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Does language do more than communicate emotion?

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Abstract

Language can certainly communicate emotions, but growing research suggests that language also helps constitute emotion by cohering sensations into specific perceptions of “anger,” “disgust,” “fear,” etc. The powerful role of language in emotion is predicted by a *constructionist* approach, which suggests that emotions occur when sensations are categorized using emotion category knowledge supported by language. We discuss the accumulating evidence from social cognitive, neuropsychological, cross-cultural, and neuroimaging studies that emotion words go beyond communication to help constitute emotional perceptions, and perhaps even emotional experiences. We look forward to current directions in research on emotional intelligence, emotion regulation, and psychotherapy.

Keywords

emotion perception; emotion experience; language; concepts; construction

“That which we call a rose, by any other name would smell as sweet”—or would it? Shakespeare's verse is so highly quoted because it captures something curious about human consciousness. We take for granted that language communicates our perceptions to others. But what if language also helps constitute those perceptions in the first place? Although Juliet surmised that language is just for communication, findings from psychology and neuroscience are beginning to suggest otherwise—a flower might indeed be perceived as sweeter by virtue of being categorized a “rose.” In this article, we draw on growing evidence that language helps constitute emotions. Together, these new findings suggest that someone else's facial movements might in fact look different by virtue of being categorized as an instance of “anger.” These findings make way for new hypotheses about the role of language in emotional experiences, which have important implications for emotional intelligence, emotion regulation, and psychotherapy.

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A role for language in emotion: Predictions from a constructionist theory

The role of language in emotion is uniquely predicted by *constructionist* theories of emotion. Constructionist theories were nascent in early writing on emotion and can be observed in the work of James (1890), Wundt (1897/1998), Duffy (1941), Shachter and Singer (1962) and Mandler (1990), to name a few (

According to our particular constructionist view, language plays a role in emotion because it helps acquire, organize, and use the concept knowledge that is an essential element in emotion perceptions (Barrett et al., 2007; Lindquist & Gendron, 2013) and perhaps even experiences (Barrett, 2006; Lindquist, 2013). We draw our predictions from cognitive science, which demonstrates the important link between the linguistic and conceptual systems. Language helps individuals acquire new concepts, both early in life (Xu, 2002) and into adulthood (Lupyan et al., 2007). Once acquired, linguistic concepts interact with and augment other cognitive and perceptual processes, warping memories of perceptual objects towards more categorical representations, and even shaping online visual perception (Lupyan, 2012). For instance, merely hearing a verbal label during a visual perception task helps individuals accurately detect the presence of stimuli that would otherwise be invisible (Lupyan & Spivey, 2010; Lupyan & Ward, 2013). Neuroscience research finds that language may shape perception by virtue of rapid and reciprocal connections between early sensory brain regions and the orbitofrontal cortex—a region associated with representing semantic knowledge (Lamme & Roelfsema, 2000; Pessoa & Adolphs, 2010). In this way, conceptual information alters and constrains on-going processing of sensory information.

Although evidence from cognitive science suggests that language shapes visual perception, relatively less research has focused on emotion perception. Herein we focus on the growing evidence that language helps categorize visual sensations of another person's facial movements into perceptions that the person is feeling anger, disgust, joy, pride, etc. Building on these emotion perception findings, we then extrapolate to new hypotheses about how language might shape individuals' experiences of emotion.

Language helps constitute perceptions of emotion

Impairing language accessibility impairs emotion perception

The best evidence that language helps constitute emotion perception comes from studies that experimentally disrupt participants' access to linguistic emotion concepts and find a corresponding disruption in emotion perception. In several such studies, we manipulated participants' access to words for linguistic emotion concepts using a method called semantic satiation and demonstrated impairments in emotion perception using two different perceptual measures. Semantic satiation involves repeating a word out loud 30 times (v. a 3-time control) until the word temporarily loses its meaning (Black, 2004). In the critical conditions of our first set of studies, participants repeated a word (e.g., "anger") that was relevant to upcoming pictures of emotion facial expressions (e.g., two scowling faces) either 30 or 3 times. Participants then completed a perceptual matching task that did not explicitly involve language in which they judged whether two facial expressions (e.g., two scowling faces) represented instances of the same emotion category or not. As predicted, participants

whose access to the relevant emotion word (e.g., “anger”) was reduced following satiation were slower and less accurate to perceptually match the two faces (e.g., two scowling faces) (Lindquist et al., 2006).

