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Becoming conscious: the science of mindfulness

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Many of us go through our daily lives on autopilot, not fully aware of our conscious experiences. In a discussion moderated by Steve Paulson, executive producer and host of *To the Best of Our Knowledge*, neuroscientists Richard Davidson and Amishi Jha and clinical mindfulness expert Jon Kabat-Zinn explore the role of consciousness in mental and physical health, how we can train our minds to be more flexible and adaptable, and cutting-edge neuroscience findings about the transformation of consciousness through mindfulness and contemplative practice. The following is an edited transcript of the discussion that occurred February 6, 2013, 7:00–8:15 PM, at the New York Academy of Sciences in New York City.

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Steve Paulson: Thank you so much for coming; it is wonderful to be here for the final event in our series. We have a fascinating evening ahead of us. Forty years ago, hardly anyone talked about mindfulness, even though there were certainly plenty of people who meditated back then. If you had a taste for Eastern exoticism, you perhaps dabbled in yoga as well, but there wasn't a *science* of mindfulness back then. The idea of mindfulness—the idea that mental activity could actually change the physical structure of the brain and that it could be studied by modern Western science—was revolutionary. "Paradigm shift" is an overused phrase, but that would seem to be the case in this instance, especially with the discovery of neuroplasticity and the insights made possible by new brain imaging techniques. And of course, what makes the new science of mindfulness so meaningful is that it's not just about what happens in the lab; it's about you and me; it's about anxiety and resilience about well-being, and happiness; and it's about learning specific things that one can do to actually make life better.

So we have a lot to talk about and a terrific panel with some of the true pioneers in the field. Let me introduce our speakers.

Richard Davidson is director of The Waisman Laboratory for Brain Imaging and Behavior and the Laboratory for Affective Neuroscience, and the founder and chair of the Center for Investigating Healthy Minds at the University of Wisconsin. He's collaborated with the Dalai Lama and many others to study the neuroscience of meditation; he's a co-author of the recent book, *The Emotional Life of Your Brain*.

Amishi Jha is a professor of psychology and director of the Contemplative Neuroscience, Mindfulness Research, and Practice Initiative at the University of Miami. Her research investigates attention and working memory; and she's investigating how mindfulness training can help various populations, including members of the United States military.

Jon Kabat-Zinn is an emeritus professor at the University of Massachusetts Medical School, where he was the founding executive director of the Center for Mindfulness in Medicine, Health Care, and Society. He is also the founder and former director of the mindfulness-based Stress Reduction Clinic. His many books include *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*—a great title, by the way.

So, Richie, let me start with you. Is the science of mindfulness changing our understanding of the way the brain works?

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Richard Davidson: I think that it's beginning to change the way we think about the brain. As you mentioned in your introduction, we now have evidence that engaging in pure mental training can induce changes not just in the function of the brain but in the brain's very structure. I think these are the first examples of top–down control—a phrase that psychologists and neuroscientists use meaning conscious volitional activity that we can engage in by our will. Through conscious volitional mental training the brain can actually change, and some of the changes may be beneficial and useful. This is giving us a new way to think about how the brain can reorganize itself.

Paulson: This is a radical idea, when you think about it. You're saying that through mental activity itself, from the way we think, we can actually rewire our brains? In some way it lays down new neural circuits? Jon?

Jon Kabat-Zinn: Well, I'm sitting between two neuroscientists and let me make it clear I am not a neuroscientist. But when no other neuroscientists are available, I will talk about the brain . . . [*Audience laughter*]

Let me begin by saying that one way of looking at the brain is that it is *the* organ of experience. It developed to regulate how we are in relation to every aspect of our experience. If you think about it for a moment the question arises, How do we experience anything? Well, we have eyes, ears, a nose, and a tongue, and without those, we wouldn't be experiencing much. And then there are other senses, such as proprioception and interoception. Proprioception is: [*putting his hand behind his head*] "I can't see my hand, but I know where it is." I know exactly where my hand is and then I can move it however I want to. Interoception is the sense of one's physiological condition; when you are asked, "how are you doing" and you say, "fine." Yet, how do you know to answer to such a question? How quickly did you assess things?—that's the sense of interoception.

We're beginning to understand how the brain organizes itself to actually optimize affective functioning in relation to a very complex and rapidly changing world. The brain has been doing this for millennia, not just since the advent of neuroscience. It's *we* who are ignorant; the brain has been way out in front of the curve from the beginning.

Paulson: The idea of neuroplasticity—we all take this for granted now—but it's actually a relatively new idea.

Kabat-Zinn: And that's because there was—correct me if I'm wrong—there was a dogma in neuroscience for a very long time that after about the age of two it was all downhill in the brain and central nervous system: we just lost neurons at an increasingly exponential rate. It turns out that isn't actually true—this was a relatively recent discovery.

Paulson: Amishi, to bring you into the discussion, in terms of neuroplasticity, how much can the brain actually change as we age?

Amishi Jha: I think it's interesting to think about this as a radical idea because at some level, based on the history of the field of neuroscience, it is pretty new. On the other hand, if I asked how many of you think that engaging in certain kinds of physical activity will change the way the body works, most of you would agree that certain types of activity can alter the body in noticeable ways. If you sprint, you're going to have different leg muscles develop than if you decide to do stomach crunches.

I hope that we'll get to the point where—as a society, as a culture across the globe—we'll start understanding that the mind is really no different than the body, that engaging in very specific mental exercises can promote health and, indeed, that engaging in regular mental activity of certain kinds will promote health.

Paulson: And is that true throughout the course of our life, whether we are 10 years old, 30 years old, or 70 years old?

Davidson: We know that plasticity changes over the course of life, but we also know that plasticity never ceases. There's definitive evidence that plasticity exists until we die. The research that actually demonstrated that neurogenesis—the growth of new neurons, a form of plasticity—exists in the human brain was done among people who were actually very close to death, because in order to definitively look at neurogenesis you need to look literally inside the brain. Those data show that plasticity exists throughout life.

I do think that there's an important lesson that can be learned and harnessed in our basic understanding of developmental changes in plasticity, because there is no question that for certain kinds of skills the brain is more plastic early in life. That is why it is much easier to learn a second language when you're a kid; it's why it's easier to learn to play a musical instrument when you're a child. I believe that if we can actually figure out ways to cultivate skills of mindfulness and related practices early in life, it's possible that those skills will be more enduring and will lead to more lasting changes.

That is speculation at this point; we don't know the answer, but it invites that kind of question.

Paulson: There's often a personal story as to why a scientist chooses a particular field of study; and I'm guessing there are some interesting personal stories among you three. Why did you first get interested in mindfulness?

Jon, let me start with you.

Kabat-Zinn: Well, you know how it is with stories: you can tell the story of yourself in a thousand different ways, depending on the effect you want to get across, to whom you're talking, etc.

