How Shallow is Fear? Deepening the Waters of Emotion with a Social/Externalist account

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Published December 20th, 2022 in *Philosophical Psychology* (https://doi.org/10.1080/09515089.2022.2160309), as part of a symposium on Joseph LeDoux's *The Deep History of Ourselves* (New York: Penguim, 2019). Please cite the published version (https://www.tandfonline.com/doi/ref/10.1080/09515089.2022.2160309)

Abstract: In The Deep History of Ourselves, Joseph LeDoux distinguishes between behavioral and physiological responses caused by the activation of defense circuits, and the emotion of fear. Although the former is found in nearly all bilateral animals, the latter is supposedly a unique human adaptation that requires language, reflective self-awareness, among other cognitive capacities. In this picture, fear is an autonoetic conscious experience that happens when defense circuit activation is integrated into self-awareness and the experience labeled with the "fear" concept. In this commentary I will propose a different view, in which fear is a skillful activity that we coordinate with others as our social interactions unfold in time. If this is true, two important conclusions will follow. Firstly, the relevant brain circuits we should be looking for in our theory of emotions are those involved in affective social learning, social cognition, embodied intersubjectivity, and so on. Secondly, emotions may not be uniquely human, and may be present in any creature with the right kinds of social skills required for affective enactments. Therefore, although LeDoux is right to hold that emotions are not as deep as defense circuits, they are not as shallow as other cognitively sophisticated human capacities.

Keywords: fear, emotions, defense circuits, social theory of emotions

INTRODUCTION: FLIES, FEELINGS AND DEFENSE CIRCUITS

In 2015, a headline from ABC science announced "*flies have feelings: fear and maybe more*".[1] This controversial statement was made on the basis of a study in which fruit flies (*drosophila*) were repeatedly exposed to overhead shadows. As a result, the article reports that "*the flies looked startled, and, if flying, increased their speed. Occasionally the flies froze in place, a defensive behavior also observed in the fear response of rodents.*" (*ibid*.)

Although no one would dispute that flies engage in these sorts of defensive behaviors, do these observations give us good grounds to attribute fear to flies and other insects who flee and/or freeze when threatened? The answer, as LeDoux has been telling us for nearly a decade now[2], is no. And the reason is quite simple: the emotion of fear involves a conscious experience with a certain subjective quality (the *feeling* of fear), and nothing in flies' defensive behavior suggests they have conscious feelings of fear. Rather, what we should say is that flies have defense circuits that activate in the presence of potential threats in their environment, leading to certain behavioral and physiological responses that prepare the flies to deal appropriately with the threat. To know what these circuits are and what responses they give rise to is an important discovery in its own right, but it should not make us attribute feelings of fear to fruit flies.

Defense circuits are widespread in nature, present in almost all bilateral animals—vertebrates and invertebrates—including of course humans. No doubt it is very useful to have biological circuits that scan the environment for threats and automatically launch orchestrated behavioral and physiological responses whenever a threat is detected, which explains why these circuits have evolved and were preserved throughout the animal kingdom. However, there are good reasons not to confuse behavioral and physiological defensive responses with fear.

For starters, there is evidence that defense circuits may activate and give rise to these responses outside subjects' conscious awareness (LeDoux 2019, 341). Secondly, it is possible to feel fear in the absence of defense circuit activation, as shown by research involving patients with a damaged amygdala—a brain structure responsible for controlling defensive behavioral and physiological responses (*ibid*.). If this is so, then indeed we should not be calling defense circuit activation 'fear'. As the research cited in the ABC Science article shows, fruit flies have defense circuits, but this is different from attributing fear to them.

