processes are not sufficient, because they must be made meaningful by species-specific processes that exist only in humans (or perhaps in limited form in great apes), such as abstract emotion concepts and language.

The conceptual act theory of emotion, in particular, is inspired by Darwin's insights in *On the Origin of Species* (1859/1964). This book contains several conceptual innovations that transformed biology into a modern science (Mayr, 1988). Before On the Origin of Species, animal species were assumed to be physical "types" whose members shared certain defining properties (essences) that distinguished them from all other types. Deviations within a type were due to error or accident. Scientific study meant reducing every phenomenon to mathematics of physical, mechanical laws. Darwin, and the biologists who further developed the conceptual framework for evolution in the following century, changed all of this. They replaced the essentialist, typological thinking with population-based thinking, in which a species is a biopopulation, and individuals within a population are unique; individual variation within a species was meaningfully tied to variations in the environment. Variation within a species was the result not of species-specific processes but instead of species-general mechanisms. And perhaps most importantly, they expanded the definition of science by offering nonreductionist, analytic approaches to understanding the natural world. These conceptual advances are directly mirrored in our psychological construction approach (Barrett, 2013; Barrett et al., Chapter 4, this volume).

The Expression of Emotions In Man and Animals (Darwin, 1872/2005), written more than a decade after *On the Origin of Species*, is the book that most traditional emotion theorists claim as their intellecual inspiration. Ironically, *The Expressions* contains only one of the five conceptual innovations mentioned in the *Origins* (the idea of common decent). It does not mention important ideas like population-based thinking (instead proposing an emotion typology). Nor does it mention natural selection (instead discussing Lamarkian evolution). These two ideas are, admittedly, Darwin's greatest conceptual achievements and the very ideas that created a paradigm shift in biology. From this perspective, *The Expression of Emotions In Man and Animals* is a conceptual throwback when compared with *On the Origin of Species*.

Psychological construction approaches allow researchers to ask a broad set of evolutionary questions. For example, perhaps the evolutionary legacy to the newborn is not a set of modular emotion circuits that are hardwired into the subcortical features of the mammalian brain but instead a set of domain-general systems that involve learning, categorization, and affective responding. The ability to categorize, for example, is not a specifically

human ability—many animals can categorize. It confers adaptive advantage, so it is likely biologically preserved, even if the specific categories are not. Perhaps specific categories are more likely culture-sensitive solutions to common problems that derive from our major adaptive advantage as a species: living in complex social groups.

Finally, humans' major adaptive advantage is to live in social groups and to engage in the kind of social learning that allows for the development and maintenance of culture. As a consequence, perhaps we have evolved the kind of minds that attempt to infer the internal states of others (so that we can better predict their behavior), as well as communicate our own internal states to others when it is advantageous to do so. Psychological constructionist accounts can be considered evolutionary in those terms.

MISCONCEPTION 8. Psychological construction occurs inside the head; therefore, the social context is irrelevant.

Metanarrative Element: Nature versus Nurture

The false dichotomy between nature and nurture is grounded in the common psychological assumption that forces occur either inside the person or outside in the world, with the skin as a reified boundary that separates the two. Attention, for example, is said to be directed outside to events in the world or inside to thoughts and feelings, and there are even networks in the brain that have been ascribed the function of switching from one focus to the other. Some processes are thought to be totally inside us (mental processes), and others are totally outside us (social processes). It is presumed that the processes going on inside and outside might cause other processes, or they might interact, but that they are inherently separate.

Why Psychological Construction Is Misunderstood

If emotions are constructed as interpretations of internal sensory or affective changes, then this can seem like an isolated process that occurs entirely inside the mind and, as such, denies the importance and potency of what goes on outside the skin, such as social relationships and context.

Correction

From the 1920s to the 1950s, when scientists were struggling with mounting observations that emotion categories did not seem to align with specific patterns of physical response, they proposed that measuring and understanding physical changes in the body provided an insufficient scientific account of emotions. Therefore, they concluded, emotions must be the result of interpreting those physical changes in light of the surrounding

context (for a review, see Gendron & Barrett, 2009). Their articles did not outline intact theories of emotion as much as suggest how theory building in the science of emotion should proceed by incorporating the surrounding situation or context. Subsequently, some theoretical approaches tended to emphasize the psychological mechanisms by which the interpretation process took place, but were largely silent on the contexts and situations that provided constraints and influence on interpretation (i.e., psychological construction). Other theoretical approaches emphasized the social conditions during which particular emotions occurred, without specifying the mechanisms by which emotions emerged (i.e., social construction).

