

What We Talk About When We Talk About Emotions

Emotions are a fundamental part of our living experience, yet our grasp on what they are and how to study them is still tenuous. *Cell* editor Mirna Kvaajo talked with Joe LeDoux, Cristina Alberini, and Liz Phelps about the challenges in researching emotions and whether studies in animals can teach us about them. An excerpt of the conversation appears below, and the full conversation is available with the article online.



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Mirna Kvaajo: Emotions are a fascinating subject that has been explored for decades. The research that focuses on emotions and how they interact with other mental processes such as cognition is very diverse, spanning from animal studies to studies in humans and also studies in cells. Where do you see the field today?

Joe LeDoux: When I started on in this field in the late 1970s, early 1980s, there wasn't much going on. It was sort of wide open, so we just charged ahead and the field evolved with the few people that were doing [this kind of work] at the time. My personal opinion is we're kind of at a crossroads now. We've done a lot of work, but we haven't thought as much about what we're studying, so the important thing to move forward with, while continuing the research, is a sharper conceptualization of what we're studying.

MK: What do you mean when you say "what we're studying"?

JL: Well, what is an emotion, for example? The most common answer will be that it's a subjective experience that you have when you're in a particular situation. When you're in danger, you feel fear; when you enjoy eating something nice, you feel pleasure. For me, an important first step is to restrict emotion to that limited category of events, the subjective experiences we have. Because if you start with something like fear as a topic and you separate out the subjective experience of fear, which is also called fear, from all of the behavior and physiology and other cognitions and other things going on that are also called fear sometimes, nobody knows what you're talking about when you talk about fear. By restricting the term fear or other emotion terms to the mental states that they are

supposed to represent, you make an important step toward cleaning up what we're talking about when we talk to each other about emotion.

MK: When you think about fear in a way in which you can experiment with it [in animals], you also try not to narrow it down too much so that it can be applicable to human studies, right?

JL: Well, I would say you can't study emotions in animals.

MK: You can't?

JL: You cannot. Because if you limit it to subjective experiences, there's no way to study that in an animal. And that's another important point because what we can do once we get to that point is say, "What can we study similarly in humans and animals?" That's everything else, basically, from cognition to physiology, appraisals, [and] behavior [*JL's note: This is not a denial of animal emotion; it's a methodological point.*]

MK: So, Liz, you've been doing studies on humans, right?

Liz Phelps: I have, and I started in cognitive psychology. What's interesting about cognitive psychology is that it really emerged from the computer metaphor. Previously, there was behaviorism, where you weren't supposed to talk about what's going on in the mind, but computers came along, and people started to break down cognition like a computer program, and early models of cognition looked a lot like steps in a computer program. And that metaphor that inspired cognitive psychology left out emotion and kind of put it over to social psychology and clinical psychology, personality psychology, so there wasn't a lot of research on emotion when I got started in cognitive psychology. There were certainly people like Ulric Neisser who

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were talking about things like flashbulb memories and the like, but not a lot.

JL: There was the whole cognitive movement in social psychology [that was focused on emotions in the 1960s].

LP: Yes, social cognition was coming along, right? But in standard cognitive psychology, there wasn’t a lot, and especially in terms of cognitive neuroscience. I got into the field about the time cognitive neuroscience was becoming a dominant technique. The only person who I could find at the time doing a lot of cognitive neuroscience research on emotion was Richie Davidson—and when I say cognitive neuroscience, I mean in humans. That led me to start looking at animal models like the kind Joe was using at the time and trying to understand emotions in humans from that perspective.

There have been a lot of theorists that talk about what emotion is. I often refer to Klaus Scherer, who separates emotion from other affective experiences. We use the word “emotion” to mean “everything affect,” right? But emotion is often constrained to the specific response to an event as opposed to something like a mood or something that can be more ongoing. And then, early on—what I think, in Joe’s perspective, has changed a bit—we included a lot of the subjective experience along with the physiological responses, and I think Joe’s arguing now that that’s getting us in trouble a little bit, that maybe we should be a little bit more specific. But earlier definitions had both the subjective experience and the physiological response, and other aspects have emerged from that response to a discreet event included in what we call emotion. You know, I appreciate the fact that we’ve been very vague about what we study. I’ve tried to stick with specific objective measures and talk about those measures when I link it back to cognition, but we can measure multiple things like a physiological response and a subjective experience in humans, which take us across those boundaries.