I don't necessarily believe the stories that I tell myself about my past and the arc of my trajectory. But I do find myself sometimes saying that mindfulness was something that I appreciated when I was very young—maybe five or so—simply while living with my family. My father was a professor at Columbia in the medical school and my mother was an artist. My father was extremely well known in scientific circles; my mother was a complete unknown. She paints; she had her first show when she was 90 years old—she's now 98 $^{1}/_{2}$. So, I grew up in a kind of C.P. Snow's "Two Cultures" world with science and art, and yet I just knew that there was something missing; I could feel it in the emotional tenor of the family. It became really important to me to understand for myself what the unifying factor was of different ways of knowing. At age five, I probably wouldn't have put it that way, but it was a "cellular" feeling, *there's got to be more to it than this.*

So as I trained at MIT in molecular biology, that feeling was always at the front of my mind and motivation, and I would say to myself, "you have to start with physics and chemistry and molecular biology, but what about complexity, what about consciousness?" That was something that I was always interested in. At MIT, I was introduced to Buddhist meditation. I won't tell the story, but I was 22 years old, and it was like a wake-up experience. It was: "Holy smoke, this is what I've been looking for my entire life!" What I had been looking for was a way of *being* that allows one to hold everything without judging it, without putting it into compartments and cognitive bins, but to just hold it and then see relationships that might have been opaque due to various filters. That made a huge difference, and from that point on, even though I did get my PhD in molecular biology, there was always this other element that was very important to me. That's how I finally wound up figuring out what to pursue, as my both profession and as my love.

Paulson: Richie, let me turn to you. How did you get interested in mindfulness?

Davidson: Well, since the start of my career and still very much today, I've been captured, in terms of my scientific interests, by the diversity among people and the ways they respond to life's slings and arrows. You know, as the bumper sticker says, "Stress happens . . . "

It's really all about our relationships to these challenges, and I've always been interested in why certain people are more vulnerable to events while and others are more resilient—this has been at the core of my scientific interests. I always had the conviction that we can do better as a society, and that the mind was central to this—that we don't have to accept the status quo.

When I had the opportunity very early on in my career to meet a number of people who had been engaged in meditation practice I was able to feel something about their demeanor, about the way they related to life's slings and arrows, and I said to myself *that* is something really important. I could just see it in the quality of their being.

Paulson: I know you were a graduate student in psychology at Harvard at the time, but then you started hanging out with people who had gone off to India and people who were serious meditators.

Davidson: That was an alternative source of education and a very important complement to my education. I learned a lot from those people and that really kindled my interest.

Paulson: Amishi, how did you get interested in this?

Jha: My story is on the lowbrow end of how people come to these things. Both of these great mentors of mine [*motioning to Davidson and Kabat-Zinn*] were part of the story, but the basic motivation for me was stress.

I was at the University of Pennsylvania as a professor, just starting out with two young kids, teaching classes, developing a lab, and I had lost feeling in my teeth from grinding. I couldn't talk anymore; that's not a good thing when you're a professor and have to give lectures. Right around that time—I don't know if I've ever shared this with Richie—Richie was giving a talk at Penn and he showed these images of electrical activity in a brain that was primarily in a negative affective state and in another brain that was in a relatively positive mood; they were quite different from each other. At the end of his talk I raised my hand and I said, "Practical question: how do you get *that* brain to look like *that* brain?" [*Audience laughter*] And Richie replied, "meditation." That was it. He didn't elaborate. And I thought, I can't believe he just used that word in this audience because it wasn't something I ever had heard someone utter a scientific context.

That experience stuck with me; and when I was struggling with my own problems with stress, I decided to check out meditation as an alternative to completely quitting my job.

So, I took the summer and started—just by myself in my office—listening to *Mindfulness for Beginners*, a little guided CD. I committed to spending a period of time where I would just do this. After a couple of months it was really surprising: I still had a lab, my kids, a busy active life, but I felt totally different in my relationship to everything. I felt much more present and stable in my experience instead of feeling in the throes of it. At the same time, I realized that I actually have the tools, in my own scientific toolbox, to study this and that doing so would be a lot more fun than the kind of basic research I had been doing. In many ways—in the same spirit of what Richie described—our societies can do better. And in my case it was, *I can do better*. I was better able to function, and because of that I became deeply curious about what was happening.

I'm a basic attention researcher, so I already had access to a lot of the paradigms and technologies, and I started applying these to questions about mindfulness training. I wrote my first grant by the end of that summer, and haven't stopped since. It's been good.

So, [*to Davidson*] thank you.

Paulson: We've been throwing around the word *mindfulness* and I think we need a definition. What does it mean to be mindful?

Kabat-Zinn: There are a lot of different answers. One is operational: *How* do you cultivate mindfulness? My working definition is that mindfulness is the awareness that arises from paying attention on purpose, in the present moment, nonjudgmentally. The nonjudgmental piece was mentioned earlier as potentially being of great value, yet it's very easy to *mis*understand what nonjudgmental means. It means suspending judgment. It doesn't mean having no judgments or forcing oneself to be nonjudgmental; rather it means that one doesn't judge how judgmental one is. Once one starts to really pay attention it becomes obvious how many ideas and opinions, likes and dislikes, actually *drive* each of us from moment to moment so that we are lost in thought—lost in our heads, caught up in emotional storms—and not actually living our lives in the only moment we ever have, which is now. That's the operational definition.

There are two different ways that my colleagues and I used to think about this in the larger sense because awareness—I don't want to get into the question of how awareness differs from consciousness—is a very interesting faculty that we all have. If we stop and think about it for a moment, we can of course experience being aware right now in this moment. We are aware of various aspects of experience, through the senses, through the body as a whole, and through the mind—through the faculty of attention and awareness itself. So, there are many different doors into mindfulness.

One is brought out in the following example. Pick one object that you attend to and see what happens if you decide—whoever the "you" is that tells the other parts of you to do things—to just attend to your breathing, to be aware of your breath, for, say, the three or five minutes. If you can, you might feel a breath come in and feel a breath go out, attending only to the breath itself. But inevitably, perhaps even very rapidly, you begin to notice your mind drifting off to something else: the past, the future, opinions, ideas, memories, anticipations . . . anything. At that point breathing—the breath—is no longer in evidence. But then you suddenly notice what has happened, and sooner or later you can bring your attention back to your breathing—it's like exercising a muscle: the mind goes off, you bring it back, the mind goes off, you bring it back to the object that you're paying attention to. But now consider how, slowly over time, your mind goes off to other things and you begin to have such a good time in your own mental space that you don't want to bring your attention back to breathing. This is where the rubber meets the road: you bring it back anyway, in spite of all the resistance. You might even say to yourself, "I don't want to focus on breathing anymore, it's getting boring," But you bring it back anyway because part of you has decided you will do it to see what might come of it. That's one door into it: *to use objects to pay attention to.*

But let me say that these comments of mine might easily convey the impression that it's the *objects* of attention that are most important. But no, it's not the object of attention—the breath or the body as a whole, or this technique or that technique—that's of primary importance. What is most important is the *attending* itself. Can we pay attention to attention, can we bring awareness to awareness? One way to do this is to practice being present without focusing or choosing a particular object to attend to, rather just resting in awareness itself. That turns out to be quite a challenging thing to do. But in essence it is no more challenging than staying with the breath. They're both very, very difficult—and also pretty easy if you can get out of your own way, and your own mental habits of self-distraction.