Although this first study is suggestive, it could be argued that semantic satiation is interfering with ancillary processes required by the matching task rather than processes related to perception of the face per se. We accounted for this possibility in another study (Gendron et al., 2012). As before, access to an emotion concept (e.g. “anger”) was disrupted using semantic satiation prior to presenting a related facial expression (i.e. a scowling face; Figure 1). Yet this time we measured the effects of semantic satiation implicitly. Specifically, we examined whether following semantic satiation of a relevant emotion word, a face retained the ability to “prime” a subsequent perception of the identical face (see Figure 1). Such perceptual priming is evidenced when seeing a stimulus once causes a person to render faster judgments about the identical stimulus on later presentations (Grill-Spector, 2008). In our study, perceptual priming was measured as participants’ speed to render an arbitrary perceptual judgment (i.e. how close or far apart the eyes were) about the second face presented. We hypothesized that if emotion concepts are routinely involved in emotion perception, then disrupting access to emotion concepts ought to interfere with how an emotional face is perceived, which would in turn impair its ability to perceptually prime itself later in the trial (see Figure 1). Consistent with this hypothesis, semantic satiation interfered with the ability of the first face to facilitate judgments made about the subsequently presented face, even though the task involved making an arbitrary perceptual judgment that did not itself require access to emotion concepts. Importantly, our findings were not due to fatigue because satiating an irrelevant word (e.g., “idea”) did not similarly impair a face’s ability to perceptually prime itself later in the trial.

We further tested whether language helps constitute emotion perception by examining emotion perception in patients with semantic dementia. These patients have permanently damaged accessibility to words due to a neurodegenerative disorder (Gorno-Tempini et al., 2011). In a task that did not explicitly require labels, patients freely sorted 120 images of 20 identities making 6 facial expressions (anger, disgust, fear, happiness, sadness, and neutral) into piles. If patients with semantic dementia were able to perceive emotion on faces, then like our age-matched healthy control participants, they would create roughly six piles for the six emotion categories portrayed (e.g., a pile of scowling faces for anger, frowning faces for sadness, wide-eyed faces for fear, etc.). Yet patients with semantic dementia did not make the same piles. Instead, they created 3-4 piles that represented the broader categories of unpleasantness (angry, fearful, disgusted, and sad faces), pleasantness (happy faces), and neutral (Lindquist et al., 2014). Without available linguistic emotion concept knowledge, patients with semantic dementia could not make meaning of facial expressions beyond the broad dimension of valence (unpleasantness v. pleasantness).

Increasing language accessibility enhances emotion perception

If impairing access to linguistic emotion concepts impairs emotion perception, then it stands to reason that increasing accessibility to linguistic emotion concepts might enhance perceptual categorization, causing individuals to see facial expressions in terms of specific

emotion categories. Indeed, prior to the development of language, infants only reliably differentiate between pleasant, unpleasant, and neutral expressions (e.g., five-month-olds look longer at any unpleasant face, whether fearful, angry or sad, after habituating to happy faces; Bornstein & Arterberry, 2003; for a review see Widen, 2013). Yet as toddlers acquire and use words for “sadness,” “anger,” and “fear,” in discourse, they become able to perceptually categorize different unpleasant expressions (Widen, 2013). For instance, two-year-olds use the very simple emotion labels “angry” and “happy” in daily discourse and like infants and semantic dementia patients, reliably differentiate faces in terms of valence. Yet two-year-olds cannot differentiate between more specific unpleasant emotion categories (Widen, 2013). When two-year-olds are given a set of pictures depicting five emotion categories and are asked to perceptually match only those faces that match an additional picture (e.g., an angry face) by placing them in a box, they place all unpleasant faces (angry, sad, disgusted, fearful faces) in the box but leave out happy faces. Yet as 3- and 4-year-olds begin to acquire the concepts “sad” and “fear,” they begin to leave those faces out of the “angry” box, demonstrating an ability to perceptually categorize unpleasant faces into more specific emotions (Russell & Widen, 2002; Widen, 2013). By the age of 7, children show adult-like perceptual categorization of most faces save disgust (Widen, 2013). These findings suggest that as children acquire emotion words, they become able to perceive facial behaviors in terms of emotion categories.