MK: Christina, you’ve been looking at cognition, right?

Cristina Alberini: Well, that’s an interesting question, because I never [thought] I’m looking at cognition as opposed to emotions. I was in fact listening to both of you, and it’s interesting that, coming from the biology field, I never was able to really separate the two in the questions that I’m addressing. I look at the modulation of emotions or memory, the combination of emotional mechanisms and plasticity mechanisms that are supporting long-term memory formation. But they cannot be really separated. If there is an event that is remembered because it is emotionally charged, it’s difficult to think biologically how to separate what emotion does to what cognition does. I cannot even envision that biologically speaking, so if we study, say, a threat-conditioning event, and we can start looking at this region involving cognition, cortex, hippocampus, we see changes, but there are changes that are

regulated by emotional state, by regions that are essential for threat.

JL: That’s what I was sort of saying. The fields evolved separately, but deep down, they’re not really completely separable at all. I mean, there’s certain things like working memory that you wouldn’t say are typically emotional, but it’s involved in the creation of a subjective experience.

LP: One of the things that happens in research with animals, you have to motivate them and measure something objective. The motivation part of it—whether it’s a threat or a reward—when we do that in humans, we may call that manipulating emotion. I can ask you to remember a list of words, and then I can make the list of words, curse words or something like that, and then I can argue [that] I’m adding something, but that’s because I can ask you to voluntarily remember a list of neutral, boring words. In animal work, you might argue that a lot of the ways you motivate animal behavior is by adding an emotional component, whereas in humans, we can up the emotion. I don’t know what your motivation is for doing a laboratory experiment, but I’m not going to call that a highly emotional circumstance. In humans, I can make it more emotional, then look at the change. It’s a little bit different.

CA: It is a little bit different, although there are tasks that are not designed necessarily to test the association with emotion, for example, spontaneous alternation, exploration—things like that. But again, in one given behavior, if there is an emotion involved, it’s very difficult to separate what’s emotional from the rest of it. Is that modification that happens in a circuitry, which is the combination of all the experiences and the feelings, or the emotions that leads to molecular changes in that circuitry? Then, the question molecularly or biologically comes, what are those? And where are they happening? How do they change?

JL: But in a way, emotion gets in the way of studying these things because what are you studying when you study emotion in a rat? You’re studying brain arousal, you’re studying the activation of some circuit that has some specific physiological function such as homeostatic function or defensive function, and while those are different from things that are more neutral, to call them emotional confuses that with the whole process of the experiences that you have, and you get back into the trap of we’re talking about emotions in rats when we don’t know what they feel. And you say, “Well, I’m not studying feelings, I’m studying non-subjective aspects of emotion.” But then, when

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you talk about it, everybody thinks you’re talking about emotion, so it all gets very confused.

MK: Okay, so when you think about emotions in the context of, say, pathology of mental illness, people are very interested in this subject. Do you find that this focuses you in a specific direction? Say, thinking about emotions which are kind of pathological, in some cases?

JL: Yeah, probably when most of us started out this research, we weren’t thinking so much about these kinds of questions. It was more just a basic question about how something interesting works in the brain. Then, over the years, it became more and more apparent that this had clinical relevance, and my work and thinking gradually moved more and more toward clinical issues. I think the clinical issues are where it’s really important that we understand what we’re talking about because, when we talk about fear in rats and then say that’s going to help cure PTSD people, we’re doing a disservice to ourselves and to the clinical field because what we’re studying is how the brain in an animal detects and responds to threats, which is similar to what a human brain does, but not necessarily to the experience that that person is having. When drugs are developed in animals, they’re tested to make the animals feel or respond less timidly in a situation, and it’s assumed that they feel less fearful, but then, when you give the drugs to people, they don’t necessarily feel less fearful, but they often are less timid. The drugs are viewed as a failure by the drug companies, but they’re actually a success because they did exactly what they were supposed to do [given what the research showed].

CA: In this sense, I think expanding on measures that are, at multiple levels, testing what certain conditions are about—say, pathological conditions, let’s take PTSD or an anxiety disorder—and have these multiple ways to reveal what parameters parallel the state, the pathology, and then see whether those are changed by the treatment, that could be a way to get into future research.