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The Importance of the Mind for Understanding How Emotions Are Embodied

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For centuries, philosophers and psychologists alike have struggled with the question of how emotions seem to affect not only the mind, but the body, too. Indeed, no definition of emotion would be complete without a corresponding description of the physiological changes that typically accompany emotion. William James, in his influential chapter "What Is an Emotion?" (James, 1884), noted that without the distinctive physiological changes that accompany emotions, emotions no longer seem to be emotional. Here, he wrote: "If we fancy some strong emotion, and then try to abstract from our consciousness of it all the feelings of its characteristic bodily symptoms, we find we have nothing left behind, no 'mind-stuff' out of which the emotion can be constituted, and that a cold and neutral state of intellectual perception is all that remains."

Although it is true that there is something nearly magical about the fact that feeling angry seems to correspond with blood pressure increases and that feeling scared goes along with our hairs standing on end, one has to wonder whether our fascination with the physical embodiment of emotion is actually a red herring—directing our attention to the body and away from the mind. For example, there are plenty of other feeling states that, just like emotions, involve both physiological changes as well as valence and arousal—states such as hunger, thirst, pain, itch, or warmth. However, we

don't typically think of these "somatic states" as emotions and thus, the fact that states like hunger or pain are embodied doesn't seem nearly as special, magical, or worth thinking twice about. For these somatic states, we rarely ask "how are these feeling states physically embodied?" because it seems obvious that these states are physically embodied. Yet, because emotions seem to play a role at the level of both the mind and the body, it becomes harder to understand how one translates into the other.

A better question for helping us to understand emotion may not be "how is emotion physically embodied?" but rather "why do we distinguish emotions from these other somatic states that clearly involve physiological changes and strongly valenced feelings—such as pain, hunger, or warmth?" In other words, why do we place emotions—such as anger, sadness, or joy—in a different category of experience than other somatic states, and what does that mean for our understanding of emotions? In the end, I will suggest that in order to understand the embodiment of emotion, we need to be looking to the mind, not just the body.

Why Is Sadness an Emotion, But Pain Is Not?

Though emotion researchers have yet to agree upon a single definition of *emotion*, there are a few common themes to most definitions. Most definitions of emotion include an accounting of the fact that emotions involve strong and valenced (positive or negative) feelings, physiological activation, and a plan for action; and some definitions also highlight the fact that emotions instantiate behavioral and physiological changes that help an organism survive by responding to challenges or goals (Frijda, 1988; Izard, 2010; Kleinginna & Kleinginna, 1981; LeDoux, 2012; Oatley & Johnson-Laird, 1987). However, by these criteria, certain somatic feeling states such as hunger, pain, warmth,

thirst, and nausea should also be included as emotions. For example, hunger is characterized by strong negative feelings, physiological activation (e.g., stomach contractions), and a plan to seek out and eat food, and these physiological and motivational changes facilitate survival (e.g., obtaining calories, preventing starvation). Yet it's reasonably safe to assume that most people (even those who aren't emotion researchers) would not lump "hunger" into the emotion category. Why do these other "somatic states" that satisfy all of the definitional requirements for emotions not count as emotions? Why is sadness an emotion, but pain is not? Why is disgust an emotion, but nausea is not? Clearly, being physically embodied is not what differentiates emotions from these other somatic states, as they all clearly affect the body. So, what makes emotions special or different from these other states?

Although there are many ways in which emotions and somatic states differ, I will focus on two distinguishing factors here; namely, (1) that emotions "feel like" they are in the mind, whereas somatic states "feel like" they are in the body; and (2) that we can consciously access the eliciting factors of emotion but not those of somatic states. Isolating these key differences may help us to identify more tractable ways to understand and study emotion.

Emotions "Feel Like" They Inhabit the Mind; Somatic States "Feel Like" They Inhabit the Body

One of the main qualities that differentiates emotions from other somatic feeling states is that whereas somatic states "feel like" they are in the body, emotions "feel like" they are in the mind as well. As noted by Shweder (1994): "It [*an emotion*] is a somatic or affective experience with a mission and with more than (or other than) just a biochemical

or somatic cause." Thus, whereas hunger, pain, or thirst feel like they primarily affect and are "about" the physical body, emotions, on the other hand, feel like they affect and are about more than just the body; they affect the mind, they are about the *self*. Indeed, this may be because, unlike somatic feeling states, which provide information about the state of the body, emotions provide information about the organism's relationship to the environment (Denton, 2009; Kleinginna & Kleinginna, 1981). In fact, Lazarus's original definition of "appraisal"—which he viewed as necessary and sufficient for eliciting emotion—referred specifically to the evaluation that environmental events were personally relevant or had consequences for the self (Lazarus, 1991).

