HAPPILY EVER AFTER...
The SCIENCE of HAPPINESS

I CAN’T DECIDE!

Harvard Happiness Guru
Shawn Achor

High School Musical’s
Mônica Coleman

Pineal Gland’s
Spiritual Vision

PLUS

Rockstar Neuroscientist
Joseph LeDoux

Robert K. Massie:
Compassionate Activist

South Korea’s Happy School Campaign

Phillip Moffitt’s Mindfulness
ROCK STAR/NEUROSCIENTIST JOSEPH LEDOUX’S NEW TERMS

by Margaret Emory

Humans are the only animals that can imagine the future. That’s great when it comes to figuring out what makes us happy. But what about those sleepless nights filled with anxiety?

memory and emotion, especially the mechanisms of fear. He has been doing research on animals, primarily rats, to understand pathological fear and anxiety in humans. A Henry and Lucy Moses Professor of Science and professor of neural science and psychology at New York University, his concentration on the amygdala, that almond-shaped structure in the brain’s temporal lobe having to do with emotional behavior, has also spawned a rock band called the Amygdaloids, with himself and three of his scientific colleagues.

These days, LeDoux is looking at things differently. During a visit we paid the professor at this NYU office, the director of the Emotional Brain Institute and author of two best-selling books—The Emotional Brain: The Mysterious Underpinnings of Emotional Life and Synaptic Self: How Our Brains Become Who We Are—shared his latest epiphanies.

Brain World: You’ve been studying fear and emotion a good many years…

Joseph LeDoux: After 30 years, I’ve decided that I haven’t been studying fear or emotion at all. This is an issue within the field—exactly what emotions are. Some people say, “How can you study emotions in rats, because you don’t know what rats feel.” I say, “I’m not studying feeling. I’m studying the way the rat brain detects and responds to danger.” But I called the circuits “fear circuits.”

Lately I’ve been re-evaluating. If you think about what an animal does in a situation of danger, it does something to protect itself, either by remaining motionless or moving away from the harm. When a person is in that state, they do the same sorts of things. But they also feel afraid. So it’s...
emotions and memory

The Amygdaloids at the Williamsburg Waterfront. Daniela Schiller, Joseph LeDoux, Amanda Thorpe (Tyler Volk not present)
natural to assume that when a rat is doing those things, it’s probably feeling some sort of fear as well. But if you follow the logical conclusion of all of this, you will see that even bacteria do these things. They’re in their little petri dish in a lab. If you put some acid on one side, they all move to the other side. Obviously there are a lot of differences between bacteria, rats and people, but what we’re looking at here is a survival function. Bacteria do all sorts of things that we do to stay alive. In addition to responding to danger, they acquire nutrients, balance fluids between their inner and outer environment, and reproduce to keep their species going. These are survival functions, and as evolution went from single-cell to multicellular organisms, the fundamental life force of staying alive still required defense against danger, sufficient nutrients and energy, balancing of fluids, thermoregulation and reproduction.

I don’t think these systems are in the brain to create emotions. They’re in there to deal with the environment. But when you put one of those systems in a brain that has other capacities such as self-reflection and an awareness of its other activities, then you get emotions.

**BW:** The research you’re doing with rats deals with defense rather than fear. Does that change the implications of the work?

**JL:** Let’s call it “defense.” And it doesn’t change the implications. The problem is my students feel that their work is going to be thought less significant if it’s not about “fear.” But the truth is, the defense system is still contributing to emotion—to fear—the same way. We’re just calling it defense rather than fear, because fear, I think, is something else. It’s a matter of how we conceptualize it. I think that’s important, because if we don’t think clearly about these things, then we run around with loose ideas, and if you look at papers in the field on emotion, nobody really says what emotion is, they just study it.

**BW:** What’s the difference between an emotion and a feeling?

**JL:** There probably isn’t a difference. In fact, emotions and feelings have traditionally been thought of as the same thing. We’ve jumped through hoops to try and find ways to talk about emotions in animals. For example, Antonio Damasio and I have said that emotions are the unconscious part of fear and that the feeling of fear is a consequence of activating that emotion. But it’s kind of like making a square peg fit in a round hole. What I’m now saying is that emotions are conscious experiences that occur when we find our self in a situation where a challenge or opportunity exists. Some occur when a survival circuit is active—like fear—while others don’t involve such. What defines the emotion is not whether there’s a survival circuit that’s active but whether we interpret the situation we’re in as either challenging or potentially beneficial. I’m putting all the emotions on a level playing field, but I am playing on a different field. I’m not studying emotion. I’m studying the function of survival circuits. Survival circuits contribute to emotions but are not emotion circuits.

