

Emotion Is Not One Thing

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In the target article, Sabini and Silver (this issue) make the important point that emotional words and emotional experiences do not have a one-to-one mapping. In making this assertion, they join a long list of researchers and theorists including Kagan (1988), Lang (1993) and others who have reached the same conclusions albeit for quite different reasons. Sabini and Silver assert that there are fewer emotional experiences than there are emotional words. Kagan has claimed essentially the opposite. Kagan noted that psychologists are wont to use basic emotion labels such as fear to refer to a very wide range of phenomena. To continue with this example, the state experienced by a rodent in response to a simple tone that has been paired with shock is called "fear." That same word is used to describe the state experienced by a person as she enters a doctor's office to learn the outcome of a breast biopsy. Although, there may indeed be some superficial resemblance between these states, it is also clear that they differ in important ways that are likely to involve different underlying neurobiological systems. In fact, when direct measures of brain function are examined, such different kinds of fear are associated with different patterns of brain activity (see e.g., Davidson & Irwin, 1999 for review), yet psychologists often use the same word to refer to these very different states. Even though reaching the same conclusion as Sabini and Silver, Kagan and others (e.g., Davidson, 1993) believe that there are far fewer emotion words than there are emotion experiences and the use of the same word to refer to very different states that are elicited in vastly different contexts is hazardous and potentially misleading.

Lang's perspective on emotion offers a different view on why emotion words and emotion experiences often diverge. Lang (1993) has suggested that there are three major domains that contribute to emotion—action, physiology, and subjective experience. Within each of these domains, many further distinctions can be made but just among these three domains, Lang and his colleagues have argued that there are imperfect associations at best, since each reflects different features of emotion that do not necessarily cohere (Bradley & Lang, 2000; Lang, Levin, Miller, & Kozak, 1983). For instance, Lang et al. (1983) observed the relative independence among verbal report of affect, overt behavior and psychophysiological measures in response to certain commonly used methods of emotion induction. Bradley and Lang (2000) report that in response to mild to moderate elicitors of emotion, covariation between the response systems explains 15% of the vari-

ance at best (p. 244). Thus, on this view, emotion names and experiences should not "neatly pair."

One of the most fundamental issues lurking behind the surface of analyses such as that provided by Sabini and Silver (this issue) is how emotional experiences should be assessed and parsed. How are emotional experiences to be segregated into types? For example, Sabini and Silver provide a useful example in their analysis of pride. They suggest that pride is the word applied to the mental state of joy when that joy "is the product of a real accomplishment." They then go on to claim that "there is nothing other than its cause that distinguishes pride at winning Wimbledon from joy at winning the lottery." Our question to Sabini and Silver is: How do you know? What are the data that give us confidence in this interpretation? It is here that we believe that an appeal to the brain is useful, even necessary, for the rigorous resolution of these issues. Our models of emotion must honor the distinctions that are made by the brain, otherwise there will be theoretical and empirical inconsistency.

So let us use the distinction between pride and joy to make the case for why these are likely to be fundamentally different emotions and why an analysis of this kind requires an appeal to affective neuroscience. There are data that suggest that different regions of the prefrontal cortex (PFC) are required for some, but not all, forms of positive affect (see Davidson, 2000, 2004; Rolls, 1999 for reviews). Davidson has argued on the basis of experimental data that goal-directed positive affect such as the development of pride as one accomplishes one's goals, requires dorsolateral sectors of the left PFC. Data from Miller & Tomarken (2001), for instance, replicating findings from Sobotka, Davidson, & Senulis (1992), showed that presentations of a cue signaling the amount of reward that could be earned if the response is fast enough in an upcoming task were related to relative left lateral prefrontal activation. The mere receipt of a non-contingent reward elicits positive affect as well. However, non-contingent reward is unlikely to recruit these same regions of PFC.

On the basis of fundamentally different underlying neurobiological processes, particularly in those parts of the circuitry that are likely to impact upon subjective experience, we would suggest that pride and joy in the sense being used by Sabini and Silver (this issue) are indeed different emotions and are not the same mental state simply caused by different antecedents. If the same mental state would underlie pride and joy, how can it then be that in these two states would yield,

among other, such different expressive behaviors? Darwin already indicated different facial and body movements associated with pride and joy, and recent work (e.g., Shiota, Campos, & Keltner, 2003; Tracy & Robins, 2004) mostly confirms these observations by Darwin. Unless such differences are taken as pure reflections of intended behaviors to communicate the person's beliefs to an audience, the most parsimonious explanation is one of different feeling states underlying these two emotions. At the very least, we would demand more compelling evidence to suggest that they are the same mental state, or even the specification of what evidence would satisfy Sabini and Silver that they are or are not the same mental state. What we are given are mere assertions with little other evidence.