Although the findings with children are correlational, experimental studies in adults demonstrate that adults become able to perceptually categorize unfamiliar facial expressions once they've paired faces with words. In the first phase of an experiment, adults viewed pictures of unfamiliar Chimpanzee facial muscle movements (e.g., a bared teeth or screaming face) or learned to associate the faces with nonsense words. Participants were later shown images taken from a continuous morphed array of two facial expressions (e.g., ranging from bared teeth to a scream) and were asked to indicate when two faces from the array were similar to one another, and when they were different. Participants who had learned to associate faces with a label displayed “categorical perception”—they were able to perceive a categorical boundary at the midpoint in the morphed array of bared teeth and scream faces—but participants who did not learn to associate faces with a label did not perceive such a categorical distinction (Fugate et al., 2010).

Cultural relativity in emotion perception

Finally, there is evidence from cross-cultural research that people who speak different languages perceive emotion differently from one another. We recently assessed emotion perception in speakers of Herero, a dialect spoken by the remote African Himba tribe, and American English speakers. Participants were asked to complete the emotional face-sorting task that the semantic dementia patients discussed previously completed. Whereas English-speakers created relatively distinct piles for anger, disgust, fear, sad, happy and neutral faces, Herero-speakers did not sort in this so-called “universal” pattern. Even labeling the piles in advance with translations of English emotion words did not help the Herero-speakers' performance. Importantly, the Herero-speakers sorted similarly to one another, suggesting that they understood the instructions but were using different perceptual cues than the English-speakers to guide their sorts (Gendron et al., 2014).

Herero-speakers might have performed differently than English-speakers because the perceptual representations anchored by emotion words varies across languages. Although this hypothesis has yet to be addressed with Herero-speakers, data from Chinese- v. English-speakers is suggestive. Chinese- and English-speakers were presented with videos of computerized facial muscle movements that changed over time and in random patterns. For instance, videos sometimes depicted furrowed brows, a relaxed nose and a scowl (consistent with the Western English representation of “anger”) and other times depicted furrowed brows, a scrunched nose and a smile (not consistent with any Western English emotion category). Participants were asked to indicate when the facial configuration was consistent with their representation of the categories “happy,” “surprised,” “fearful,” “disgusted,” “angry,” or “sad.” During analysis, the authors used reverse correlation based on participants’ self-reported indications (e.g., that a certain set of facial muscle movements belonged to the category “anger”) to reconstruct models (which are visualized as a video) of facial muscle movements for each emotion category, for each individual subject, and across subjects within each culture. These models displayed the visual features, that on average, participants from each culture thought were indicative of a certain emotion category (e.g., anger). Whereas English-speakers represented each of the six so-called universal categories with a distinct set of facial movements, Chinese-speakers did not, showing considerable overlap in the facial muscle movements they considered to be indicative of surprise, fear, disgust and anger (Jack et al., 2012). There was less agreement amongst Chinese participants about which facial muscle movements corresponded to each category, perhaps because the response options included in the task were translations of English emotion terms rather than the terms used most frequently by Chinese speakers. It is thus possible that Chinese-speaking individuals would show greater reliability for a different set of emotion categories that are more representative of their language—a point that underscores the linguistic relativity of emotion concepts and the cultural relativity of emotion perception.

A role for language in emotion experience

Thus far we've focused on the role of language in emotion perception because most research to date has done so for practical reasons—it is easier to experimentally manipulate and control visual images than sensations in someone's body. Nonetheless, our constructionist model unifies *emotion perceptions*, in which people categorize visual sensations of someone else's facial muscle movements as instances of emotion, and *emotion experiences*, in which people categorize interoceptions of their own body sensations as instances of emotion, under one framework with a common set of mechanisms to explain both (Barrett, 2013, in press; Lindquist, 2013). Our constructionist approach thus makes the novel prediction that concept knowledge represented by language also influences how individuals experience sensations interocepted from their own bodies (e.g., quickened heartbeat or accelerated breathing, etc.) as instances of specific emotions (e.g., anger v. disgust v. fear etc.) (Lindquist & Barrett, 2008). This novel hypothesis has important implications for how psychologists think of emotional intelligence, emotion regulation, and even psychotherapy, and current directions in research are suggestive of its promise.

