Essentialist biases in reasoning about emotions

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Abstract

A large literature debates whether emotions are universal and innate. Here, we ask whether reasoning about such matters is shaped by intuitive Essentialist biases that link innateness to the material body. To gauge the perception of innateness, we asked laypeople to evaluate whether emotion categories will be recognized spontaneously by hunter-gatherers who have had no contact with Westerners. Experiment 1 shows that participants believe that emotions are innate and embodied (facially and internally), and these two properties correlate reliably. Experiment 2 demonstrates that the link is causal. When told that emotions are localized in specific brain areas (i.e., embodied), participants concluded that emotions are innate. Experiment 3 shows that this naïve view persists even when participants are explicitly informed that these emotions are acquired. Our results are the first to suggest that laypeople believe that emotions are embodied and therefore innate.

A large literature debates whether emotions are universal and innate, and correspondingly, whether they are uniquely expressed in the face, body, and brain (e.g., Barrett, Adolphs, Martinez, Marsella, & Pollak, in press; Gendron, Crivelli, & Barrett, 2018; Sauter, Eisner, Ekman, & Scott, 2015; Siegel et al., 2018; Tooby & Cosmides, 2008). Despite hundreds of studies on the topic, the debate shows no signs of abating. The factors that contribute to the persistence of the innateness debate are unknown. Here, we explore the possibility that the stalemate emanates from biases inherent in naïve psychology—the tacit beliefs that people hold about the bodies and the minds of others (Baron-Cohen, Leslie, & Frith, 1985; Keil, 1986; Spelke, 1994). Very little research has specifically addressed the role of naïve psychology in views of emotion. To begin investigating this question, we examined laypeople’s beliefs about whether emotions are universally expressed in the material body and whether such beliefs are linked to their reasoning about innateness.

Previous research has shown that adults rate emotions highly on biological attributes such as “naturalness”, akin to bodily state and natural kind categories, as distinct from abstract nominal kinds and cognitive states (Lindquist, Gendron, Oosterwijk, & Barrett, 2013). These observations suggest that laypeople’s understanding of emotions is guided by Essentialism—an intuitive psychological principle that governs reasoning about living things (Gelman, 2003; Keil, 1986). Per Essentialism, living things are believed to possess an innate immutable essence. For example, young children know that racoons cannot turn into skunks by painting their exteriors, as such manipulations do not alter their inherent essence (Keil, 1986). If people reason about emotions the way they reason about natural kind categories (Lindquist et al., 2013), then they assume that each emotion category has an innate, immutable essence.

In addition, a careful read of the literature on essentialism further suggests that people believe the innate essence is in the material body. Children, for example, assert that a puppy inherits its brown color from its mother by the transfer of some tiny brown pieces of matter (Springer & Keil, 1991). Children further believe that this innate essence is physically localized in material body (i.e., the body of the puppy and its mother). Furthermore, the essence is presumed to be in a specific place within the body. So when children are invited to discover which animal is hidden inside a fossil, they insist that the sample be taken from the center of the fossil, but this do not do the same when interrogating non-organic material, such as rocks or metals (Newman & Keil, 2008). Other findings suggest that material bodily traits (e.g., foot size) are more readily perceived as innate than psychological characteristics (e.g., shyness; Heyman & Gelman, 2000). These results suggest that, in naïve psychology, embodied biological traits are innate.

This Essentialist belief provides a powerful causal mechanism for reasoning about psychological traits. If people assume that an innate biological essence is in the material body (i.e., if essences are *embodied*), then their tendency to interpret psychological traits as innate will depend on their perceived materiality and embodiment. Traits that are perceived as immaterial and disembodied should elicit a negative innateness bias, whereas those that are readily linked to the material body would elicit a positive innateness bias.

The contrast between knowledge (concepts and principles, such as “objects are cohesive”) and emotions (e.g., “anger”) allows us to evaluate this prediction. Intuitively, emotions appear to be embodied in the material body (e.g., in the face), whereas knowledge seems disembodied and immaterial. If so, we expect people to exhibit opposite nativist intuitions towards these two categories.