Modern constructionist approaches, by and large, perpetuate this fault line, not by stipulation, but by oversight. Psychological constructionist theories, for example, do not deny the importance of the social interaction as a dynamically unfolding process that shapes the construction of an emotional event; but they have not specified or emphasized the importance of situational constraints either. The reverse can be said for social constructionist theories. Nonetheless, there are several notable exceptions in this volume (Barrett et al., Chapter 4; Boiger & Mesquita, Chapter 15; Ortony & Clore, Chapter 13; also see Clore & Ortony, 2013; Solomon, 1976). These psychological constructionist theories acknowledge that the dichotomy between the person and the situation is a false one. They discuss, for example, how situations constitute the mind (e.g., children learn emotion concepts, and therefore how to construct emotions, within a matrix of social interactions). If emotion concepts are tools for regulating homeostasis (Barrett et al., Chapter 4, this volume) that are acquired in a culture-sensitive matrix of social learning, and they prepare a person for or predict situated action, then this effectively breaks down the barrier between inside and outside the skin. This makes every emotional episode a cultural artifact as much as it is a biological event.

Psychological construction also highlights how there is no "environment" that is independent of the "person" (e.g., Ortony & Clore, Chapter 13, this volume). People do not experience an environment: They construct it via their perceptions of their physical surroundings and their actions (Boiger & Mesquita, Chapter 15, this volume). Other animals also can be said to "construct" their environment by actively responding to some elements in their physical surroundings but ignoring others. Richard Lewontin, the evolutionary biologist, describes how an "environment" should be understood as the physical surroundings that are relevant to an animal's behaviors and activities. For example, he notes that two kinds of birds (phoebes and thrushes) live in the same physical surroundings within the Northeastern United States, but their ecological niches are very different (for a detailed discussion of this example, see Lewontin, 2000). The relevant niche, or situation, for each kind of bird is determined by its activities. A phoebe needs grass to build nests, so grass is part of its situation or niche.

A thrush requires rocks to crack open seeds, so rocks are part of its situation. Both birds occupy the same physical surroundings that contain grass and rocks, but the potent aspects for each—that is, each bird's situation—are different. Some aspects are physically present but unnoticed. Similarly, it is possible that within a common physical surrounding there exists different "situations" for different people (or for a single individual at different points in time). It is also consistent with the idea that the mind determines the "active ingredients" or psychological features of the situation (Shoda, Mischel, & Wright, 1994; Wright & Mischel, 1988). In essence, the mind determines the nature of the situation, so that a "situation" does not exist separately from the person. In this way, it cannot be said that the situation causes emotion in a way that is independent of the mind. The construction of an emotion might, in fact, be an element in how situations are constructed (e.g., if one person categorizes his or her high-arousal negative affective change as anger (vs. fear), then this prescribes his or her power and dominance in an interaction relative to his or her interaction partner in a particular cultural context; Solomon, 1976).

MISCONCEPTION 9. Any evidence for the biological basis of emotion is evidence that emotions are biologically basic.

Metanarrative Element: Essentialism

Biological explanations for a psychological category will, necessarily, reveal their essence. Nonessentialist views have no grounding in the physical world.

Why Psychological Construction Is Misunderstood

It is difficult to imagine a theory of emotion (or of any other psychological event) that is grounded in nature without it being a nativist theory.

Correction

Every human thought, feeling, and behavior must be causally reduced to the firing of neurons in the human brain, informed by events in the body (when the two are normally functioning). Prior experiences and learning are encoded in the human brain; even a strict constructionist approach must therefore have a strong grounding in nature. As a consequence, a neuroscience approach to emotion need not be a basic emotion approach, and it need not make the modular, essentialist assumption that distinct brain regions or circuits are dedicated to instantiating psychological categories such as *anger, sadness,* and *fear.*

It should be noted that basic emotion theories make very specific predictions about the biological bases of emotion. Each emotion, for example,

must be consistently and specifically localized to an anatomically constrained and homologous circuit or network within the brain (i.e., that is inheritable and homologous in other animals). Biological evidence that distinguishes emotion categories from one another, but does not follow these predictions, does not support a basic emotion view (e.g., Kassam, Markey, Cherkassky, Loewenstein, & Just, 2013; Vytal & Hamann, 2010).

Psychological constructionist theories, in contrast, make very different predictions about how, at the biological level of analysis, instances of the same emotion category might be different, different emotion categories might differ, and instances of different emotion categories might be similar (e.g., Barrett & Satpute, 2013; Barrett et al., Chapter 4, this volume; Cunningham et al., Chapter 7, this volume; Oosterwijk et al., Chapter 5, this volume; Touroutoglou et al., 2014; Wilson-Mendenhall, Barrett, Simmons, & Barsalou, 2011; Wilson-Mendenhall, Barrett, & Barsalou, 2013).