Brain regions involved in semantics are active during emotion

Evidence from neuroimaging suggests that language helps constitute emotional experiences. For instance, when individuals experience emotions in the fMRI scanner, they not only have increased activity in limbic/paralimbic brain regions that correlate with bodily arousal, but they also have increased activity in lateral prefrontal brain regions that correlate with semantic retrieval and medial prefrontal regions that correlate with categorization of body states (Satpute et al., 2013). Meta-analyses of hundreds of neuroimaging studies confirm these findings: Brain regions that are consistently involved in language and semantics also have reliable increases in activity across studies of emotional experiences and perceptions (Kober et al., 2008; Lindquist et al., 2012) (see Figure 2). Although these findings are ultimately correlational, they are consistent with several behavioral studies that experimentally manipulate language accessibility and shape emotional experience.

Increasing language accessibility enhances emotion experience

In ongoing research, we are testing the constructionist prediction that accessible linguistic concepts shape how a person experiences his/her body state. For instance, in one study we increased participants' access to emotion concept knowledge, manipulated their body state, and measured whether they experienced the specific discrete emotion of fear. To increase access to emotion words, participants wrote a story about a character that felt "fear," "anger," or neutral. We next manipulated participants' body state by having them listen to unpleasant and highly arousing or neutral music. Consistent with the idea that accessible emotion words shapes how body states are experienced, we found that participants who felt unpleasant while knowledge about "fear" was accessible were more likely to behave in a fearful manner (i.e., be risk averse) than participants who felt unpleasant while knowledge about "anger" was accessible, participants who felt unpleasant while emotion knowledge was not particularly accessible, or participants who felt neutral while knowledge about "fear" was accessible (Lindquist & Barrett, 2008).

Another recent study demonstrated that the accessibility of emotion words during a stressful task actually shapes participants' resulting cardiovascular profile. Participants who labeled their emotions while completing a stressful mental arithmetic task showed physiological responses consistent with an experience of threat (i.e., increased total peripheral resistance; TPR, relatively reduced cardiac output), whereas participants who did not label their emotions experienced a physiological profile more consistent with active coping (i.e., decreased TPR, increased cardiac output) (Kassam & Mendes, 2013). Together, these findings point to the constructionist hypothesis that the presence of emotion words during the experience of affective states shapes participants' behavior, physiology, and perhaps even their experiences.

Manipulating language results in emotion regulation

If language helps constitute emotional experiences as a constructionist view predicts, then this has far-reaching consequences for clinical psychology. Although psychologists have long known that putting feelings into words after the fact helps diminish them (Pennebaker & Beall, 1986), recent research on affect labeling (Kircanski et al., 2012), conceptual re-appraisal (Jamieson et al., 2012), and mindfulness-based therapies (Goldin & Gross, 2010),

hints that training individuals to categorize their feelings as instances of emotions in the moment can reduce phobias and stress. For instance, explicitly labeling facial expressions with emotion words produces decreased activity in the amygdala (Lieberman et al., 2007), a brain region that responds to the presence of uncertain stimuli and promotes autonomic responding (Cunningham & Brosch, 2012; Whalen, 2007). Language might therefore help regulate emotion by reducing the uncertainty of sensations in the world or body—once a person knows what sensations mean, he or she can do something about them.

Techniques using emotion words might therefore be fruitful avenues for training emotion knowledge and emotion regulation, in both clinical and non-clinical settings. For instance, the emotion perception deficits observed in Autism are mediated by impairments in using words to label emotional states (i.e., Alexithymia) (Cook et al., 2013). Training children to label the emotions of themselves and others leads to a host of positive social and academic outcomes (Hagelskamp et al., 2013). In fact, psychotherapy might operate by helping individuals to increase the complexity of their emotion category knowledge and more specifically label their emotional experiences and perceptions.