So, again, there are many different doors into defining what mindfulness is, and it's important to realize that each may be contributing something different but important to our understanding.

Paulson: I want to bring the neuroscience perspective into this. Richie, you have watched people in brain scanning machines as they are practicing mindfulness. What's going on in the brain?

Davidson: Lots of things are going on and it's not something that we can summarize easily, for a few reasons. One is that it depends on whether we're examining a person who's just starting practicing mindfulness or someone who's done say 35,000 hours of lifetime practice. What the latter person shows and what a novice shows may be quite different.

In terms of what we measure in the brain, it differs whether one is using breath as the object of focus versus an external visual stimulus: there will be somewhat different parts of the brain that are involved. One other thing we can say is that brain networks important for attention are engaged by mindfulness practices, and in certain ways they are strengthened.

Paulson: Which parts of the brain are activated?

Davidson: Particularly regions in the prefrontal cortex, which play important roles in aspects of attention. Again, it depends upon a person's level of expertise; we've seen in very expert practitioners that the prefrontal cortex comes online for very brief periods of time, but then goes back down to baseline. This corresponds, we think, to reports that these practitioners give of being able to rest in awareness completely effortlessly, in the way Jon was describing it. Such practitioners don't need, in an effortful way, to "yank" the mind back to attention because being in a state of simple awareness, if you will, is more familiar. One definition of the word *meditation*, by the way, in Sanskrit, is *familiarization*. In practice, mindfulness is a person becoming more and more familiar with the quality of awareness that Jon was talking about.

Paulson: Now I know you have had very experienced meditators, particularly Buddhist monks, come into your lab and you evaluated them; some have spent literally tens of thousands of hours meditating over the course of their lives. I think you've described them as the "Olympic athletes of meditation." What have you noticed in them?

Davidson: In that work, first of all, we see very different patterns with different kinds of meditation practice. We've been talking here about mindfulness . . . in fact there are many varieties of mindfulness practice that people engage in. There are also practices that are explicitly designed to cultivate certain kinds of positive qualities, like compassion and loving kindness. We see differences depending upon what practices people are engaged in. One of the things that we noticed early on when people are doing basic mindfulness practice—particularly the kind that Jon described where they're not choosing a specific object but just resting in awareness—they exhibit an oscillation in the brain that we call γ-oscillations, particularly in the prefrontal region, but we see it across widespread regions of the brain. These γ-oscillations are high frequency oscillations of about 40 cycles per second that have been implicated in basic mechanisms of synaptic plasticity. The oscillations are highly synchronized across wide regions of the brain. When an external stimulus is presented, the oscillations become phase locked to the external stimulus. This is best described in a metaphorical way: imagine a very, very still lake, and you throw a stone in the lake, you'll easily see the ripples that that stone produces, even if you're standing on the other shore of the lake. In contrast, if the lake was turbulent and you throw a stone in, you wouldn't see an effect. Analogously, if the mind is turbulent when an external stimulus is introduced, the stimulus is going to be part of the turbulent gamish. But if the mind is quieter, one sees phase locking, where an external stimulus locks onto a phase of the ongoing brain oscillations. That may be a way in which the brain can enhance, if you will, the signal-to-noise ratio, largely by decreasing the noise rather than by enhancing the signal.

Kabat-Zinn: [*Speaking to Davidson*] Would you say that that actually might be, if not a biological model, at least a metaphor for an insight?

Davidson: Yes.

Kabat-Zinn: . . . or a particular kind of realization in the moment, like, "that's a horse," or any kind of discrete insight. Is that what the phase locking provides, a kind of background–foreground jumping out-at-you?

Davidson: Yes. I think that's a reasonable speculation.

Paulson: Amishi, you said that you got into the science of mindfulness for very personal reasons—too much stress in your life. What do we know about how mindfulness helps reduce stress? What's going on in the brain to reduce stress?

Jha: I actually think it ties back to what you were asking about the definition of mindfulness. I think Jon's description is quite prophetic. I'm going to say it again: paying attention, in a particular way, on purpose, in the present moment, nonjudgmentally. [*To Kabat-Zinn*] Did I get it right?

Kabat-Zinn: Yes.

Jha: Okay. The paying-attention-on-purpose piece is essentially, to me, a hypothesis: that what we will change is our ability to voluntarily direct our attention. Let's think of the capacity of the mind and of attention as something like a flashlight that can be directed at will. This could be useful in cases when the mind tends to move the flashlight in directions that aren't that useful. For example, in the context of depression, one may be constantly shining his/her internal flashlight on depressogenic negative thoughts and feeling that the thoughts are uncontrollable. If allowed to engage in activities and practices that could give a better hold of the flashlight so as to direct the mind where you want it to go, that could be helpful. Attention is one part of that.

The in-a-particular-way and in-the-present-moment pieces—and I'd say the field is sort of moving in this direction—is a hypothesis about our ability to develop *meta-awareness*, an awareness of what is experienced in the moment, of what is happening right now—so the quality of being able to know where my mind is: Am I wandering? Am I here? Am I actually sitting in the chair or is my mind somewhere else? That's the meta-awareness piece.

This last point, nonjudgmentally, is about the kind of value-laden, affectively charged meaning we give to things and controlling how much value we decide to give something. If something happens and you say, "this is the worst thing that could have ever happened." Well, that's one meaning you can give to what happened. But what if there's another meaning, such as "this is the best thing that could have ever happened," or "this is of no consequence." Those are all different judgments on an event.

Paulson: So from the neuroscience perspective, why do some people fall apart in a stressful situation, whereas other people somehow can ride it out, and it doesn't get to them so much?

Jha: These areas—paying attention willfully, meta-awareness, being able to be aware of what's going on and having some control over the amount of meaning put into something or how much self-relatedness there is to something—all are vulnerable points in life experiences. They represent core mental functions that have limited capacities. For example, the ability to pay attention willfully is limited; if attention is directed a lot or used up, one won't have a lot of control to willfully use it again.

One way to think about stress is that people who are experiencing it (including me at that point in my life) are spent; they don't have any more capacity to willfully guide what their mind does. They are really prone to bad habits of mind. The same thing goes for meta-awareness. If one is spent in the ability to see what he/she is doing and feeling and thinking and experiencing—if one has no further capacity to experience—one is going to switch to autopilot mode and lose mindfulness of behavior. The same thing with affective meaning.

When I think about certain vulnerabilities and what it means to be stressed, the flipside is to be *resilient*—having the capacity to bounce back when things go wrong, and the capacity to maintain functioning even when things are more and more stressful. Going back to the question about which brain regions are

activated in mindfulness . . . , what brain regions are activated during resilience? One place I have been looking is in the areas associated with human attention.

Paulson: Let me follow up on this. Richie, I know that one of your areas of research is resilience—trying to figure out what's happening in the brain so that people can be (more) resilient. Have you figured this out?