**BW:** So you’ve been studying survival in rats…

**JL:** That’s my aha! moment. If we want to understand emotions, feelings, we have to study humans. Do animals have mental states? We don’t know, and we can never know for sure. Some people argue that we can interpret that from their behavior. But we can’t, really. If we could, then we’d have to interpret on the basis of bacteria’s behavior as well. So if you’re willing to say that emotions are in bacteria, that’s fine. But if you aren’t going to call it that, then we have to figure out why behavior is useful in saying a rat is afraid when it responds to danger and not in saying that bacteria are afraid when they do that.

Many people say that rats are closer to people, so they probably have something like human feelings. But what about a lizard? They have a similar brain to ours—all vertebrates do. Where do you draw the line? Fish, bugs, worms? My philosophy of doing science is that I want something solid. I prefer to try to study survival in the rat. I think from the point of view of doing research it makes sense to try and learn as much as you can without assuming mental states. Then maybe at some point we’ll have to come to terms with it, but I don’t think we’re at that point yet.

**BW:** So the brain is about survival…

**JL:** Yeah, that’s its main job, to keep us alive. But it’s not just about biological survival. It’s also about social and cultural survival. We are in social situations all the time. We have to figure out who’s going to benefit us, who’s going to harm us. You can’t say the wrong thing to your boss. You are going to a party where there will be social challenges to navigate, whether it’s a work party, fun party or whatever. There are lots of things that our brain has to manage that are not just about surviving as a wild animal but surviving in our modern sociocultural environment.

**BW:** Can you locate the parts of the brain that are involved with social survival?

**JL:** There’s a lot of work now in social neuroscience. The challenge there, when they’re doing experiments in laboratory as opposed to real-life situations, is what does it mean to have a social stimulus. For example, a face is thought to be a social stimulus. A fearful face will activate the amygdala. But it turns out that if you really look at what it is about the face that is activating the amygdala if all you show on the screen is the shape of the whites of the eyes in a fearful situation.

**BW:** Really? I guess that’s where that expression comes from—whites of the eyes!

**JL:** It’s a social stimulus because it’s another human, but it’s not the whole person. Very basic primitive stimuli shoot to the amygdala and activate it. You’re not conscious of this. You’re not aware that it’s the whites of the eyes. The amygdala “sees” the specific trigger. It goes in there, releases hormones, and all of the sudden consciously you’re paying attention to the environment and you see the face of the person. But it’s the eyes that did the deed. A lot of stuff is triggered by very simple stimuli in our social encounters, and then we elaborate it through cognitive and conscious processes.

**BW:** You’re walking along, you see a snake, it becomes a memory and the next time you’re at that spot you have that fear…

**JL:** You’re talking about three kinds of memory. One is memory in the conventional sense, which is your conscious experience. You remember where you saw that snake, you remember seeing that snake. But the way your brain learned to be defensive about that situation is that information not only went to the part of the brain that formed the conscious memory, which is called the hippocampus, but also to the amygdala. The amygdala detected the danger in the snake, because the snake is more or less an innate stimulus for people. Not everyone has a snake phobia, but we all have some kind of an innate response to snakes. You might freeze when you see the snake; that will trigger the release of hormones; hormones come back to the brain where they imprint the amygdala and hippocampal memories and make them stronger. The next time you go back to that place, although there’s no snake, you’re now dealing with the context. The amygdala is important not only in detecting the snake but in detecting the context. It’s the contextual information coming into the amygdala that then triggers the fear response again: the release of hormones, brain arousal and all sorts of things that are facilitating the retrieval of the conscious declarative memories about the past experience. So you’ve got the cognitive memories now in your mind supplemented by the arousal that the unconscious amygdala memories are generating at the same time, and those are coming together to make that conscious memory.

**BW:** What is the goal of your research?

**JL:** To help people who have problems with fear, because activation of the defense system is a major factor in people who have fear and anxiety.
“As UN Youth Champion, I initiated a six-month global tour to experience firsthand the unique challenges that youth face and to learn more about the positive contributions they make in their communities and the world. The goal of the trip was to learn as much as I could about the world’s youth and share my experiences with others by creating a dialogue between myself and the youth. In the six months, I visited 24 countries, including Australia, Bangladesh, India, Chile, Kenya, Argentina, Japan, Indonesia, Thailand, and several countries in Europe. The world tour changed my life. Visiting countries like Bangladesh and India, where I saw extreme poverty, shifted my perspective drastically. I slept at the Kakuma Refugee Camp in Kenya; I visited a safe house in the Phillipines, where girls had been rescued from trafficking, and I had breakfast in Colomba with young men who were formerly involved with revolution and warfare—these are things I will never forget.”