Recent studies from our lab have evaluated people’s nativist intuitions towards knowledge. We found that people presume that knowledge is not innate, and they maintain this negative bias despite explicit evidence to the contrary (Berent, Platt, & Sandoboe, 2019b). Moreover, the perception of knowledge as innate was inversely linked to its perceived materiality (Berent, Platt, & Sandoboe, 2019a).

Here we test for the complementary (positive) bias for emotions. Observing that emotions such as fear are expressed in the face, for instance, people would be more likely to conclude that these emotions are innate. We hypothesize that this link is causal: people are inclined to view emotions as innate precisely *because* they believe that emotions are embodied.

Our three experiments test this hypothesis. Experiments 1 asked whether the (perceived) innateness of an emotion is linked to its propensity to be expressed in the human face and body. Experiment 2 determined whether this association between embodiment and innateness is causal, such that people are more likely to believe that emotions are innate when these emotions are described as embodied (i.e., localized in specific brain regions) compared to when they are not (i.e., devoid of brain localization). We predicted that embodiment would promote the perception of emotions as innate. Experiment 3 investigated whether people maintain their conviction that emotions are innate even when informed that the emotions in question are acquired.

Experiment 1:

Emotions are viewed as embodied and innate

Participants in Experiment 1 rated how likely emotions are to (a) to be expressed in the face, (b) elicit a physiological response in the body, and (c) be recognized spontaneously by hunter gatherers who have had no previous contact with Westerners (suggesting that emotions are innate and universal). We hypothesized that people would consider emotions as embodied and innate, and that beliefs about the innateness of emotions would be associated with beliefs about their embodiment

Methods

Participants. Sixty participants took part in this experiment. In this and all subsequent experiments, participants were recruited from Amazon Mechanical Turk. They were native English speakers who resided in the US. Participants were reportedly free of reading disorders and had reportedly taken no upper level courses (beyond an introductory level) in Psychology. Across experiments, 33% of the sample had a high school education, 50% had a college education, and 17% had a post-graduate education.

To be included in the sample, participants in Experiment 1 must have further provided a coherent answer to a question presented at the end of the experiment (asking them to explain their response) and spent at least 200 seconds on the experiment. All participants signed a written informed consent form, approved by the Institutional Review Board of Northeastern University.

Sample sizes in Experiments 1-3 were determined by pilot work as well as by previous research (e.g., Lindquist et al., 2013). Accordingly, we determined that samples of at least $N=60$ per group were optimal to yield modest to large effect sizes.

Materials and procedures. The materials consisted of twenty emotion terms (*anger, disgust, fear, happiness, surprise, love, contentment, excitement, joy, pride, sadness, shame, contempt, jealousy, relief, desire, embarrassment, pain, awe, and boredom*). This word list was compiled from Lindquist et al (2013) and Cordaro et al., (2018). The 20 emotion terms were presented in random order. For each emotion term, participants were asked to consider three questions (counterbalanced for order, see SOM-Appendix I).

One question asked participants “how likely is it that a person who feels this emotion will “show” it as a distinct facial expression? In other words, how likely is it that you could tell that a person is experiencing this particular emotion from the person’s facial expression?” A second question asked “how likely is it that each emotion will elicit a physical bodily response (e.g., a change in blood pressure, heart rate, perspiration)?” To evaluate the universality of emotions (a gauge of innateness), a third question invited participants to consider an experiment involving people in a small-scale society living in a remote part of the world, following the methods of actual published experiments (e.g., Ekman & Friesen, 1971; Ekman, Sorenson, & Friesen, 1969). Participants were told that “these people are hunter-gatherers; they have no electricity, so they have no access to media, and most of them have had no interactions with Westerner people before”. They were then asked “to reason how likely is it that they would recognize an emotion from the list below in facial expression. For concreteness, suppose you presented them (with the help of an interpreter) with a short story, depicting an event (e.g., “a person encounters a threatening animal in the jungle and he is afraid for his life”). Next, you showed them two pictures, depicting two distinct facial expressions (“horror” vs. “euphoria”), and asked them to pick which picture corresponds to the person depicted in the previous story. How likely is it that their responses would match those of U.S. participants?”. For each of the three questions, participants provided a rating for each of the 20 emotion words on a seven-point scale (1=very unlikely; 4=neither likely nor unlikely; 7=very likely).