Furthermore, psychological constructionist theories caution scientists to resist the lure of essentializing when interpreting biological data. This is important, because temptations are everywhere. Most recently, it is possible to see essentialistic thinking in interpretations of pattern classification techniques (see Barrett, 2013). It is tempting to believe that the patterns distinguishing different emotions within a single study are *the patterns* to distinguish emotion categories, rather than the patterns that distinguish those particular instance of emotions (therefore, the patterns might not generalize across experiments). As noted earlier in this chapter, two recent pattern classification studies that used similar methods and stimuli did not replicate each other in the reported patterns that distinguished between emotions in each study (Kragel & LaBar, 2013; Stephens et al., 2010). Similarly, our meta-analytic pattern classification of brain activity distinguishing different emotions (Wager et al., 2014) does not replicate a recent study that also reported patterns of distinctiveness (Kassam et al., 2013). From a psychological constructionist perspective, these are not surprising results, because experiments elicit emotional instances (even though the data are often interpreted as if they reveal truths about emotion types).

MISCONCEPTION 10. Psychological construction theories suffer from the same problems as basic emotion theories. Both attempt to localize a set of categories to brain networks in a one-to-one manner.

Metanarrative Elements: Essentialism and Reductionism

For much of psychology's history, it has been assumed that modularity was necessary for science to proceed. A psychological process must be localized to a discrete packet of brain tissue, making it possible to redefine a mental process as the specific function of a brain circuit or network.

Why Psychological Construction Is Misunderstood

The basic idea that emotions are physical types that can be localized to specific brain regions or networks is a textbook case of faculty psychology, associated with a view of the mind as comprising innate, neural modules, each with a distinct function (what Fodor [1983] called "vertical" modules; Lindquist & Barrett, 2012). Psychological construction, in contrast, hypothesizes that emotions can be described as emerging from the interactions of a set of more psychologically basic ingredients (affect, categorization, attention, language) that themselves can be understood as arising from within the brain's domain-general core systems. The idea is that the brain functions like a neural "ecosystem" from which mental states, such as instances of emotion, emerge. The metanarrative elements of essentialism and reductionism make it tempting to try and localize each psychological ingredient to a specific brain network (e.g., affect is located within the salience network; language within the language network; conceptualization within the memory network; and so on; for discussion, see Herschbach & Bechtel, Chapter 2, this volume).

Correction

The brain is a complex collection of neurons. There is no single true way to organize these neurons into functional groupings; a brain does not speak for itself in this regard. Depending on a scientist's goals, the brain's functional properties can be understood differently at different time scales and levels of organization. The brain's function must be understood in terms of the concepts and categories that we use to represent the human mind. This endeavor necessarily involves construct validity (Cronbach & Meehl, 1955).

In neuroanatomical research, when two neurons are wired together, are they part of the same circuit, or is one neuron modulating the circuit to which the other neuron belongs? When a distributed network is identified in brain imaging research, it is rarely observed to include exactly the same voxels on each occasion (meaning that it does not involve the exact same neurons each time). Is this evidence of instability in the network, or is this just a normal property of how distributed networks function? These are questions that cannot be answered anatomically; they are part of the construct validity of the psychological functions assigned to the neurons in question. Some scientists believe that we can sidestep this complexity and study the brain without appealing to psychology, but this is a mistake. The study of the brain without appealing to mental categories is just the study of neurons. The problem is that traditional approaches to construct validity (e.g., using classical measurement theory) are essentialistic in nature. They imply that there is a single underlying cause for a set of measurements

(i.e., the construct), and assume that this must correspond to a specific set of neurons that is activated every single time the construct is in evidence (Barrett, 2011).

Certain psychological constructionist theories attempt to understand the brain basis of emotion using assumptions that are very different from the metanarrative elements of essentialism and reductionism (e.g., Barrett & Satpute, 2013; see, in this volume, Barrett et al., Chapter 4; Cunningham et al., Chapter 7; Oosterwijk et al., Chapter 5; Thagard & Schröder, Chapter 6). For example, the conceptual act theory proposes that the brain contains a set of intrinsic networks that can be understood as performing domain-general operations; these operations serve as the functional architecture for how mental events and behaviors are constructed. We are not suggesting that all neurons within a network have exactly the same (general) receptive field, or that all neurons within a network fire every time the network is engaged. Instead, we are suggesting that, at the level of brain imaging, a neuron's function can be understood in the context of neural responses within the network (i.e., the function is distributed across the assembly of neurons within the network that are active at a given point in time), and this function is domain-general. Each of these "core systems" in the brain does not produce one distributed pattern of response. Instead, instance by instance, the function of the core system corresponds to a set of "functional motifs" arising from the "structural motif" that undergirds each network (for a discussion of motifs, see Sporns & Kötter, 2004). A theoretical framework like ours relies on assumptions of supervenience (see Barrett, 2011), degeneracy (Barrett et al., Chapter 4, this volume), and holism (see Barrett, 2013) rather than essentialism and reductionism. The goal is to shift the empirical emphasis from the search for mental faculties as unified neurobiological categories toward development of a more componential, constructionist functional architecture of the human brain, on the expectation that such a shift will deliver a more empirically justifiable theory of how emotions are created. One thing we can say for sure is that there is no strict one-to-one correspondence between a psychological ingredient like affect or categorization and a domain general brain network.