Of most importance in considering the issues raised by Sabini and Silver (this issue) is simply the nature of the evidence that could potentially be used to adjudicate among the different views that might be offered of how "emotion works." What kind of evidence would we use to establish that pride at winning Wimbledon and joy at winning the lottery are really the same state? Sabini and Silver base their argument upon studies in which scenarios are presented, where the participants are asked to verbally report on how they would feel if they were in different emotion-eliciting situations. As we know all too well, a sole reliance upon self-reported feeling states has a number of problems, and in particular when people are asked to imagine being in a particular situation and to indicate what they would do in such a situation, their reports bear little resemblance to how they actually behave in such a situation (see e.g., Gilbert & Ebert, 2002). When using such methodologies, what people most likely reflect in their responses is not an accurate reflection of what they might feel at some stage in a situation as described in a video or vignette, but a stereotyped, mostly socially construed, response about how they believe emotions should work. The data that Sabini and Silver thus present in support of their argument, although leading to interesting hypotheses about how emotions might (or might not) differ, probably reflect a cultural prototype more than reports of how one actually would emote in such a situation. Given these problems with relying upon emotion words to make inferences about emotional experiences, it is not clear what evidence Sabini and Silver would use to compare the similarities and differences between two putative emotional states. In the absence of solid operational criteria, it is impossible to resolve between these contrasting views.

With regard to the role of the context in feeling states, it is our belief, along with many others, that the context in which a person finds him- or herself will be an important determinant of what type of emotional response the person experiences. Sabini and Silver (this issue) seem to offer a different view. They suggest that different contexts merely provide differing interpreta-

tions of the same underlying emotion. They offer their example from a "scenario study" they conducted (Sabini, Garvey, & Hall, 2001) to support their claim. However, we ask how they really know that in their case, shame and embarrassment are merely different interpretations of the same "raw feeling"? What is their independent measure of "raw feeling"? On the basis of reviewing an extensive corpus of literature in affective neuroscience, Davidson, Jackson, and Kalin (2000) suggested that context changes the very core of emotion that would include the neural substrates of "raw feeling" and thus raw feeling itself.

Recent neuroscientific evidence from our laboratory (e.g., Urry et al., 2005), and that from Ochsner, Bunge, Gross, and Gabrieli (2002), highlights how the interpretation, or evaluation, of a context *changes* the emotion. This work has shown that presentations of negative pictures, known to induce negative affect, activates the amygdala, among other regions of the brain. When people are asked to reappraise the content of the pictures by imagining a better or worse outcome of the scenes depicted in the slides, not surprisingly, regions within PFC important for working memory and attention are more highly activated compared to passive viewing of the images. Most importantly, activation in the amygdala increased when people were asked to imagine a worse outcome and decreased when asked to imagine a better outcome. Given the role of the amygdala in the circuitry of (negative) emotion, both in attaching emotional significance to information and in triggering changes in the autonomic nervous system, these findings suggest to us that alterations in the interpretation of negative information alters the "raw feeling" by means of top-down control of the amygdala by regions within PFC. If the reappraisal of the scenes simply results in a differing interpretation of the same "raw feeling" as Sabini and Silver (this issue) assert, then one would predict that regions of PFC would reflect the reappraisal process, in the absence of any change in the amygdala. These data suggest that appraisals and reappraisals of emotionally relevant situations in everyday life, mostly occurring outside of awareness, are not necessarily merely interpretations of the same "raw feeling" but rather actually change the fundamental neural substrates of the experience and thus alter the experience itself.

In conclusion, it is our view that the study of emotion is incomplete without taking into account the changes that occur at multiple levels. Not all emotion is conscious and thus accessible to self-report. We suggest, in line with many others, that emotions are multi-faceted phenomena, are accompanied by changes in a number of components, and that reliance upon self-report alone in the study of emotion will not resolve issues such as the ones addressed by Sabini and Silver in the target article. Ultimately, even though affective neuroscience is still developing, we suggest

that the study of the brain will provide us with crucial insights into the mechanisms underlying emotion elicitation and experience.

Note

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Language, Emotion Attribution, and Emotional Experience

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Sabini and Silver (this issue) provide a clever and thought-provoking analysis of emotion language with a precision and clarity that is all-too-rare in social psychological treatments of emotion. The nature and function of emotional states, and the extent to which both may depend on language and situational contexts, are persistent (and therefore always timely) issues. In no other area of psychology is there a more striking gap between our understanding of how of mental states function, and what those mental states actually are, than in the study of emotional experience. To a large extent this may be due to the interaction of definitions and mechanisms of emotion: Discrete, basic, and phylogenetically primary emotions

are born of different theoretical assumptions (if not different theorists) than emotions that follow from cognitive assessments (for example), and each imply and constrain models of emotion-cognition interaction in very different ways. Regardless of whether their characterization of particular emotions and their relationship to emotion language is apt, Sabini and Silver are provoking a debate that needs to be had, somewhere, among emotion theorists.

However, as useful and important as the arguments are, and as interesting as a many-to-one mapping of language to emotional experience would be, the authors' data support only the much weaker claim that language does not map one-to-one onto emotion attri-