Results

Figure 1 plots participants’ rating of how likely each emotion is to be expressed in the face, manifest in the body, and emerge universally (for the data of this and all subsequent experiments, please see Supplementary Materials or visit <https://data.mendeley.com/datasets/j7y3b7rpvf/draft?a=7c7fcc7b-2e82-4638-a422-518048f38665>).

We first compared the means to the scale's neutral midpoint (4-“neither likely/unlikely”) using a paired t-test. To evaluate the generality of our conclusions across participants and items (specific emotions), we conducted these tests using both participants (t_1) and items (t_2) as random effects.

The results confirmed that people considered these emotions as likely to imprint their marks on both the face ($M=5.33$, $t_1(59)=13.00$, $p<0.0001$, $d=1.68$; $t_2(19)=7.04$, $p<0.0001$, $d=1.57$) and the body ($M=5.06$, $t_1(59)=9.91$, $p<0.0001$, $d=1.28$; $t_2(19)=4.64$, $p<0.0002$, $d=1.04$). Similarly, people believed these emotions will be spontaneously recognized by hunter-gatherers, a result significant by participants ($M=4.45$, $t_1(59)=3.48$, $p<0.001$, $d=0.45$) and marginally so by items ($t_2(19)=1.97$, $p<0.07$, $d=0.44$). This finding suggests that participants viewed these emotions as innate and universal.

Figure 1. The mean rating of emotions with respect to their manifestation in the face and body, and their universal recognition. “Basic” emotions are marked by asterisks. Error bars are 95% CI for the difference between the means. The “neutral” midpoint of the rating scale (4) is indicated by the dashed line.

Strikingly, the presumed innateness of these emotions (gauged by their universality) correlated with beliefs about their propensity to manifest in the face ($r_1(58)=0.44$, $p<0.0005$; $r_2(18)=0.94$, $p<0.0001$) and in the body ($r_1(58)=0.39$, $p<0.003$; $r_2(18)=0.81$, $p<0.0001$). Additionally, beliefs about the face and body manifestations correlated strongly ($r_1(58)=0.71$, $p<0.0001$; $r_2(18)=0.83$, $p<0.0001$).

To compare laypeople’s intuition and distinctions made in affective science, we further examined people’s rating for certain emotion categories that are classically proposed as universal “basic emotions” (Anger, Disgust, Fear, Happiness, Sadness, and Surprise; classified following Ekman, 1992; Sauter, Eisner, Ekman, & Scott, 2010) and “non-basic emotions”.

The 2 Emotion (Basic/Non-Basic) x 3 Question (face/body/innateness) ANOVA yielded a significant effect of Question ($F_1(2,118)=25.81$, $p<0.0001$, $\eta^2=0.09$; $F_2(2,36)=21.49$,

$p < 0.0001$, $\eta^2 = 0.10$), as the universality question elicited a lower rating than both the facial and bodily questions (Tukey HSD, $p < 0.0001$; $p < 0.0001$, respectively, by both participants and items).

Critically, the main effect of Emotion type was highly significant ($F_1(1,59) = 200.95$, $p < 0.0001$, $\eta^2 = 0.23$; $F_2(1,18) = 8.84$, $p < 0.009$, $\eta^2 = .27$), as putatively basic emotions ($M = 5.72$) were rated higher than non-basic emotions ($M = 4.61$). The interaction between Emotion and Question was marginally significant ($F_1(2,118) = 6.41$, $p < 0.003$, $\eta^2 = 0.01$; $F_2(1,36) = 1.82$, $p < 0.18$, $\eta^2 = 0.01$), as the effect of Emotion type was largest for the innateness question $\Delta = 1.37$ (for the face and body questions, $\Delta = 1.08$ and $\Delta = 0.89$, respectively). Thus, laypeople's beliefs in the embodiment of emotions and their innateness were particularly pronounced for putatively basic emotions.

