

Brain Science Podcast #44: Meditation and the Brain with Dan Siegel, MD

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This is the *Brain Science Podcast*. The podcast for everyone who has a brain. And I'm your host, Dr. Ginger Campbell. On the *Brain Science Podcast*, we explore how recent discoveries in neuroscience are unraveling the mysteries of how our brains make us who we are. For more information, including show notes, links to previous episodes, and information about how to subscribe, please go to the website: www.brainsciencepodcast.com. We also have a discussion forum at www.brainscienceforum.com, and you can send me e-mail at docartemis@gmail.com.

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This is episode 44 of the *Brain Science Podcast*. Today my guest is Dr. Daniel Siegel from the Department of Psychiatry at UCLA. We're going to be talking about meditation and the brain. Before I get into the interview, I just want to remind you that you have until August 31st, 2008 to complete the audience survey and be eligible to win an iPod Touch. Just go to wizzard.tv/brainscience. (Note the correct link is <http://wizzard.tv/survey/brainsciencepodcast>) Wizzard is spelled w-i-z-z-a-r-d. Or just go to my website at www.brainsciencepodcast.com and follow the link. If you're listening to this episode after August 31st, I hope you will still fill out the audience survey. Please stay tuned for the closing announcements after Dr. Siegel's interview. And don't forget that the *Brain Science Podcast* depends on listeners like you for ongoing financial support.

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My guest today is Dan Siegel, the author of *The Mindful Brain: Reflection and Attunement in the Cultivation of Well-Being*. Dan, I'm really glad to have you on the show today.

Dan Siegel: Well Ginger, it's good to be here.

Ginger Campbell: Many of my listeners have expressed an interest in the relationship between the brain and meditation. I think that you can bring a unique perspective to this question, which is why I'm so happy to have you on the show. Would you like to share a little bit about yourself? Your background and how you became interested in meditation?

Dan Siegel: Sure. I was trained initially in biology and then went to medical school, so I'm a physician. I started in pediatrics and then went to psychiatry, and then got trained both as an adult psychiatrist and a child/adolescent psychiatrist. And then I went into research, studying the relationship between children and their parents. So that's my background. I was an educator at UCLA for a while, running their training program in Child Psychiatry, and then started an institute called The Mindsight Institute, where we look into how insight and empathy can change a person's relationships and their personal life, how we can work on that in education and the larger communities. So that's basically what I do.

The meditation piece came out in kind of an odd way. I worked in a field called interpersonal neurobiology, which is a long phrase for just basically looking at all different fields of science and how we can understand well-being and mental health, and how relationships and the brain interact in fundamental ways to help us to build mental well-being. That led to a book published called *The*

Developing Mind and which is about how kids are shaped by their parents, and then a parenting book called *Parenting from the Insight Out*. And in the parenting book that I wrote with Mary Hartzell, we use mindfulness as a basic idea on parents being intentional and awake and conscientious in their parenting.

But when parents would take our workshops and read the book, they would say, "When are you going to teach us to meditate?" And this book came out in 2003, so not so long ago- just 5 years ago. And I was not a meditator, and Mary was not a meditator, and so we would say, "Well, what do you mean 'teach us how to meditate?'" And they'd say, "Well, meditation is your first principle." And I'd say, "I don't know which book you refer to." They'd open up the book, they'd point to *mindfulness*, and they'd say the word *meditation*, and I would say mindfulness, and they would say *mindfulness meditation*. And at the time, and I'm embarrassed to report this, I didn't know what that was. I was unfamiliar with mindfulness meditation. And so people would start explaining to me that it's a practice that's been around for 2500 years, that there's recent science (that I was unaware of at the time) that has come out about it, showing that in fact it improves all sorts of aspects of well-being.

So since that time, back around 2004, I started getting to know people in this field of studying meditation, in particular this one kind of meditation which, the aim is one way of cultivating the mind, and that is mindfulness meditation. And so I've had the opportunity to meet these folks, to immerse myself in direct experience myself, and also begin a research program in UCLA called the Mindful Awareness Research Center. There we conducted research on this mindfulness approach. Then ultimately to write a book called *The Mindful Brain*, which came out just last year. And so that's basically how new I am to this whole concept and practice of mindfulness and mindfulness meditation.