As LeDoux is ready to admit (2019, 340), his own past research is partly responsible for this conceptual confusion. In his 1996 book *The Emotional Brain* he called the behavioral and physiological responses following defense circuit activation 'implicit fear'. And the problem, as Melvin Marx aptly puts, is that when we use a label of a subjective state ('fear') for a non-subjective state (a behavioral and physiological response), we unintentionally endow the non-subjective state with properties of the subjective state.[3] Then, as journalists and the general public read the word 'fear'—even if qualified as *implicit* fear—they cannot help but think in terms of conscious, experiential fear. From there, it is but a small step until the press is reporting on empirical research on flies' defense circuits with headlines like "*flies have feelings.*"

LeDoux, courageously, took responsibility for the confusion, and has done an impressive job in clearing up the conceptual mess that plagued empirical research on fear and defense circuits.[4] As he has been at pains to emphasize, we should avoid using names like 'fear circuits' to refer to the brain circuitry that controls behavioral and physiological responses to threats. Rather, these are *defense circuits*. Although defense circuits contribute to the conscious experience of fear, they are not directly responsible for it, and the two should not be conflated. Fear, in other words, is not the same as defense circuit activation.

THE INTERNALIST CONCEPTION OF FEAR

Fear, for LeDoux, is an *autonoetic conscious experience* that represents the subject of the experience as being in danger, an experience that is cognitively assembled by the brain out of more general ingredients that are not specific to emotions (2019, 351). As such, to feel fear an animal must be able not only to have noetic awareness of threatening stimuli, but also a capacity for reflective self-awareness and grasp of emotion concepts, in order to represent oneself as being in danger and to label that experience with an emotion concept like 'fear' (*ibid.*).

To clarify what these ingredients are and how the brain assembles them, let's start with defense circuits. Whenever the organism encounters a threat, information flows from the retina through the optical nerve to the thalamus. The thalamus sends signals to the sensory cortex to allow the object to be recognized, but it also sends signals directly to the amygdala. This subcortical pathway has been called the "low road", in contrast with the "high road" through which signals travel to the neocortex before reaching the amygdala (LeDoux 1996). This allows the organism to initiate a set of bodily responses much faster on the basis of coarse visual information.

The amygdala then sends signals to various structures that modulate bodily responses, such as the medulla and pons involved in heart rate and breathing, trigeminal nuclei in the brainstem involved in the production of facial expressions, various hormonal structures that initiate changes in hormone levels, and the basal ganglia, which controls motor responses. In addition, the amygdala also sends signals to the visual cortex, which enhances sensory processing of threat-related stimuli. As a result, the organism is in what LeDoux calls a global defensive survival state (LeDoux 2019, 364).

These states, however, are not yet experiences of fear, as two key ingredients are missing: the 'self' concept and the 'fear' concept. Global defensive survival states may provide a creature

with noetic awareness of threatening stimuli, but unless the creature is able to represent that itself is in danger, and to label this experience with the 'fear' concept, it will not have an experience of fear. For LeDoux, then, defense circuit activation becomes fear when it is integrated into self-awareness and interpreted in terms of a 'fear' concept (LeDoux 2019, 368). Since fruit flies lack the circuitry required for autonoetic emotional consciousness, the headline "*flies have feelings*" is not only confused but blatantly false. As Ledoux puts it, "emotions are human specializations made possible by unique capacities of our brains", such as language, hierarchical relational reasoning, and reflective autonoetic consciousness (*ibid.*).

I think LeDoux is certainly right in distinguishing defense circuit activation from fear, and his efforts at clarifying the relations between the two have been laudable. The conflation between fear and more primitive behavioral and physiological responses, as LeDoux himself observes (2019, 350), is embedded in a Platonic conception of emotions as irrational, unruly wild beasts, an idea that does not do justice to the intelligence and rationality of emotions, their epistemic role in the acquisition of knowledge and their connections to morality and the good life.[5] I am thus on LeDoux's side when it comes to the distinction between defense circuit activation and fear.

But when it comes to the decision of what else must be added to defense circuit activation in order to yield fear, we must part ways. For starters, LeDoux holds a highly internalist and intellectualist theory of emotions. In this picture, emotions are inner experiences, events that take place in the brain, and that require the subject to possess a host of higher cognitive capacities that are uniquely present in human beings. And while I do not deny that we have certain inner experiences when we are afraid, I dispute that fear (or any other emotion for that matter) should be identified with these inner states and experiences.