Summarizing, Experiment 1 shows that, overall, people viewed emotions as both innate and embodied, especially for categories that are presumed to be biologically "basic". The perception of innateness, moreover, correlated with the belief that emotions are expressed in both the face and the body. We hypothesized that when people view emotions as embodied, they also perceive them as innate *precisely because* they interpret embodiment as evidence for innateness. Experiment 2 tests this possibility.

Experiment 2: Embodiment promotes the perception of emotions as innate

To determine whether the perception of emotions as innate is caused by the belief that they are expressed in the material body, Experiment 2 manipulated beliefs about the embodiment of emotions. Embodiment, here, was operationalized by the instantiation of an emotion in a particular brain area, corresponding to a discrete piece of matter. Of interest is whether describing an emotion as embodied will promote its view as innate.

Embodiment was manipulated across two groups of participants. Both groups were presented with the same list of 20 emotion words from Experiment 1. The "material" group was informed that these emotions each are localized in a distinct region of the brain. Participants in the "immaterial" condition were informed that these emotions are devoid of a brain localization. If people believe that embodied emotions are innate, then the "innateness" rating should be higher in the "material" relative to the "immaterial" condition.

Methods

Participants. Two groups ($N = 60$ each) took part in the experiment. To be included in the sample, participants must have provided a coherent answer to a question presented at the end of the experiment (asking them to explain their response) and spent at least 150 seconds on the experiment (the time cutoff was decreased because the duration of Experiment 2 was shorter than Experiment 1). Four participants (three in the "material" condition) were removed from the analyses because their mean responses fell over 2SD from the group mean.

Methods and procedure. As in Experiment 1, participants were asked to assist a scientist in determining which emotions are likely to be recognized from their facial expressions by a hunter-gatherer who has had no previous contact with Westerners. These emotions were the same 20 emotions in Experiment 1 (putatively basic vs. non-basic, as defined therein). Prior to reading this question, however, participants were informed about the localization of these emotions in the brain (see SOM-Appendix I).

Participants in the “*material*” condition were told that past research has shown that “when people engaged in that emotion, that region of the brain was active, and different emotions activated different regions. The scientist concluded that each of these emotions is associated with a specific material localization in the human brain”. In the “*immaterial*” condition, participants were told that, in previous research “the scientist was not able to link any of these emotions with a specific brain region. So, when people engaged in each of these emotions, no distinct region of the human brain was activated, and the pattern of activation for different emotions was overlapping. Accordingly, the scientist concluded that these emotions are not associated with any specific localization in the human brain; in fact, the scientist is wondering whether these emotions even have a material basis in the human body”.

With this information in mind, participants in both groups were asked to determine how likely it is that a hunter gatherer who has had no previous interactions with Westerners would be able to match facial expressions to a sentence. For example, the hunter gatherers would be presented with the sentence “*a person encounters a threatening animal in the jungle and he is afraid for his life*” and asked to indicate which of two facial emotions (“horror” vs. “euphoria”) matches the person depicted in the story. Participants were once again reminded that these two emotions either do/don’t correspond to distinct brain regions, as do the remainder of the emotions on the list. They were asked to rate how likely is it that the responses of the hunter-gatherers would match those of U.S. participants, for each of the 20 emotions (1= very unlikely; 7= very likely).

Results

Figure 2 plots the effect of materiality on perception of emotions as innate (as gauged by their presumed universality). An inspection of the means suggests that participants rated emotions as more likely to be innate in the “material”- relative to the “immaterial” condition.

Figure 2. The effect of materiality on the perception of emotions as innate (in Experiment 2). Innateness is gauged by the spontaneous emergence of emotions in hunter-gatherers. The scale's midpoint is indicated by the dashed line. Error bars are 95% CI for the difference between the means.