Ginger Campbell: That gives you the gift of you're really coming to it really from a scientific standpoint without really preconceived notions about what it means.

Dan Siegel: Absolutely, and I don't have a- for better or for worse, the truth is that I don't have a contemplative or, you know, a religious background that would have me say, "This is the right way to do it" because I've been raised with that. I'm more raised as a scientist so I come out from a scientific and clinical point of view, really.

Ginger Campbell: In the preface of your book, you mention your field of- and I'm referring to *The Mindful Brain*- but you mentioned that your field is interpersonal relationships. I was wondering if you could explain what you meant when you talked about the relationship between what you call attunement and mindful awareness.

Dan Siegel: Yeah, well, as you mentioned, Ginger, in my own background as an attachment researcher, I was trained to study how children interact with their parents. And when those interactions are called attuned. That is when a parent focuses in on the internal state of the child like their feelings, their thoughts, their state of mind, and the way their body is. When parents tune in in that way, children thrive. They have what in the scientific literature is called a secure attachment. And secure attachment predicts all sorts of great things. You know, that people are emotionally intelligent, they're socially intelligent, they're able to reach their intellectual potential, they can find all sorts of ways of being resilient in life. And so it's a pretty nice thing if you can offer that to children- attunement that produces

security of attachment that goes on to develop resilience. And ultimately, you can say, is a foundation for well-being.

That was my background to begin with writing *The Developing Mind*. I basically made the proposal that at the heart of that kind of attunement is something called the integration, which is how we take separate stuff and link them together. So in *The Developing Mind*, the essential point is that the way the brain integrates itself enables parents to provide attunement. In other words, to integrate themselves with their children, but also to provide this internal clarity, something called coherence of mind or a coherent story of your own life. So all that stuff was before I ever heard of mindfulness, and attunement was basically the interactive thing that happened between two people, like a child and a parent, or between two people in a romantic relationship, or a friendship, or between a clinician and a client- a patient. Attunement was found in every culture as the commonality for healthy relationships.

So primed with all that, I then got exposed to this concept of mindfulness, just from the term we used, and then mindfulness meditation. And a striking thing happened where I had uncovered the notion that areas of the prefrontal cortex- that's the front part of the brain right behind your forehead- integrate all sorts of things together and produce about nine different functions, which we can talk about later. But the bottom line is that seven, and now we know, eight- eight of those nine were outcomes of secure attachment. But the list itself came from prefrontal functions so the hypothesis was that this integrative region of the brain, this region of the brain that pulls everything together, enables attunement to happen and enables security to develop, and that integration was at the heart of healthy attachments.

When I learned about mindfulness, what struck me was that that list of nine, which came out the brain's integrative functioning that overlapped with attachment, that list of nine- all of them seemed to be the outcome and, it turns out, the way of being mindful. And so we then had mindfulness practice through meditation, prefrontal function, which was integrative- that is, these are areas of the brain that link widely separated and differentiated areas to each other- with relationships. These three very different domains of knowing- mindfulness meditation, brain function, and relationships- all seem to fit into the same kind of grouping. And when you find that, it's called consilience, this independent fields having resonance with each other.

And so, I was wondering, and then explored in my own personal experience, and then professionally with my patients, the idea that interpersonal attunement is what creates secure attachment. What if there was something called *intrapersonal*- within the person. Internal attunement that allows the person to observe their own experiences instead of trying to make them what they want them to be. They have this kind of curious, open, accepting, loving stance to themselves, which is really the essence of what mindfulness is.

Ginger Campbell: So being as open and loving to ourselves as we want to be toward our children.

Dan Siegel: Absolutely. In a way, it's really providing a secure attachment with yourself. It's really a way of becoming your own best friend (mindfulness is).

Ginger Campbell: So what was your goal in writing *The Mindful Brain*?