Davidson: One specific example is the following. One way that we sometimes get ourselves into trouble is by perseverating over adversity. If we're confronted with stress, we often have an emotional reaction that perseverates—that just goes on beyond the point where it's useful, beyond the point where the stress is actually present. In the brain this is expressed as prolonged activation in a particular part called the amygdala, which is very important for emotion, and particularly for stress, negative emotions, and anxiety. We have been able to measure the duration of time that the amygdala responds to a particular discrete emotional stimulus presented in the laboratory. One of the things that we found is that practicing mindfulness will lead to faster recovery in the amygdala; the amygdala comes back down to baseline more quickly. So, there's a response and a quicker recovery. That may be a key attribute of resilience.

Paulson: Is this a long-term thing? Is it the case that the more practice one has in mindfulness the more naturally resilient one is?

Davidson: Our data do indicate that there is a positive correlation between the number of hours of formal practice and the rapidity with which the amygdala recovers in this particular way.

Kabat-Zinn: To bring together some of what Richie and Amishi are saying, if we take major depressive disorder, one of its most painful aspects is that the mind just keeps going over the same thing over and over and over again—the perseveration Richie was talking about. Also, the thoughts secreted by the mind are also believed to be true; one has no separation from them, no idea that they can be seen as *events* in the field of awareness, events in the field of consciousness, and impersonal events at that. Instead, we believe that they are the reality, or an accurate reflection of reality: "I know it's the truth; I'm a terrible person; I've always been a failure; I'm too old . . . .", These are all just thoughts; but when they are taken as the truth, they have power over us, and are often oppressive, even imprisoning.

However, by cultivating mindfulness, one is adding another dimension to the picture, but without trying to fix anything or make anything go away. And in that sense, the added mindfulness dimension is a radical stance to take. One is expanding the field of awareness so as to hold the observing *capacity* as separate from what is being observed. One quick way to frame this is that when you see that you are separate from your thoughts or your emotions you have a whole palette of different ways to be in relation to those thoughts or emotions, and this can break the vicious cycle of depressive rumination. This capacity to separate shows itself in different areas of the brain. For example, before people are trained in mindfulness-based stress reduction (MBSR), they tend to have a lot of activity in the so-called *default network*, a network associated with activity in the midline of the cerebral cortex that generates narratives about our experiences, and is also associated with mind-wandering. After eight weeks of MBSR training, another, more lateral, brain network becomes active. And while it's not that the midline default network shuts down after MBSR, it does seem to decrease in activity. The lateral network is associated with a kind of non-narrative self-referencing, for example, "I'm here now, feeling my breath, feeling my body standing, with the air on my skin," which provides a whole other way to be in relation to the basal thinking part associated with the default network. Researchers refer to it as an *experiential network*. Of course there's nothing wrong with narrative thinking about ourselves, but when such thinking dominates our lives, or we become lost in thought or completely oppressed by our own thought, then we're not free.

So in this way, the cultivation of mindfulness gives us a whole other dimension to inhabit in relationship to our experience, and thus a way to be in a broader and potentially wiser relationship to whatever is unfolding—and perhaps not taking it all so personally, which is what our narrative is almost always about.

Paulson: This is fascinating; you're suggesting that to be truly mindful we have to get rid of the story we tell ourselves.

Kabat-Zinn: No, we don't have to *get rid* of the story of ourselves—the language here is very, very important. It's not about getting rid of anything. Rather, it's about cultivating different innate aspects of ourselves by, as Richie was saying, becoming more familiar with the territory. [*Turning to Jha*] It's as if we only shine the flashlight in one direction in a territory that actually has at least 5 or 10 different dimensions. When we tune into these different dimensions through the senses—through awareness itself—then we've got a whole way of being in relation to thinking and to the narrative that is liberating. It's freeing.

The take-home message is: if you want to reduce the stress in your life, be aware of how much you tend to take things personally that actually aren't personal. We all make things personal through our own narratives. But actually, what is construed as personal may just be the human condition; it may be life expressing itself. When each of us creates a big story of "me," we can wind up feeling the first victims of something and, moreover, believing it. Mindfulness is about expanding awareness and the narrative so that you are in a different relation to your life; and, importantly, if you had meditated for, say, 50,000 hours, this relation would be different than if the practice of mediation had begun a week ago.

Paulson: I want to step back for a moment and talk about the way mindfulness is practiced in a Western setting, particularly in the United States, because I think a lot of people would say that it originally came through Buddhist meditation, which then raises the question of whether mindfulness, in the modern Western sense, is an offshoot of Buddhism or something else.

Kabat-Zinn: It's a wonderful question. Do you mind my pointing out that the Buddha wasn't a Buddhist? This question is kind of tricky because we run the risk of turning the Buddha into something he wasn't. In fact, as our colleague, Alan Wallace, likes to point out, one could think of the Buddha as more like a great scientist—a Galileo or an Einstein—somebody with very deep insight into the nature of his own experience, who developed the language, framework, methods, laboratory tools, and so forth for doing something special, which is what all these meditative practices are about. And yes, a religion grew up around it. But the religion of Buddhism, for one thing, has no God, and so from a Western point of view that's a very interesting thing to note.

Although it is spoken of as the heart of Buddhist meditation, mindfulness is about paying attention—and how specifically Buddhist is that? It's about awareness—and how specifically Buddhist is that? It's about loving kindness and compassion—how specifically Buddhist are those? If we drop into the essence of mindfulness, those kinds of questions—for example, is mindfulness an offshoot of Buddhism?—really become second order. It's not like anyone is secretly trying to turn everybody into Buddhists.

Paulson: Let me ask a more pointed question, then. Is mindfulness a spiritual practice?

Kabat-Zinn: Well, that depends on what you mean by the word *spiritual*. I tend to stay away from the word. In my experience, people sometimes get quite attached to their particular view of what constitutes spirituality, with the implication that others who see things differently are not quite as spiritual as they are. My working definition of *spiritual* is the answer to the question: "What does it mean to be truly human?" And the answer is, many things. Is giving birth spiritual? Is chopping vegetables spiritual? Is seeing the look in your daughter's eye when she comes home from school a spiritual experience? From this point of view, what *isn't* spiritual? As long as one brings full, open-hearted presence and awareness to experience,

the world in some sense "lights up" with meaning and beauty. That's my particular view of spirituality, but I'd love to hear others.

Paulson: I want to follow up with Richie, in particular, because you have collaborated with the Dalai Lama, and you have worked with a number of Buddhist monks. How do you deal with the question of the connection with Buddhism and, more specifically, the question of whether we're talking about some sort of spiritual practice?

Davidson: I very much agree with Jon about the nature of spiritual, and I think that he put it beautifully. I don't talk about spiritual because I don't really know what spiritual means. I think that what we're talking about is part of every human being's basic, innate capacity. We all have the capacity to be aware. We all have the capacity to express compassion and loving kindness. And you can call that whatever you want to call it. It doesn't really matter. It's all part of the basic human repertoire.

In terms of the work that I've done with the Dalai Lama and with other Buddhist monks, from a scientific perspective, if we want to study these kinds of practices we need a group of people who have been trained in a very specific way. In one sense we have simply taken advantage of samples of convenience by working with Buddhist monks because these are individuals who have received extremely similar training; we can thus be sure that the kind of meditation practices that each person does is the same. That's extremely important if one is going to study a group of people who are asked to engage in a specific kind of mental practice; you want them to have been trained in the same way. Again, we have simply taken advantage of this sample of convenience. There may be other traditions where there are comparable samples of people, and in fact there are serious scientists who are studying practices that come from very different religious traditions.