Interestingly, it is probably this very distinction between body and mind that leads us to puzzle over how emotions are embodied. It is easy to accept that somatic states, like hunger, are embodied because they are about the body. Emotions, on the other hand, are about the mind, so it seems more difficult to understand how we get from something that affects the mind to something that affects the body. However, if we think about these physiological changes from an evolutionary perspective, this mind–body difference becomes trivial. For instance, it is just as easy to imagine how, with regard to emotions, we evolved physiological responses to changes in our *external* environment that helped us to deal with common threats or challenges (e.g., heartbeat increases during fear) as it is to imagine how, with regard to somatic states, we evolved physiological responses to changes in our *internal* environment that helped us to deal with threats or challenges (e.g., hunger pangs). However, this fundamental human distinction between body and mind can make it seem especially puzzling that emotions, which so clearly affect the mind, could also be embodied.

This inherent tendency to distinguish between mind and body may reflect a fundamental way in which the brain is organized (Lieberman, 2007, 2009; Uddin et al., 2007). Studies have shown that we use different neural systems to understand bodies vs. minds. We utilize a *lateralized* frontoparietal network to understand the physical aspects of the self, such as recognizing one's face or voice or retrieving information about the body, whereas we use a more *medial* frontoparietal network to understand the psychological self, such as when thinking about one's traits, qualities, or preferences (Lieberman, 2007). Likewise, thinking about *others* in terms of their bodies (e.g., in order to imitate them) leads to activity in the *lateral* frontoparietal network (Iacoboni et al. 1999), whereas thinking about others in terms of their minds or "mentalizing" (e.g., in order to understand what they are like or what they might be thinking) leads to activity in the *medial* frontoparietal network (Mitchell, 2008).

Thus, our fascination with the embodiment of emotion may be due to the fact that we naturally compartmentalize stimuli or experiences as mental or physical. Emotions are unique in that they are mental experiences that are also embodied, which may, at times, lead researchers to focus the magnifying glass on the physiological changes that accompany emotion. However, focusing on the "mental side" or the fact that we process emotions as affecting the mind may be more critical for differentiating emotions from other somatic states not typically classified as emotion.

For instance, inducing physiological changes on their own, such as with an injection of adrenaline, has been shown to lead to experiences described in terms of sensations, but not in terms of true emotional states (only "as if" states, with subjects reporting that they felt "as if afraid" or "as if expecting a great joy") (Cannon, 1927).

Conversely, reducing the experience of physiological changes by way of spinal cord injury does not always interfere with an individual's ability to experience emotion (Bermond et al., 1991; cf. Hohmann, 1966). However, those with damage to medial prefrontal regions, involved in understanding minds, do show an impaired ability to recognize emotional states (Heberlein et al., 2008; Keane et al., 2002; Werner et al., 2007), and the magnitude of this impairment is associated with an impaired ability to experience these states (Heberlein et al., 2008). Damage to lateral prefrontal regions, on the other hand, does not impair emotion recognition (Heberlein et al., 2008). Such findings suggest that mechanisms associated with processing minds are as critical to emotional experiences, if not more, as mechanisms related to somatic states. Hence, focusing on the way we "process" the minds of ourselves and others is critical for understanding emotion.

The Elicitors of Emotion are Consciously Accessible; the Elicitors of Somatic States Are Not

Another factor that distinguishes emotions from somatic states is the extent to which the eliciting factors are accessible to consciousness. Although both emotions and somatic states are themselves consciously experienced, they differ in that we have no consciousness of the factors that trigger somatic states, whereas we do have consciousness of the factors that trigger emotions.

For example, when we feel hunger, we know we need to eat, but we have no conscious or accessible representation of the eliciting factors that led to the hungry feelings. We do not consciously represent a depletion of our glucose or energy supply. We may infer it based on our feelings of hunger, but we do not consciously experience "a

lack of glucose." Similarly, with a headache, we feel the painful feeling but do not consciously experience the factors that elicited the pain (e.g., constriction of blood vessels). Emotions, on the other hand, typically have more of an accessible story with consciously accessible eliciting factors. Thus, "I feel sad because I wanted something that I could not have." "I feel angry because somebody betrayed me." "I feel embarrassed because I did something socially inappropriate." The reasons for the emotional experience can be consciously experienced and recognized and thus differentiate emotion from these other somatic states. In this way, emotions, more so than somatic states, are "complex narrative structures that give shape and meaning to somatic and affective experiences" (Shweder, 1994).

One interesting consequence of the fact that emotions have consciously accessible elicitors is that emotions may then be more easily relived or re-experienced than somatic states. We know from past experience that thinking about a prior loss can sometimes make us feel sad again, even though the eliciting event occurred long ago. However, thinking about a past physical pain, for instance, cannot bring back that feeling of pain. Likewise, thinking about a past feeling of hunger cannot bring back those hungry feelings.