Dan Siegel: Well, you know, this set of findings- that attachment between a parent and a child, prefrontal function, which is integrative, and mindfulness, which comes from thousands of years of historical practice, I wanted to write a book that could explore the possible ways in which these three entities went together. And then to try to illuminate, if I could, the scientific nature of meditation and mindfulness as a form of practice that could then maybe show us the way to how people who are suffering from various things like anxiety or drug abuse or chronically relapsing depression- these are all areas of human suffering that have been shown to be helped by mindfulness, and many others as well- why was it so useful. What was happening? And if I could present it in a scientific way, plus sharing some of the subjective experience that's at the deep heart of mindfulness, then maybe that would help people bring this more into their lives professionally in terms of clinical work and education, but also personally so that people could see in fact this great scientific merit to this important practice.

Ginger Campbell: In your book you combine the personal or subjective experience, science, and the professional applications. Is that an accurate description of the approach?

Dan Siegel: It certainly is. And I'll have to say, you know, people in the publishing world were telling me not to do that. That you write a scientifically valid book that has no subjective personal stuff in it, or you write a kind of memoir, which is just your personal subjective stuff, and you don't make it scientific. And, you know, I really felt strongly, even with that opposition, that it was important to go deeply into both. To try to really bring those two worlds of personal, subjective first-person experience with the more objective third-person science, and bring them together in one book. You know, it was a challenge because it was a different kind of writing, it's a different kind of reading, but the feedback from people who have read the book is that it worked to bring both those sides of the reader's mind in as well- the kind of objective, scientific analysis of what's being said, but also as an invitation to personally experience the meditative practices I talk about in the book.

Ginger Campbell: Why do you think it's important to combine first-person knowing with the scientific point-of-view?

Dan Siegel: Well, first-person knowing on its own is fantastic. It's got beauty to it, it's got an essence to it that doesn't need science. And scientific studies can explore all sorts of things, like physics and mathematics and systems theories and all sorts of things, to a certain extent, but since it's human beings with their personal perspective, a scientific needs to embrace that, and even, you know, the whole notion of uncertainty is that we- the Heisenberg Uncertainty Principle- we introduce uncertainty just by the act of studying something. I hope I got that principle right.

Ginger Campbell: Yeah [laughs].

Dan Siegel: And if I didn't, someone e-mail me at mindsightinstitute.com [transcriptionist's note: the contact e-mail on his website, drdansiegel.com, is info@mindsightinstitute.com]. I think I remember from physics days.

But in any event, the point is that in science we need to hold on to the personal. But in my training as a physician and my training as a scientist, the personal was eliminated. It was almost as if we were just

walking automatons as physicians. We're not needing to take into account the fact that we are subjective creatures running around with our own internal worlds. I felt even as a scientist that that was missing. And certainly, in something as a subject of science as mindfulness, where it's such an interior experience, that even if you can measure EEG changes- you know, electrical changes in the brain- which you can. And even measure functional flowing changes of blood in the brain during meditation. You can measure that too. You can quantify that. But even when you do that, it's still not the essence of the subjective experience of being mindfully aware. So I felt very strongly that it was important to combine the two, because that's a deeper way of knowing.

From a practical point-of-view, of course, let's say you're an educator and you want to bring mindfulness into your work in schools, or if you're a physician or a psychotherapist of various sorts and you want to bring mindfulness into your clinical practice. For those of us who do it professionally, it's really important that we have the scientific grounding to show 1) that this practice does no harm, 2) that it's helpful to people, and 3) that we figured out who it's helpful for and how we can help them to eliminate the suffering in their lives. So for all those reasons, science is really helpful. More helpful than just intuition and personal expression. But the two combined are the strongest integrative stance to take.

Ginger Campbell: I agree with you completely about that. I guess before we start talking about meditation in the brain, I should start out by asking you- since this is something that people sometimes disagree about- how do you define the mind?

Dan Siegel: Yeah [laughs]. Well, Ginger, that's a great question. When I was writing *The Developing Mind*, of course with a book with that title you've got to define the mind. And what was striking to me was I couldn't really find some readily accessible definitions of mind. Certainly in *Webster's Dictionary* the psyche has *mind* as one of the definitions, and the psyche is defined as the intellect and the spirit and even the soul, and the mind as a subjectively experienced entity, one that is ultimately based on physical properties, *Webster's* says, but has properties of its own. So that's a good description of the mind, but it doesn't really define the mind. I've been at meetings where, I must tell you, wonderful philosophers and scientists have said, "Hey, let's not define the mind because we'll limit ourselves." So we need to know that some people don't want to define the mind.