A 2 Materiality x 2 Emotion (Basic/Non-Basic) ANOVA yielded a reliable main effect of effect of Emotion type ($F_1(1,114)=114.19$, $p<0.0001$, $\eta^2=0.16$; $F_2(1,18)=13.02$, $p<0.003$, $\eta^2=0.38$), as putatively basic emotions were rated higher than non-basic emotions. Crucially, the effect of Materiality was significant ($F_1(1,114)=5.38$, $p<0.03$, $\eta^2=0.03$; $F_2(1,18)=49.51$, $p<0.0001$, $\eta^2=0.07$), and it did not further interact with Emotion type ($F_1(1,114)=0.51$, $p<0.48$, $\eta^2=0.00$; $F_2(1,18)=1.19$, $p<0.29$, $\eta^2=0.00$). Thus, the presentation of an emotion as material promotes its perception as innate.

A single-sample t-test found that the mean rating of all 20 emotions was significantly higher than the scale's "neutral" midpoint for the "material" condition ($M=4.77$, $t_1(56)=5.37$, $p<0.0001$, $d=0.71$; $t_2(19)=4.44$, $p<0.0003$, $d=0.99$). In the "immaterial" condition, this difference was marginally significant ($M=4.27$, $t_1(58)=1.80$, $p<0.08$, $d=0.23$; $t_2(19)=1.47$, $p<0.16$, $d=0.33$).

Thus, when told that emotions are localized in the brain, participants concluded that these emotions are innate, and this conviction was higher compared to when the same emotions were presented as devoid of material manifestation in the body. Experiment 3 further evaluates the strength of this conviction.

Experiment 3: Our nativist bias

Experiment 3 examined whether the belief in innate emotions is a bias. We were especially interested in the degree of bias present for putatively basic emotions – the emotions that people are prone to view as embodied and innate. Will people maintain their conviction that these emotions are innate even when *explicitly* informed that these emotions are actually acquired?

Methods

Participants. Sixty participants took part in this experiment. To be included in the sample, participants must have provided a coherent answer to a question presented at the end of the experiment (asking them to explain their response) and spent at least 150 seconds on the experiment.

Materials. Participants were asked to reason about the propensity of a group of isolated hunter-gatherers to spontaneously recognize 20 emotions (putatively basic and non-basic) using the same emotion words and procedure as in Experiment 1. These participants, however, were further told that “previous research has conducted the same experiment in various cultures, and the results in different groups did not turn out the same. Accordingly, the scientist believes that people learn these emotions from experience with members of their own culture.” With this information in mind, participants were asked to determine “how likely is it that, when presented with each emotion below, that the responses of the indigenous group would match those of participants in the US?”. Full instructions are provided in SOM-Appendix I.

Results

When informed that emotions are “acquired”, the mean rating of “non-basic” emotions ($M=3.85$) no longer differed reliably from the scale’s midpoint ($t_1(59)=-0.98$, $p>0.33$, $d=0.13$; $t_2(13)=-0.93$, $p>0.37$, $d=0.25$). For putatively basic emotions, however, the mean “innateness” rating ($M=4.67$) was still higher than the scale’s “neutral” midpoint, and this difference was highly reliable ($t_1(59)=3.75$, $p<0.0005$, $d=0.48$; $t_2(5)=2.94$, $p<0.04$, $d=1.20$, see Figure 3)

Figure 3. The perceived innateness of emotions as a function of their origins (Acquired vs. Neutral, In Experiment 3). Innateness is gauged by the spontaneous emergence of emotions in hunter-gatherers. The scale’s midpoint is indicated by the dashed line. Error bars are 95% CI for the difference between the means.

To confirm that participants did not simply ignore the instructions, we further compared their responses to participants in Experiment 1, who were given no information about innateness (a “Neutral” condition). We were specifically interested in responses for the putatively “basic” emotions. Since people do not necessarily view “non-basic” emotions as innate, the effect of the “acquired” instructions here might be minimal. Putatively basic emotions, on the other hand, are typically viewed as innate. If people have attended to the instructions, then participants in the “acquired” condition should view these emotions as less likely to be innate relative to the “neutral” condition. Figure 3 plots the results.