Paulson: Are you wading into what has traditionally been considered troubled waters? Are you talking to some degree about mind–body medicine here? The power of the mind to alter the body? I'm sure that there are some scientists who would say that this isn't real science. Have you run up against that in some circles?

Davidson: To be honest, I think most scientists today would agree that there are certain kinds of evidence for effects of the mind on the body that are incontrovertible. We now know, for example, that there are certain psychosocial factors that can influence the course of certain physical illnesses. The data are absolutely bullet-proof and compelling. Place an asthmatic in a stressful situation and you will find exacerbation of lung inflammation that can be measured objectively. When one begins to look at such data the mind has to be involved, because how else are psychosocial influences from the world getting under the skin and actually influencing eosinophil infiltration and inflammatory responses in the lung? There's no way other than through the mind and the brain. I think that recognition of such effects have led to increasing openness. Today we have the scientific tools to begin to study the mechanisms by which these mental influences may operate. And if some of the mechanisms are deleterious, this invites the possibility that training the mind, and changing one's relationship to the ruminations and to external stresses, may produce the flipside—their use for beneficial purposes.

Neuroplasticity is silent with respect to whether it's good or bad; it's both. If we take advantage of plasticity and use it for promoting virtuous qualities, then it can be in the service of positive change.

Paulson: Jon?

Kabat-Zinn: I'd like to piggyback on that and say that it's not just neuroplasticity; the science of the mind–body connection has evolved to the point where we now also understand that what we used to think of as our genetic inheritance is no longer quite so fixed. How our genes get expressed has everything to do with what we do: how we behave, what we eat, how intimate our relationships are, how we feel about ourselves, how much we exercise, whether we meditate—virtually everything that we're doing is in some

way or another influencing which of our genes get upregulated and which get downregulated. This is the science of epigenetics. Many of the genes that get upregulated under stress are inflammatory genes. These genes seem to be at the root of a number of different kinds of chronic illnesses that people often refer to as *lifestyle-related* illnesses, including cancer. In addition to epigenetic evidence of a strong mind–body connection in relationship to health, there is also the emerging story of stress and its effects on our telomeres and, therefore, on aging. Tips of all of our chromosomes are capped with shoelace-like structures called telomeres, which shorten every time the cell divides; but there's an enzyme (telomerase) that builds them back up again. Under stress, telomeres degrade much more quickly. Elizabeth Blackburn and her colleagues won the Nobel Prize in 2009 for the discovery of telomeres and telomerase. In one study out of her lab, it was shown that people with severe chronic stress that doesn't go away—because it has to do with parenting children with chronic diseases—have accelerated telomere shortening, but only if they report high levels of perceived stress. It turns out that while stress can rapidly accelerate telomere degradation, the ways in which an individual chooses to be in relationship with his/her stress and stressful conditions can actually reduce the rate of telomere shortening and enhance their lengthening through the action of telomerase.

Each of us is in a dynamic flow of mind and body speaking to each other. And while the science is still in its infancy, it has been a very long time since I have heard anyone express deep skepticism about the validity of the mind–body condition and the evidence behind it.

Jha: Let me answer from a different perspective—not so much the mind–body side of things—but from the cognitive augmentation field and questions like, How is it that we might be able to train the brain using other techniques? For example, computer-based training. Many of you might have heard of Brain Age, Posit Science, or Lumosity. These are publicly available for-profit possibilities for how people can train their minds. There seems to have been a convergence around such possibilities at the same time that a lot of mindfulness training studies, and the study of their impact on the brain, are happening.

Paulson: Amishi, I want to follow up on some of the fascinating work that you've been doing. You have been working with soldiers in the U.S. military who are being deployed to go off to war zones, in a project teaching them mindfulness techniques, yes?

Jha: Right. The project has lots of people on the team. The person teaching mindfulness practices, Liz Stanley, is exceptional. She's a former Army captain and an ordained Buddhist teacher; she's a Daughter of the American Revolution and a professor of security studies at Georgetown. She really has a number of hats on and was the perfect partner for this project to develop mindfulness training that would be appropriate for people that are in the military.

I was interested to see how, when stress is on the horizon—stress that one knows is coming—it might degrade the ability to pay attention, and if so, how this might be protected against. We offered mindfulness training to 240 soldiers who were then deployed to Afghanistan. We tracked their functioning both before and after they got training, and then after they came back from deployment. Pretty soon I'll be able to say publicly what we found.

In one project that we've already finished, with predeployment Marines, the results are interesting. It was a much smaller sample, but I'll tell you what we found with that project because we were talking earlier about people with 40,000 hours of training, the so-called Olympians of meditation. In the completed project with predeployment Marines we found that getting as little as 12 minutes of mediation practice a day helped the Marines to keep their attention and working memory—that is, the added ability to pay attention over time—stable. If they didn't practice mediation or practiced less than 12 min or not at all, or weren't offered the training, they degraded in their functioning.

Kabat-Zinn: This is important work. At one point I got into an argument with Liz Stanley because I was concerned that the meditation practice might be misappropriated and used to create better killers—that is, the argument that a mindful sniper could be a better sniper. Liz convinced me that meditation training

and practice in the military probably actually saves lives rather than turns people into better killers. And this could be because a robust working memory capacity that doesn't degrade in the Marines who actually practice mindfulness as they were trained to do is exactly what one wants to have access to when in a counter-insurgency situation, in which nobody is wearing a uniform and it is very difficult to discern who is the enemy, and differentiate them from non-combatants, passers-by, women, and children. Such situations change very rapidly and are terrifying. If a soldier or Marine has undergone some kind of mental training that can keep him or her grounded, as in Liz and Amishi's studies, it may make the difference between killing a whole bunch of innocent people and holding fire appropriately.

Morally and ethically speaking, I think it's important to understand that these are complex issues, but the argument can be made that training in mindfulness may be helping soldiers to function more effectively and do what needs to be done to save lives rather than to take lives.

Jha: I think that's an important point: the ability to hold our own ethical code really relies on our working memory. If one cannot hold information in the mind in the moment that guides behavior, one will just go into a reactive mode that, depending on the circumstances, can be very problematic and destructive. The data in our study showed the pattern of increased working memory and better attention. But what was really interesting was having the Marines themselves describe how things were different. Most of these Marines had been deployed three or four times before, and one of the medics who was trained described things beautifully. He said, "the last time I was there, everything was a blur; everybody was a target; but this time I could, for example, identify a boy who could be my son." This marine shifted in the way he was thinking and was able to *see* things; he was more discerning. This pilot project led us to give it a bigger shot with a larger population.