Indeed, it has now been empirically demonstrated that individuals are more easily able to relive the socially painful feelings associated with recalling a past episode of betrayal or social pain (which is more in line with an emotional state; Eisenberger, 2016) than they are able to relive the physically painful feelings associated with recalling a prior episode of physical injury (which is more in line with a somatic state) (Chen et al., 2008). This may be due, in part, to the fact that we can consciously access and reactivate the

elicitors of emotional states, but not those of somatic states. Hence, with regard to emotional states, individuals can think back to the situation and the eliciting factors that led them to feel social pain, and because they, in some ways, are experiencing the same eliciting events that they did when the event occurred, they can re-experience the emotional state of social pain. With regard to somatic states, however, there are no consciously accessible eliciting events to re-experience. For example, no matter how many times we imagine having low glucose levels, this will not elicit feelings of hunger, and no matter how many times we imagine constricted blood vessels, this will not trigger a headache.

To examine these processes more closely, we explored the psychological and neural correlates of reliving social vs. physical pain (Meyer et al., 2015). Replicating prior work (Chen et al., 2008), we demonstrated that reliving social pain led to greater experiences of relived pain than reliving physical pain, even though both experiences were matched in how painful they felt when they initially occurred. In addition, consistent with the idea that emotional states have consciously accessible elicitors (such as the thoughts and intentions of oneself and others), reliving the emotional state of social pain was associated with a greater focus on the thoughts, feelings, and intentions of oneself and others—a process called *mentalizing*. Moreover, this greater focus on mentalizing when reliving social pain was associated with higher levels of re-experienced social pain. On the other hand, reliving physical pain was associated with a greater focus on the physical state of the body; however, just as thinking about low glucose levels cannot elicit hunger, this enhanced bodily focus was not associated with feeling pain when reliving the physical pain event.

In addition, neural data showed that reliving social pain not only led to greater activity in the neural regions that process the affective or distressing component of pain (dorsal anterior cingulate cortex [dACC] and anterior insula [AI]; Treede et al., 1999), but it also led to increased activity in the dorsomedial prefrontal cortex (DMPFC), associated with processing the minds of oneself and others (Mitchell, 2008). Moreover, when reliving social pain, activity in DMPFC was functionally coupled with increased affective pain-related activity (dACC, AI), which was associated with greater self-reported pain. This is similar to other work showing functional connectivity between DMPFC and affective pain regions (dACC, AI) when individuals must consider the mental states of others to induce negative emotions, such as when feeling bad in response to evaluative feedback (Eisenberger et al., 2011) or when empathizing with the suffering of someone else (Zaki et al., 2007). Hence, it is possible that being able to re-experience the eliciting factors of social pain—such as thoughts about the negative intentions of others—may be a key ingredient for re-experiencing the socially painful emotional state.

Reliving physical pain, on the other hand, did not activate neural regions involved in mentalizing, but instead led to increased activity in lateral prefrontal regions, associated with processing the bodies of oneself and others. Activity in these lateral prefrontal regions was functionally coupled with sensory-related neural regions (primary somatosensory cortex), but these sensory-related regions were not associated with self-reported pain.

Interestingly, this medial–lateral distinction in the prefrontal regions engaged by reliving social vs. physical pain maps onto the mind–body distinction mentioned earlier. Thus, when reliving social pain, an emotional state, individuals were more likely to

engage a medial prefrontal network, associated with thinking about the “minds” of oneself and others; whereas reliving physical pain engaged a lateral prefrontal network, associated with thinking about the “bodies” of oneself and others. This medial–lateral distinction in both our ability to process minds (medial) vs. bodies (lateral) and our ability to consciously access the causal elicitors (medial) vs. not (lateral) is an interesting one and suggests that computational differences implemented in medial vs. lateral prefrontal networks may engender these different properties.

Conclusion

In sum, by comparing emotions with other somatic states such as pain and hunger, we notice that what is special about emotions is not just that they are physically embodied, but rather that they have a unique mental state element that these somatic states don’t have. Specifically, emotions “feel like” they affect the mind in addition to the body (which may explain why we are more likely to focus on the body’s contribution to emotions), and we have conscious access to the causal elicitors of emotion. Together, this means that physical embodiment is not enough for true emotions to take shape, and these representational mental states are needed as well. Moreover, this critical involvement of consciously accessible mental states in emotion seems to be what allows us to re-experience or relive emotions, but not these other somatic states. Thus, although the physiological embodiment of emotion is a unique factor that separates emotions from other types of cognitive experiences, we must not forget about the importance of processing mental states in the creation of emotional states.