The 2 Group (Acquired/Neutral) x 2 Emotion (Basic/Non-basic) ANOVA yielded a reliable main effect of Emotion ($F_1(1,118)=153.54, p<0.0001, \eta^2=0.17$; $F_2(1,18)=10.97, p<0.004, \eta^2=0.33$), as well as a main effect of Group ($F_1(1,118)=5.24, p<0.03, \eta^2=0.03$; $F_2(1,18)=20.89, p<0.0003, \eta^2=0.06$). The Emotion x Group interaction was significant ($F_1(1,118)=9.72, p<0.003, \eta^2=0.01$; $F_2(1, 18)=7.38, p<0.02, \eta^2=0.02$).

Planned contrasts indicated that participants rated the putatively “basic” emotions significantly lower in the “acquired” relative to the “neutral” conditions ($t_1(161.33)=3.34, p<0.002, d=0.578$; $t_2(21.36)=4.22, p<0.0004, d=1.47$); rating for “non-basic” emotions did not differ ($t_1(161.33)<1$; $t_2(21.36)=1.68, p<.11$).

The lower rating for the “basic” emotions in the “acquired” condition confirms that participants did heed the instructions. But participants nonetheless maintained that emotions (especially, “basic” emotions) are universally recognized by hunter-gatherers and Westerners alike. Thus, despite explicit instructions to the contrary, people still viewed these emotions as innate.

General Discussion

Our investigation examined laypeople’s beliefs regarding the innateness of emotions. To gauge innateness, we asked people to determine whether emotions would be spontaneously recognized by a group of hunter-gatherers who have had no experience with Westerners. We hypothesized that people will view emotions as innate when they believe these emotions are manifested in the material body.

In line with this hypothesis, Experiment 1 showed that people believe that emotions are both embodied and innate, and these two traits were reliably correlated. Experiment 2 demonstrated that the links between embodiment and innateness are causal. We found that when people are informed that emotions are embodied (i.e., localized in the brain), they rate emotions higher for innateness (relative to participants informed that the same emotions are devoid of a material embodiment in the brain). Finally, in Experiment 3, we showed that people maintain their conviction that “basic” emotions are innate even when told that these emotions were actually acquired. Together, these results suggest that the belief in innate emotions is a bias, and it is causally linked to the view of emotions as embodied.

We attribute this bias to intuitive Essentialism. Past research has shown that children believe that living things possess innate immutable essence, and this essence is embodied in the material body (Heyman & Gelman, 2000; Newman & Keil, 2008; Springer & Keil, 1991). Other evidence for the view of people's essence as material is presented by their capacity to elicit contagion by physical contact (Rozin & Nemeroff, 2002). If people assume that innate natural traits (biological and psychological) must be embodied, then they would be more likely to interpret traits that they consider embodied as innate. Since people readily link "basic" emotions with bodily changes, they might be inclined to presume that emotions are innate. The results of Experiments 1-3 are in line with this possibility.

The positive bias we have uncovered towards innate emotions complements our previous findings, where we found a negative bias towards innate knowledge. As noted (in the Introduction), people tend to view knowledge as immaterial and disembodied, a perception that contrasts with their view of emotions (as material and embodied). If Essentialism requires innate traits to be material, then we expect people to assume that (immaterial) knowledge cannot be innate. This prediction was borne out by our findings (Berent et al., 2019a, 2019b). Thus, the principle we have outlined to explain our positive nativist intuitions towards emotions can also account for our negative nativist attitudes towards knowledge.

Returning to the case of emotions, we note that our findings from Western participants cannot speak to the generality of this putative bias across cultures. Additionally, these results strictly concern naïve psychology—they do not evaluate whether emotions are in fact embodied or innate. These limitations notwithstanding, our results show that participants tend to systematically conflate emotions with their bodily manifestations (e.g., they believe that happiness is equivalent to a "Duchenne" smile), and to misinterpret those bodily changes as evidence for innateness. The discovery of such biases in laypeople suggests caution in the discussion of these matters within affective science.

Author contribution

IB conceived the study, designed the materials and wrote the initial draft; LFB commented on the draft and the analyses; MP implemented the study, analyzed the data, and commented on the draft.

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