THE SOCIAL/EXTERNALIST CONCEPTION OF FEAR

Rather, what must be added to defense circuit activation in order to yield fear lies not within but without the organism. In order to clarify this point I will borrow John Dewey's theory of emotions (1894/1895). According to Dewey, emotions are complex phenomena involving both internal and external elements. They are felt and experienced internally but also extend onto the world, using the material and social world as scaffold. Emotions to Dewey are *modes of behavior*, dynamic and embodied ways of negotiating the social world. They are enactments, skillful activities that we engage in with our whole bodies and minds and that we coordinate with others as our social interactions unfold in time[6].

We can illustrate this theory with the case of fear. Although the literature on fear is filled with examples of lone encounters with dangerous wild animals in the woods, most of our fear episodes happen between two (or more) people in social settings. When a child is afraid of something (a shadow, a loud noise, the boogeyman, a stranger, etc.), she will typically look at her caretaker, call her by name, walk into her direction with arms outstretched waiting to be picked up, etc. The caretaker, in turn, will probably pick the child up, cuddle her and reassure her that there is no danger, and so on, as the child insists on being held tightly.

LeDoux might say the child's fear – granting that the child is old enough to master emotion concepts – consists in certain inner events, such as higher-order representations of lower-order defense circuit activation becoming integrated into self-awareness and labeled with the 'fear' concept. For Dewey, however, fear is the entire mode of behavior, something that might start out with defense circuit activation (perhaps in response to a strange shadow, an unknown person or a loud noise outside) but that extends onto the world and unfolds dynamically as the child enacts her fear with her caretaker in a coordinated manner. Fear in this picture is not an inner state, but the way the child acts and coordinates her bodily and facial movements with those of her caretaker as their

interaction unfolds in time. Her call for help, her walking towards the caretaker with arms outstretched, her demands to be continuously held tightly, and so on, constitute the entire mode of behavior (the emotion of fear), along with inner feelings. In this case, the caretaker's embrace and reassuring words become scaffolds for the enactment of the child's fear, a context that shapes and influences how she enacts this particular emotion. In a different context, perhaps in the companion of the child's peers rather than her caretaker, she would have enacted her fear in a completely different manner.[7]

Perhaps here LeDoux might reply by saying our accounts differ only in focus. That is to say, even if we grant that fear involves complex behavior and interactions, it may also be true that the subject, in addition, will undergo certain inner experiences and have certain feelings when performing these actions. If this is so, it is open to LeDoux to say that fear constitutively involves having inner experiences, even if these experiences are also accompanied by complex behaviors and social interactions. In other words, as long as emotions have both internal and external elements, we can if we wish focus on the internal ones without denying that bodily actions typically occur in emotion episodes as well.

This might make it seem like it is only a matter of definition, i.e., whether we define emotions as internal states or as more complex modes of behavior. But I maintain that our differences run deeper than that. For starters, although it is true that in my account—following Dewey— emotions have both internal and external elements, there is no requirement that reflective self-awareness should be present for emotion to be possible. In my proposal, it suffices for one to engage in socially coordinated behavior with shared affective meaning, without having to represent that oneself is engaging in this mode of behavior. Following Lambie and Marcel (2002), we can say that a first-order socio-affective experience suffices, without requiring a second-order, reflective experience of emotion based on a first-order one. Lifting this second-order requirement also

alleviates the need for language and mastery of concepts, as it will not be necessary to label the first-order emotion experience with an emotion concept. As long as a creature has the capacity to socially enact her emotions and coordinate shared affective meanings with others in a flexible manner, it may be credited with emotions.

An example of this sort of non-linguistic, practical socio-affective enactment can be seen in reconciliation behavior observed in macaque monkeys (De Waal and Johanowicz 1993). Shortly after an aggressive confrontation, two former opponents of the same species might enact a friendly reunion. This reunion might be accomplished with a wide repertoire of bodily, vocal and facial actions, which are, in context, recognized as openings to reconciliation. This reconciliation behavior is, quite plausibly, a part of the fear response. More specifically, it is a method of *fear coping*, which is often acknowledged as a constitutive component of emotion episodes (Lazarus 1991). As the loser fears the winner and is afraid he might be attacked again, he might engage in reconciliation behavior, a strategy that has been linked to significant reduction in anxiety following confrontation (Aureli et al. 1989). This behavior is as much a part of the fear response as handling over your wallet to a mugger or pleading for safety with a bully. It is a form of coordinated affective engagement which one enacts in various ways depending on the material and social context.