Coleman found the trip to be an incredible eye-opener, calling it “challenging and ultimately the most rewarding experience I’ve had…. Like Martin Luther King said, ‘Everybody can be great, because everybody can serve.’ You have to let go of this idea that happiness is ‘out there’ or contingent upon having something. Happiness stems from within. It’s choosing to love yourself and your imperfections. It means being grateful even when you don’t have everything you want. Seeing the extreme poverty and conditions I saw only reinforced this notion within me.”

Coleman’s pursuit of happiness and passionate youth activism didn’t stop once her world tour ended. Back in the states, she embarked on yet another first—this time joining forces with She’s The First, an organization that raises money for girls in developing countries to be the first to graduate high school, which Coleman calls an “incredible organization.”

Besides advocating for girls education, Coleman is also involved with the Do Something campaign, which is the largest youth organization in the United States. “I love the Do Something campaigns,” she says. “They empower teens to get involved with lots of different causes that affect them—from homelessness to bullying, self-esteem to the environment. I’ve been involved with them for the past five years or so.”

As if all that wasn’t enough, Monique still has mo’. She’s also launched her own initiative, called GimmeMo, which she was happy to talk about.

“GimmeMo is a movement that is devoted to empowering youth through safe conversations about real issues,” she says. “I’m in the process of revamping the website and will have lots of cool changes this fall. My goal is eventually to have a talk show that largely focuses on young people.”

Indeed, Coleman credits a large part of her happiness to being of service. “I’m happiest when I’m being of service,” she said.

Coleman was kind enough to slip us some of her other “happiness how-tos” to share with our readers:

• Surround yourself with positive people.
• Volunteer with an inspiring organization.
• Wake up each day and express gratitude before you even open your eyes.
• Take care of your body by eating healthy and exercising. I find that self-image is one reason a lot of people feel unhappy. Doing good things for yourself and your body definitely contributes to your happiness—and healthiness!
• Smile, even when you don’t feel like it. If you do this long enough, eventually you’ll find something to smile about.

“I love quotes, just in case you haven’t noticed,” says Coleman. “Thom McKinnon once said, ‘Be a wonderful role model because you will be the window through which many children will see their future.’ With that said, I think it’s most important for people to follow their personal passions, and then see how they can use what they’re passionate about to make a difference. It doesn’t matter what you love to do, almost everything can be applied to social change. Learn as much as you can about the world, give more of your time than your money, and take advantage of social media as a tool to spread positive messages.”

You can follow Coleman online at GimmeMo.com; you can also learn more about She’s The First at shesthefirst.org and Do Something at dosomething.org.

Disorders. They’re perpetually in that state, or that state is easily triggered. The defense circuit contributes in a major way. Maybe it’s off-kilter, and that’s why one has problems. We’re still trying to understand how fear and anxiety come about, but we’re saying that one of the components is not a fear system or anxiety system but a defense system. It’s doing the same thing regardless of what we call it, but it clarifies what the role of this thing is, especially from an evolutionary point of view. It’s not in the brain to create feelings like fear and anxiety. It’s in the brain to allow an organism, whether it be a bacterium or a human, to detect and respond to danger.

BW: Are there ways to stop disorders like post-traumatic stress disorder?
JL: One of the things we work on is how to alter the memories that are created in these situations. We reported a discovery in a paper in Nature [in 2000], something called “reconsolidation.” Basically, when you retrieve a memory, the memory has to go through a new learning process in order to be kept in the brain. A key thing involved in formation of memory is that the neurons forming the memory have to synthesize new proteins. These stabilize the synaptic connections that are constituting the memory. Memory is thought of as a set of synaptic inputs that have changed as a result of some experience, and the way those changes are stabilized is by protein synthesis. If you block protein synthesis after you retrieve a memory, you lose the memory just as you do if you block protein synthesis while you’re forming the memory. The idea there is that each time you retrieve a memory you have to put it back in, because it is now a new memory. You have to re-store it, that’s why it’s called reconsolidation. So a person goes to court to testify about a crime they witnessed and talks about what they read in the newspaper, rather than what they gave in the police report on the day of the crime, because the memory was reactivated by reading the newspaper. The new info gets incorporated in the memory and is stored as part of the new memory, and that’s what the person remembers. The bottom line is that our memory is only as good as our last memory. Not very reliable, but people have been saying that for a long time. Somehow it all works out most of the time.

It does raise questions about our legal system. I’ve often been asked to give expert testimony on murder crimes, and I always turn those things down. “I didn’t do it, my amygdala did.” First of all, if it’s about memory, it’s a slippery slope, and I’d rather stay out of it. I have, on occasion, given information saying that memory is unreliable, but not in a formal setting. I think the courts are aware of this; they don’t know what to do about it.