One other thing I want to say about this study... we have talked on the panel here about people accepting or not accepting the effectiveness of mindfulness practices. In fact, about half the Marines that we trained were really not into it. They were resisters, not going to do it; Liz tried her best, but they were just not interested in doing it. They didn't practice, and we saw that—just like the group that didn't get the training—they degraded in their working memory. When they came back, we tested them all again and about half of the group of resisters actually got better after they came back compared to before they left. I really scratched my head and wondered what could explain this. Did being deployed give them a sense of purpose and they were now more aware? I asked Liz if there anything these about this group that stood out that could help explain how they functioned better after deployment than before. Liz in fact told me several of the Marines had been e-mailing and calling her from Iraq because their buddies weren't getting the shakes, were able to function, and were sleeping at night; they wanted to know what that "stuff" was that she taught them. The explanation is for how some of the resisters showed improvement is that they started practicing mindfulness after all while they were deployed.

Paulson: We've been talking a lot about stress and how to reduce stress. Let me flip the question around the other way: is there a science of happiness?

Davidson: I think that there is a growing science of happiness; and I think one of the things that we've learned about happiness from the kind of work that we've been talking about here is that it's best to think of happiness as a skill. We normally don't think of happiness as a skill. But in fact the current research leads us to the view that if we practice we can get better at being happy.

One fascinating research area that bears on these questions is work looking at the origins of certain kind of virtuous qualities, such as being kind toward others, which turns out to be one of the strongest stimuli or situations that produces happiness in one's self. It turns out that young infants have an innate propensity to express kindness toward others; they prefer watching that kind of interaction, and they prefer engaging in that kind of interaction. But then, stuff happens that mucks it up for us as we grow older.

In some sense, we can think of such qualities—being kind—in the same way that we think of language. Language is clearly an innate capacity. All of us have the capacity for language; but in order for language

to be expressed, we need to be raised in a linguistic community. Likewise, in order for happiness and for well-being and other qualities like kindness and compassion to be expressed, we need to have it nurtured from early on. If it hasn't been nurtured, one can use some of the practices that we're talking about to help familiarize oneself with that place within each of us, which is there from the beginning, that has a given capacity as its core. I think these are some of the insights that have been gleaned from recent research, and of course there's a whole neurobiology to this that we've been learning as well—that when people engage in these kinds of practices, to strengthen certain emotional attributes, there are changes that occur in the brain.

Finally, we also know that happiness is related to health; and again, these data are really compelling. There's a group in the United Kingdom working with the Whitehall Study of British civil servants—a very large sample. There are recent data indicating that people's reports of their happiness are a strong predictor of all kinds of physical health outcomes. What we don't know are the mechanisms for these outcomes. But we do know that there is a positive relationship between happiness and health.

Paulson: Jon?

Kabat-Zinn: I think there's a very important take-home message from what Richie is saying—you heard him say that happiness is a skill. We don't normally think of it as a skill; we think of it as a special state that we get to. I think it's really important to recognize that happiness is not a single state and that mindfulness is not a single state, nor is compassion. There is a whole range of different ways of being inside or under the umbrella of those innate human capacities. And if you want to increase your own happiness, probably the best way is to help others to be happy, and to particpate in meaningful undertakings larger than yourself. They are many, many healthy ways to go about discovering happiness in your life, but there are also some very unfortunate ways to go about it, such as simply grabbing for something you think you want, with the hope that it will make you happy. Instead, it might be wiser to recognize that happiness and well-being may actually already be a part of you, already here, in the same way that your breath is, but perhaps you haven't recognized it, never given it any attention. So your intrinsic happiness and well-being (or access to them) may be a little atrophied. I'm sure that if you held your breath for 30 seconds, the next breath you take would be a source of very great happiness. We take hugely for granted so many things, like a simple breath. But as soon as you can't have that thing, it's all you care about.

Too often, we get so busy or intoxicated with trying to get what we most want and escape from what we most don't want, that we may ignore or don't pay close enough attention to aspects of our own affective life experience that actually offer us profoundly meaningful, deep connections to ourselves and to others, the sense of interconnectedness and belonging that truly lies at the heart of well-being and happiness in the very moment in which we are alive, which is always *this* one.

Paulson: Let's go to the audience now. I'm willing to bet that this discussion has sparked questions and comments.

Audience question #1: Thank you very much for sharing your wisdom. I'm a student at the City University and we have just started a mindfulness course there last week. I'm still grappling with this issue of comparative cognition. Different meditation practices affect consciousness differently. It takes thousands of hours to change brain patterns, but when you look at comparative cognition—at human children listening to national anthems and listening to propaganda messages, and at the nationalistic response across the board—there is a correlation. I think how humans make meaning is far more crucial than just watching one's breath for 15,000 hours. For the flourishing of the species, we have to start thinking about the meaning systems that we propagate in specific cultures, and what effects they have on our not speaking against, for example, the spending that is going on for weapons to kill fellow humans. Thank you.

Paulson: Provocative question.

Kabat-Zinn: Thank you for the question; it's an absolutely wonderful question. There are some very, very deep correlations here; we were talking about mind–body interconnectedness, but there's more than just mind and body. There's also what we call the *body politic*. The army can be thought of as the immune system of the body politic or of the nation.

We call ourselves as a species *Homo sapiens sapiens*, which in Latin comes from the verb *sapiere*, which means to taste, sense, or to know, in the sense of noncognitive knowing—awareness. We're the species that knows and knows that it knows: awareness and meta-awareness.

Yet, I don't think we really do; not quite yet. We haven't really fully grown into the name that we've giving ourselves as a species. And what's being suggested by your question, that one doesn't have to practice attending to breathing for 15,000 hours, that over relatively short periods of time (MBSR is just eight weeks) one's view can rotate, a shift can occur—it's like a rotation in consciousness. All of a sudden, what someone has been doing for 20 or 30 years is seen in a new light. That's a kind of insight; that's a revelation. This is happening in society now.

I don't know if you know the work of Tim Ryan—a Congressman from the 17th Congressional District in Ohio—who just wrote a book called *The Mindful Nation*, in which he speaks about just this kind of thing. This has profound implications for our society and how we conduct ourselves.

The Chinese have a 1500-year history of mindfulness and yet when they see the word *mindfulness* written in Chinese they read it as *thinking*. Mindfulness has been eradicated from the mainstream of their culture. Imagine if China were to get back in touch with its own deep wisdom roots in the form of Chan and Taoism, and so forth. It could potentially have vast economic consequences for the entire world, as well as vast consequences for Tibet and for all of the minorities in China. And this is true for many, many different countries.

Richie was mentioning the United Kingdom. Baron Richard Layard, a member of the House of Lords and a professor at the London School of Economics, is trying to develop new metrics beyond the gross domestic product for the health of the U.K. society. He and his colleagues are looking at ways to measure happiness and well-being and a sense of connectedness. This is something that is moving into the body politic in many different ways.

Paulson: Let's go way in the back, over there.

Audience question #2: At the beginning of the talk, you talked about Buddhist meditation and the 40-Hz oscillation in the brain. This 40-Hz oscillation, which is the γ-wave, corresponds to an actual auditory tone.

I'm an electrical engineer. What if you could induce this tone in the brain, would you also get the corresponding state?

Actually, there's an app for this; an app for the iPhone called *Brainwave*. There are 30 different states, a combination of γ, θ, and other tone states that supposedly will put your brain in these different dispositions—concentration, euphoria, whatever. I've used it for about three years now and I'm an educator; it helps my students prepare for exams; they calm down, they focus, and they all swear by it because their generation is using an app for everything.