Conclusion

Linguistic concepts clearly do more than just communicate emotion. Evidence that linguistic concepts interact with visual sensations to influence the emotion seen on another person's face make way for new hypotheses about the role of language in emotion experience. Early findings are suggestive that language helps shape how people make meaning of their body states, and perhaps, how they regulate their emotions.

The idea that language shapes experience is not new. Questions about the role of language in experience are often aligned with the Linguistic Relativity Hypothesis (LRH; Whorf, 1956), the oft-debated idea that language can shape thought and experience (Boroditsky, 2003). Our argument is consistent with, yet distinct from the LRH. The extreme interpretation of the LRH—that language determines all experiences—is untenable. Yet the idea that both sensory information and conceptual information contribute to conscious experience has been long accepted (Bruner & Postman, 1948). What remains a question for contemporary scientists is the *relative* extent to which sensory information and conceptual information contribute to emotion.

On one end of the spectrum, “basic emotion” approaches argue that language plays a minor role in emotion. If emotions are triggered by innate, dedicated mechanisms that produce specific “expressions” of 5-7 universal emotion categories (e.g., facial muscle movements, behaviors, bodily changes, and feelings) (Ekman & Cordaro, 2011; Izard, 2011; Panksepp & Watt, 2011), then language might help identify or express pre-existing perceptions and experiences of those emotions (Ekman & Cordaro, 2011; Ogarkova et al., 2009) (see Figure 3a). By contrast, constructionist views predict that language plays a constitutive role in emotion by interacting with sensory information from the body and world during the actual formation of discrete emotions (see Figure 3b).

Of course, further research is required to develop a more mechanistic understanding of constructionist accounts. Findings from cognitive science suggest that language dynamically constitutes emotion because it activates representations of categories, and then increases processing of sensory information that is consistent with conceptual representations (Lupyan & Ward, 2013). In the case of emotion, language might not only increase attention to sensory information (e.g., a furrowed brow on someone's face; a beating heart in one's own body), but might feedback to infuse those perceptions with additional information (e.g., a perception or experience of anger), causing a discrete experience of emotion to “pop out” in consciousness (cf., Barrett et al., 2007). That language has the power to shape emotion in some manner is increasingly clear—the question that remains for future research is just how far language reaches to shape our emotional perceptions and experiences.

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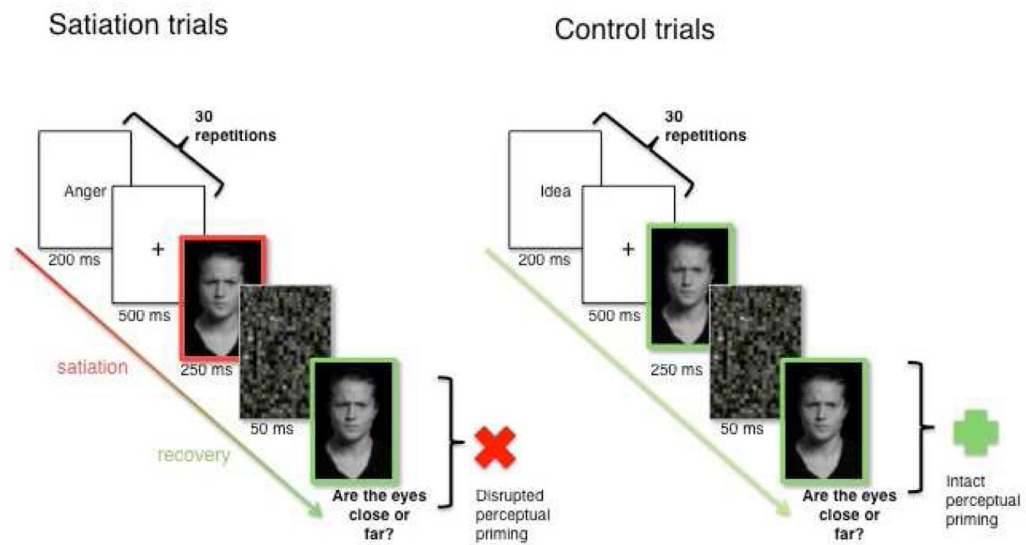


Figure 1. Critical trials from the perceptual priming paradigm

On satiation trials in Gendron et al. (2012) (left), participants repeated a relevant emotion word out loud 30 times prior to seeing the first face in a perceptual priming paradigm. We predicted that without access to the meaning of a relevant emotion word, perception of this first face would be impaired. Upon perception of the second face, participants' access to the word would have recovered and they would be able to perceive the face normally. The result would be that face 1 (red) and face 2 (green) would appear different from one another and perceptual priming would not occur. By contrast, on control trials, participants would have access to the meaning of a relevant emotion word during perception of a first face (green) and perception of a second face (green), which would result in perceptual priming. (Figure adapted from Gendron et al. 2012).