Summary

Because the human mind's ability to assimilate new ideas into an existing metanarrative framework is so much easier than its ability to build a new framework for a novel theory, metanarrative elements have a very powerful undertow in scientific storytelling, particularly when they are unexamined or unacknowledged. Hopefully, this chapter has illuminated at least a few of the metanarrative elements that make certain emotion theories seem obvious, while making others seem preposterous.

Standard emotion theories, such as basic emotion theories, and traditional "causal" appraisal theories, have a much easier job telling stories about the nature of emotion with their data because they routinely employ the dominant metanarrative structure of psychology, which itself derives from basic assumptions within the Western philosophy of mind that have been with us since ancient times. This structure provides a simple set of hypotheses (e.g., each emotion is a biological type) that prescribes a straightforward experimental method (e.g., expose any subject to an anger-inducing stimulus of any type and *the* anger response will be triggered, assuming the correct appraisals have been employed). These hypotheses and their associated experimental procedures are used in the hope of revealing particular insights about human nature (e.g., we are animals, and emotions are part of our animal nature). Such simple and powerful ideas make for good storytelling, good careers, good press, and for some, even a lucrative consulting business. It is rather more difficult to tell a scientific story about emotion that violates these themes—that emotions are complicated, stochastic, and dependent on context, and that no simple law or force will explain every instance of a particular emotion category. These are the kinds of stories that psychological constructionist approaches offer to the science of emotion, however, as illustrated in many of this volume's chapters.

NOTES

1. Essentialism is a widespread folk theory that biological categories are natural kinds waiting to be discovered rather than human constructions, and that these categories possess an underlying (often unseen or unknown) causal force (the essence) that is responsible for category members sharing so many properties. Categories are thought to be immutable (or to change at glacial speeds) with boundaries that are sharp and strict ("cutting nature at its joints"; Gelman & Rhodes, 2012).

2. If behavioral adaptations do not map to emotion categories one-to-one, there are several ways to solve the problem. One popular way is for scientists just to stipulate that emotions correspond to individual behaviors. Freezing = fear. Aggression = anger. Behaviorists, then behavioral neuroscientists, tried this maneuver. If fear is defined as the state that accompanies freezing, then whatever we learned about the circuitry for freezing would apply to all cases of fear, by definition. In such a scenario, all the nonfreezing instances that used to be categorized as fear would now be categorized something else (so that the *fear* category would become more homogeneous). You might imagine, then, that other categories for subtypes of *fear* would pop up, so that we end up with a variety of *fear* categories, each bearing its own distinctive name ("fear 1," "fear 2," "fear 3," etc.). In fact, philosophers (Scarantino, Chapter 14, this volume) and behavioral neuroscientists (Gross & Canteras, 2012) are attempting to go the route of "fear 1," "fear 2," "fear 3," and so forth. The advantage of this approach is that such categories permit the accumulation of scientific knowledge, but why not just call them behavioral categories? Why

call all of them fear? Anyway, this strategy does not really work, probably because the category *fear* serves social functions, in addition to its scientific functions, and those social functions are not well served by having a bunch of subtype categories (Barrett, 2012). So, what actually happens is the category *fear* remains heterogeneous, but, with the help of essentialist thinking, we imagine the category to be homogeneous. What scientists learn about the instances of fear involving freezing is mistakenly thought to generalize to all instances, when a creature is not freezing. Any concerns about illegitimate generalizability can be solved by imagining that fear instances without overt freezing must involve *some tendency to freeze*, even if the behavior never actually materializes and therefore cannot be observed (i.e., an action tendency). Perhaps this is why the circuitry for learning to freeze in response to a conditioned stimulus is seen as key for understanding PTSD (see Suvak & Barrett, 2011). Of course, another way out of this quandary is to just admit that not all instances that we categorize as fear involve freezing, so that the circuitry for freezing is not the fear circuit. We might even discover that freezing can occur in instances that we might categorize as other emotions, such as anger, surprise, or awe, or even as a non-emotional state such as uncertainty. This approach, of course, requires the search for mechanisms that allow freezing to contribute to fear in certain instances, that allow instances of fear to materialize without freezing, and that allow freezing to contribute to other mental states that are not fear.

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