The other comment involves how you were talking about spirituality and how you're trying to stay away from discussing it. I listened to a Bill Moyers interview with the philosopher Joseph Campbell, who passed away recently. They were talking about a similar kind of thing, and Campbell asked Moyers if he thought of himself as a light bulb or the light?—meaning that the light bulb is analogous to the body. In other words, does one define oneself as a body or as the essence of a human being, something beyond the physical? I think that is a very good way to separate the religious aspect that goes along with spirituality. It was really profound when I heard that.

Davidson: Thank you for an interesting set of questions and comments. With regard to using a measure of 40-Hz activity to feed back to a person to try to enhance this state, if you will, I would say that if we

really understood what the brain was doing when it was expressing this kind of awareness, and we had a good measure of the global brain state that occurred, then maybe we could try something in a bio- or a neurofeedback context. But I would say that at this point in time, it's a bit of hubris to say that we actually understand something about this. For that reason, I think such apps are premature. If they are genuinely helping people, certainly that's wonderful. But they may not be operating through the mechanisms that the individuals who designed these apps think they are because they've never been seriously evaluated.

With regard to using technology, however, I am a big fan. We are doing a major study now in our lab, funded by the Bill and Melinda Gates Foundation, to develop apps to cultivate mindfulness and kindness in children. This came about after a meeting that we had in Washington, D.C. with the Dalai Lama on the theme of education. In the last session I threw out the idea that game manufacturers should take this kind of work seriously, and instead of developing games that cultivate aggression and violence why don't they develop games to cultivate kindness and compassion? Without filling in all the blanks, we ended up having an opportunity to work with some game designers to do this, and so we will be evaluating it. But it does not use neurofeedback; it uses other kinds of principles, and we are evaluating the impact that these games have on the brain.

This is a good place for me to mention a broader point in response to another question. It doesn't take thousands of hours to change the brain; that's a myth; it's not true. In fact, there are recent data that show that there are structural changes that can be produced in the brain from 1.5 hours of training. Structural changes, not just functional changes. So the structures of our brains are continuously being modulated dynamically. If you have a warm-hearted conversation with a loved one in the morning, for example, the structure of your brain was probably being changed by that. Knowing this should give all of us the impetus to change our brains in healthier ways. Since they're being changed wittingly or unwittingly, we might as well wittingly do it in a way that is more salubrious.

Paulson: Let's come up here to the very front row.

Audience question #3: Thank you very much for this very interesting panel. I have a question about the issue of mindfulness and personal drive. Do these states that can diminish stress also affect an individual's drive? This comes back to the question of happiness versus life satisfaction. Sometimes the greatest achievements have been performed by the most stressed people; sometimes they're satisfied with that achievement, although they may feel terrible. How do you correlate those two, and has that been studied?

In other words, can some people misconstrue mindfulness as a loss of drive in favor of a personal state of happiness?

Davidson: When I'm asked a question like that my favorite example is the life of the Dalai Lama. He practices mindfulness about five hours a day, by his own report, and it doesn't seem to have affected his energy level and his drive. If anything, I think it has strengthened it.

Jha: I don't know of any serious studies that have looked at effort as separable from the other kinds of changes that have happened, but I could certainly give other examples, too.

Kabat-Zinn: I don't think the military would be using mindfulness training if they were concerned that it was going to reduce the drive of their soldiers.

Speaking personally,—and I don't think these two people [*indicating Jha and Davidson*] have any problem with drive—I don't think I have any problem with drive. And we've been meditating forever. Everybody I know who is a meditation practitioner has tremendous drive, but it's modulated with something else, which is *balance*, a kind of dynamical, embodied understanding that if you push against the river unnecessarily, you're going to exhaust yourself and burn out—generating all sorts of hormonal and neural consequences.

But if you allow things to unfold in their own time, and you understand the systems in which you find yourself, work, family, other engagements, in such a way that you can guide things in a particular direction in alignment with your overall aims and goals, that is an art form in and of itself: the art of conscious living.

It brings together mindfulness, drive, and love—and I think love might be a better word for what you're talking about. It's not a matter of worrying, "oh, if I start meditating, I'm going to get stupid, dull, or lazy." I don't know a single person who's come into meditation and become a dullard. It just doesn't happen, in my experience.

Audience question #4: I've heard that certain sects of Buddhists have traditionally been fierce warriors and I was wondering what role mindfulness may have played in the development of a lifestyle and values. Is this known?

Jha: Not something I know about.

Kabat-Zinn: I really don't know.

Davidson: You'll have to ask a scholar of Buddhism about that great question.

Paulson: Okay. Let's go over here, near the back there.

Audience question #5: I'm a student at Ramapo College. I was wondering if you have heard of any studies that dealt with mindfulness and ADD or ADHD, and if so, what were the findings and how could mindfulness help these people?

Jha: There are a couple of published studies that have looked at the impact of mindfulness training on attention.

I can talk about the one we did in my own lab; my collaborator was Michel Baim from the University of Pennsylvania. We recruited adults with ADD and we had them continue whatever clinical treatment they were having, but we offered them a mindfulness course. The course was very different from the standard versions of mindfulness-based stress reduction. Starting the first day of class, their homework for the week was a one-minute mindfulness exercise. During that minute they listened to a recording, which was silence for a minute, except that every 10 seconds there was a little *ding*, *ding*. That was it; that was the exercise. The instruction was, "bring your attention back to the here and now when you hear the ding." It was so funny because these people with ADD said they just played it all day long; at work, they constantly listened to it, and every 10 seconds or so, they'd get back to being in the present moment. We found that it improved their ability to protect against mind wandering and it improved attention. What was also very interesting is that they said that while they didn't change the amount of medication, they were better able to use it. They were better able to *know* when the medication had worn off and when to take it again. Something had shifted for them based on the exercise.

It was such a creative group of people; I never received so many cards, gifts, letters, and paintings as I did after that study. It was an amazing project. We're starting to learn that it is helpful and that there is some data on it.

Paulson: Let's go to and the woman on the aisle.

Audience question #6: I've had some recent experience meditating at the Tibet Center and experimenting with visiting a couple of different gurus and meditating. I'm a physician, so I come from the traditional mind–body kinds of meditation. At the Tibet Center, I've been taught that there's a specific way of meditating for *awakening*, that awakening is a specific process; and that meditating in the presence of a guru, or under the guidance of a guru, has a different outcome than just learning how to meditate on one's own. Could you address some of that?

Kabat-Zinn: From my perspective, if it's not about awakening, it's not meditation. Awakening doesn't necessarily mean one thing; we can awaken to a lot of different aspects of ourselves.

There is a practice called *guru yoga* where one potentially benefits from being in close proximity to another who has gone deeply into these practices and lives it, and I'm sure that is something that could potentially be studied. But to a first approximation, it's all about waking up; that's what mediation means: waking up to the actuality of our experience, using all of the different sense stores and everything else that we can bring to bear on the present moment.

Audience question #7: We've been talking about the mind as being the brain. Could you comment on if the mind is more than just the brain?