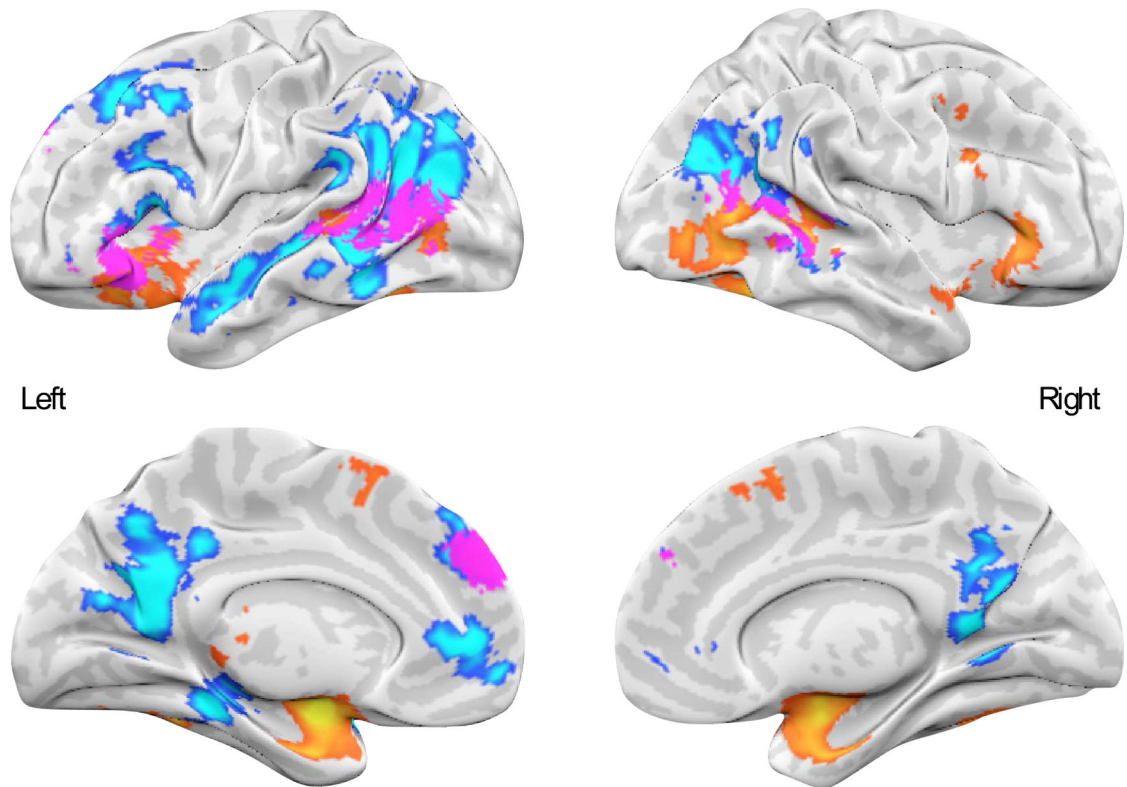


Figure 2. Overlap between brain regions involved in emotion and semantics

Meta-analytic summaries of functional neuroimaging studies on emotion (orange; evoking discrete emotions relative to neutral conditions) and semantic processing (blue; e.g. word processing or object naming conditions) show overlaps in several cortical regions (purple). We thank Dr. Jeffrey Binder for providing semantic judgment meta-analysis data.