Moreover, there is evidence that reconciliation behavior in monkeys is socially learned, as De Waal & Johanowicz (1993) showed with rhesus (*macaca mulatta*) and stump-tail monkeys (*macaca arctoides*). The latter are more tolerant, less antagonistic and reconcile more, relative to the former. Their study found that when younger rhesus monkeys were routinely exposed to reconciliation behavior in older stump-tails, they learned and adopted this behavior and increased their own rates of reconciliation behavior, which remained high even after they returned to their group.[8]

In the present account, what the monkeys are doing is enacting fear, as they learn new ways of coordinating shared affective meanings with their co-specifics in situations of social conflict. The context of the fight and the facial/bodily/vocal behavior of the other, in this picture, creates a context for the monkey to enact his fear in a certain manner, which may be flexibly adapted according to context.

Of course, not any behavior that conveys social information will be an emotion.[9] Some plants, for example, will shrink upon being touched, and human teenagers will develop acne as a pre-emptive immune (over)reaction to an external threat. Although these may be described as defensive responses that send social signals to plants' and the teenagers' interactants, these responses do not qualify as emotions. What is missing is the organism flexibly enacting social affective meanings in a coordinated manner with their interactants. As Dewey suggested, the emotion is the entire mode of behavior.

CONCLUSION: DEEPENING THE WATERS OF EMOTION

If what was said so far is true, two important conclusions will follow. Firstly, emotions may not be unique human specializations, but may be present in any creature with the right kind of social skills required for social affective enactments. Macaque monkeys are a good example, but these skills may be extended to other animals who live socially complex lives as well. How far they will reach is an open empirical question that demands further investigation. Secondly, if we want to investigate these animals' emotions, then perhaps the relevant brain circuits we should be looking for in our theory of emotions are not primarily circuits responsible for autonoetic consciousness, but circuits involved in affective social learning (Clément and Dukes 2017, Gruber and Sievers 2019), embodied intersubjectivity (Fuchs and de Jaegher 2009, Froese and Fuchs 2012), dynamic non-

verbal communication (Fogel and Garvey 2007), socio-emotional development (Krueger 2013, Clay and de Waal 2013), and whatever else may be required for one to be able to coordinate shared affective meanings in a flexible manner. How far they will reach is an open empirical question that demands further investigation.

To conclude, I fully agree with LeDoux that we should not conflate fear with the behavioral and physiological responses characteristics of defense circuit activation. I do not, however, agree with a conception of emotions as autonoetic inner experiences. Rather, my suggestion is that it might be useful to think of emotions as social enactments, manifested in the way two agents coordinate shared affective meanings in a flexible manner. This view has consequences not only for neuroscientific investigation into the brain circuitry supporting emotions, but also for the attribution of emotions to non-human animals.

So although it is true, as LeDoux puts it, that "*survival is deep, but emotions are shallow*", (2019, 368) perhaps they are not so shallow as to be unique human capacities. We may sometimes believe we are in shallow waters, but this is only because we have been restricted to our immediate surroundings, afraid of venturing further into the water. But if the suggestions laid out in this commentary are taken seriously, the waters of emotion might just be a bit deeper than LeDoux proposes. In order to discover just how deep they are, a more social and externalist approach might give us courage for these extra steps. In this commentary, I hope to have provided at least an indication of how to proceed in the murky waters of the science and philosophy of emotions.

Notes

[1] ABC Science, 2015. Accessed October 20th, 2021. https://www.abc.net.au/science/articles/2015/05/15/4236373.htm. Quoted in LeDoux 2019, 343.

[2] See especially LeDoux 2012; 2013; 2014.

[3] Marx 1951, quoted in LeDoux 2019, 340.

[4] See LeDoux 2012; 2013; 2014.

[5] On these points, see especially De Sousa 1987 and Solomon 2007.

[6] Krueger 2014a.

[7] For a more detailed account of how social niches shape emotions see Krueger 2014b.

[8] This evidence is also discussed by Aranguren (2017) in support of a social constructionist theory of emotion. In this commentary I will remain neutral on whether a Deweyan theory of emotions is compatible with social constructionism.

[8] I thank an anonymous referee for this point.

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