In other words, you've been talking about studying brain function and brain waves, and have really focused on the brain as being what's changed in meditation. But many other things are probably changed, too; so could you just comment a little bit on that?

Davidson: Wonderful question . . . Let me address this with an anecdote. The very first time I met His Holiness, the Dalai Lama was in 1992, and I was with a small group of scientists—three other people. He asked us if we would please give a lecture to the young monks in the Namgyal monastery, which is connected to his residence in Dharamsala, about science. This was really the beginning of the Dalai Lama's interest in conveying science to the monks. On this visit to India, we had schlepped all this equipment with us, thinking that we could actually collect some data—which was a grand illusion; but that's beside the point. But since we had all this equipment with us, so we decided that instead of giving a dry academic lecture, we would actually give a demonstration and show how we can record brain activity. One of the scientists in the group was Francisco Varela, a very famous neuroscientist, who is one of the cofounders of the Mind and Life Institute. Francisco was our subject that night; so we put electrodes on Francisco's head, and we had laptop computers and were standing in front of him getting all this prepared, with 200 monks sitting dutifully on cushions on the floor. When we parted ways and the monks could see, all 200 just spontaneously started laughing. We thought they were laughing because Francisco looked kind of funny with the electrode cap on. It turns out that they were laughing about something far more serious; it was because we were talking about studying compassion by putting electrodes on the head rather than on the heart. That was a really interesting wake-up call.

Let me respond directly to your question. We can spend hours on it. But the knee-jerk reactions from conventional modern neuroscience are to say that the mind is an emergent property of the brain, or that the mind is simply another way of talking about the brain, or that the mind is what the brain does. Those are all phrases that you will see in the standard neuroscientific literature. What I try to teach my students is that we have no idea. We are really at such an early stage in understanding the relationship between mind and brain, and there are so many deep unanswered questions. So we need to do everything we can to resist giving a knee-jerk reaction.

Paulson: We have time for one last question.

Audience question #8: This question relates partly to the warrior question and partly to the drive question. Clearly there are some behavioral consequences of drive that are not compatible with the value system that seems to be an integral part of mindfulness. I was wondering if there are studies of people in prison who have a recidivist history, and whether mindfulness practice has an effect on their subsequent behavior and maybe moral cognition.

Kabat-Zinn: I think your starting premise may be incomplete, that is, to assume that there's some kind of disconnect between being still—meditating—and motivating factors that can change your experience or life.

We worked for four years in the Massachusetts Department of Correction with over 1200 inmates, and trained them with the aim of studying recidivism rates—a long-term study to see what happens when inmates get out. That kind of study is very difficult to do, and in the end, we were unable to get good enough data over a long enough period of time. But we did show that major short-term (eight week)

changes had occurred in individuals, including improvements on the "hostility index" that's used on the MMPI (Minnesota Multiphasic Personality Inventory). Prison is one of the most hostile places on the planet, and yet people were finding different ways to be in relation to hostility, and showed reductions in hostility. There are also other groups studying mindfulness of one kind or another—meditation practices in prison. And I think the overall evidence, which is primarily anecdotal, seems to be that people shift their relationship to their past actions and deeds and reconfigure their moral coordinate system for the future. It's a huge question in our society because we imprison more people in the United States than does any other country on the planet, including South Africa during apartheid and the USSR during the Soviet era. The United States imprisons more people than anywhere else on a percentage basis, and there are huge costs on a lot of different levels to that, beyond the economic cost.

It really is a wonderful question that you've asked, and I think we do need to research it in much more rigorous ways.

Paulson: We could go on, but we should wrap it up here. I want to thank everyone for not just coming to this session, but for those of you who have come to the three other panel discussions for the series, the Emerging Science of Consciousness: Mind, Brain, and the Human Experience. This has been a fantastic four-part series.

I want to thank our partners, the New York Academy of Sciences and the Nour Foundation. If you want to see the webcasts of the previous sessions, they are on the website of the Nour Foundation, as this one will be.

I want to thank especially our wonderful panelists.

@article{Paulson2013BecomingCT, title={Becoming conscious: the science of mindfulness.}, author={Steve Paulson and Rosemarie Davidson and Amishi P. Jha and Jon Kabat-Zinn}, journal={Annals of the New York Academy of Sciences}, year={2013}, volume={1303}, pages={. 87-104 } }. Steve Paulson, Rosemarie Davidson, +1 author Jon Kabat-Zinn. Published in. Annals of the New Yorkâ€¦ 2013. Psychology, Medicine. Many of us go through our daily lives on autopilot, not fully aware of our conscious experiences. Help the New York Academy of Sciences bring late-breaking scientific information about the COVID-19 pandemic to global audiences. Please make a tax-deductible gift today. DONATE.Â Accepted students and mentors receive free membership to the New York Academy of Sciences! More. Program Member-to-Member Mentoring.

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Become Conscious. navigation. log in or register.Â Below are the raw and unedited show notes from episode 16 of the Becoming Conscious Podcast What is the Creativeâ€¦ Ethan Nelson 0 October 11, 2020. Emotional Mastery.Â I wrote about mindfulness for years without understanding what it means. The theory wasâ€¦ May 18, 2020. Neuroscientists Richard Davidson and Amishi Jha join clinical mindfulness expert Jon Kabat-Zinn to explore the role of consciousness in mental and physical health, how we can train the mind to become more flexible and adaptable, and what cutting-edge neuroscience is revealing about the transformation of consciousness through mindfulness and contemplative practice. Excerpt from â€œBecoming Conscious: The Science of Mindfulnessâ€. Your level of expertise and the kind of meditation you practice, whether you focus within or on an external visual stimulus, will make a difference in the way your brain creates the experience for you. Different parts and regions of the brain will get involved in the process. Whatever the case may be, research seems to agree on one fact: When you engage in mindfulness, multiple brain areas get activated almost simultaneously.Â They are designed to detect a threat before conscious awareness. You know those hunches you get sometimes? When you feel something is off and you find yourself tensing up for no apparent reason? Blame it on your Amygdala. Itâ€™s your body getting ready to fight or fly. The Science of Mindfulness book. Read 86 reviews from the world's largest community for readers. Have you ever noticed that trying to calm down before a ...Â And, a large and fascinating body of scientific research now validates the remarkable benefits of mindfulness practice for psychological as well as physical health. But how exactly does mindfulness work, in scientific terms? How can understanding the science and practice of mindfulness improve everyday life? And how can the human brain, whose very functioning gives rise to so many of the problems we struggle with, actually provide a solution? Paulson et al. Becoming conscious: the science of mindfulness. Paulson: And is that true throughout the course of our life, whether we are 10 years old, 30 years old, or 70 years old? Davidson: We know that plasticity changes over the course of life, but we also know that plasticity never ceases.Â That is why it is much easier to learn a second language when youâ€™re a kid; itâ€™s why itâ€™s easier to learn to play a musical instrument when youâ€™re a child. I believe that if we can actually gure out ways to cultivate skills of mindfulness and related practices early in life, itâ€™s possible that those skills will be more enduring and will lead to more lasting changes. That is speculation at this point; we donâ€™t know the answer, but it invites that kind of question.