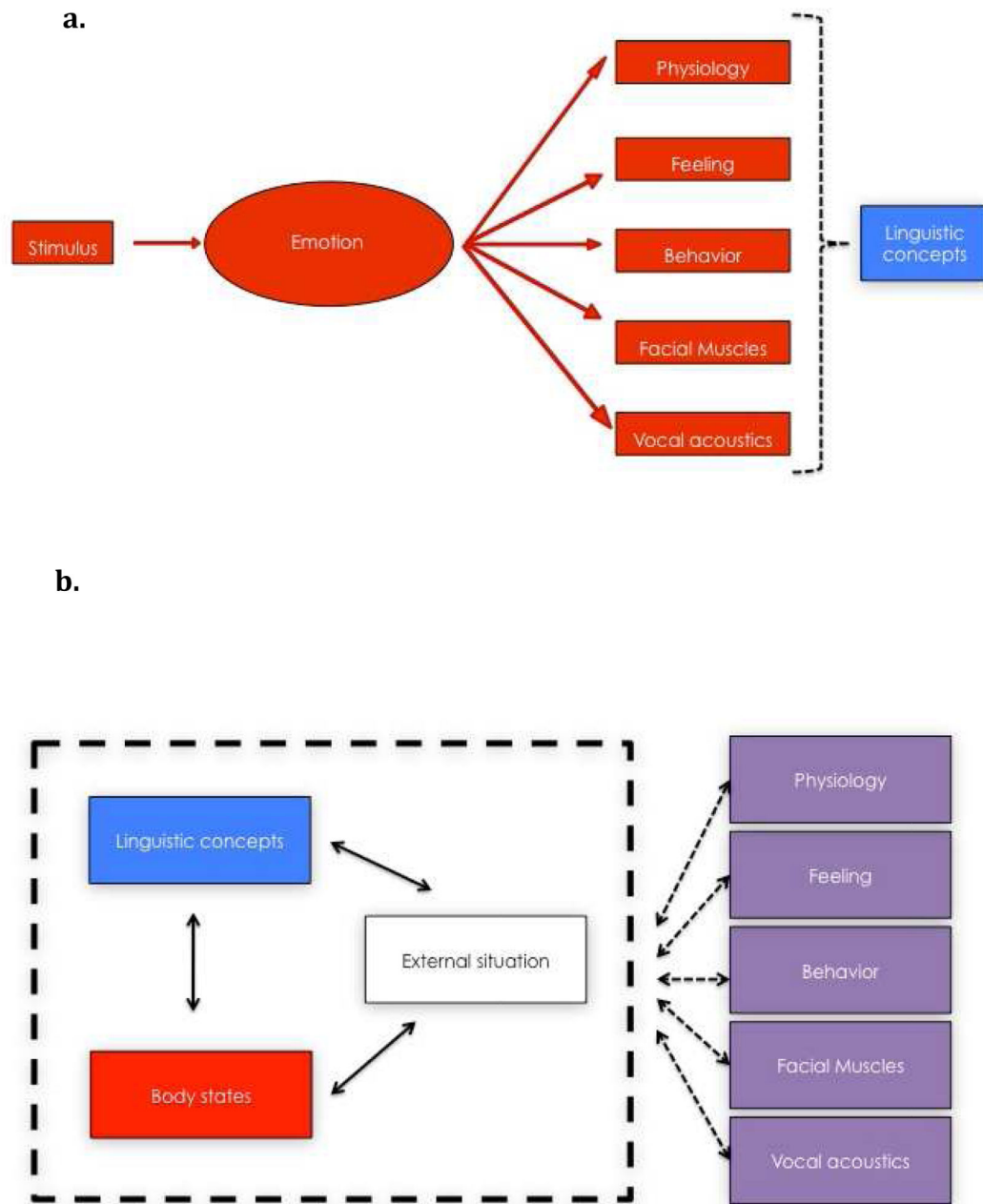


Figure 3. Basic v. Constructionist approaches to emotion

In a basic emotion view (a), linguistic concepts are at most invoked after an emotion has formed and are purely used for communicating emotions to others. In many causal appraisal models, a cognitive appraisal is thought to intervene between the stimulus and emotion, but this is not typically thought to be a linguistic process per se. By contrast, in a constructionist view (b), linguistic concepts help make meaning of ambiguous body states in light of the present context. Linguistic concepts are thus constitutive of the emotion, helping to create the experience in the first place.