I've now had the opportunity since *The Developing Mind* came out (where I do define the mind, which I'll tell you about in a moment) to actually ask in person, face-to-face, in large audiences, over 75,000 mental health practitioners the following two questions. These are mental health practitioners all over the globe who represent every branch of the mental health world from, you know, psychiatry and psychology, social work, educational therapy, occupational therapy, physical therapy, dance therapy, music therapy, you name it. 75000. And the results have been remarkably consistent. And here it is. First question: how many of you (if these were the group I was asking)- how many of you have ever had even just one lecture (of course besides the ones I give), one lecture that defined what the mind is. Right? And these are mental health practitioners.

Ginger Campbell: Right.

Dan Siegel: Now this is 75000 people all across the planet. What do you think the number is?

Ginger Campbell: That say that they have or that say they've not.

Dan Siegel: That they have had it.

Ginger Campbell: Zero? [laughs]

Dan Siegel: Well, it's actually 2-5%

Ginger Campbell: Wow

Dan Siegel: 2-5% of this number of 75000. So then you ask the next question, of course. "All right, fine, 95% of you, and me too, as I was trained at wonderful places that are great programs but also didn't define the mind." And then the next question is, "How many of you- OK, you're mental health practitioners, yes, we're all mental health practitioners. How many of you have had just one lecture defining mental health?" And the percentage was the same- 2-5%. So I can say- and now it's almost like a joke, because now I've been lecturing so much I have to say, "Besides me giving you the lecture, how many have had it?" It's always the same. We have this weird finding that 95% of mental health practitioners have never had in their training one lecture, even, on what the mind is or what mental health is. And that is just a shame. And of course, we've had lots of classes on mental illness. So we have the Diagnostic and Statistical Manual, we've got all sorts of treatment approaches to try to help reduce the symptoms of disorders of psychiatric disorders. But we don't have a foundation in that which we're practicing if we're mental health practitioners.

So the story for me in terms of coming up with a phrase that is a definition of mind, really comes from running a inter-disciplinary study group back in 1991. I ran it for about 5 years. And it was a group study in the connection between the mind and brain. And we had anthropologists in the room, and neurosurgeons, and neurobiologists, and complexity theory people, and systems analysts and computer scientists, and we had developmental psychologists and clinical psychologists and psychoanalysts and all sorts of people, all of whom came from different backgrounds. And they couldn't find a way of communicating about this business of mind, because none of them really had a definition. So in order to keep this group from killing each other, and keep this group alive- I really cared about the people in the group and the group itself- I offered the following definition, which, it turned out, all forty people in the room agreed upon. And we used it for all those years. You ready?

Ginger Campbell: Yep.

Dan Siegel: This is what I said. That the mind can be defined as a process that regulates the flow of energy and information.

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Dan Siegel: The mind can be defined as a process. So it's a verb, not a noun, as a first starting point. Then "that regulates," and *regulates* means that it has to monitor something and then influence that thing, so it's regulating it- monitoring what's happening with the thing, change how that thing is going.

So it regulates. "Regulates the flow." So the flow means something is dynamic and changing over time. Flow of what? "The flow of energy and information." Like if I said to you, [starts talking in a low, slow voice] "Ginger, we're going to talk about the brain today and it's really kind of an interesting topic." [resumes normal speech] You know, I would have a different kind of energy. You can feel the difference. Even if I said, "Ginger, today we're going to talk about the brain and it's really interesting." Same words, but it contains different energy. And you know, from a physicist's point-of-view, there's lots of different ways of describing or defining what energy is. There's no accepted single definition. But from our point-of-view, we say it's the capacity to do something. That's energy.

And information, from a scientific point-of-view, is something that represents something other than itself. So if you and I are in a room together and I handed you a stone, you know, like a large pebble, that stone would have no information in it. It would have features to it, and you could collect data from it. How much does it weigh? How much volume does it displace? You know, what's its color, what's its texture? But it wouldn't have information because nothing would be symbolizing anything other than stone being itself. So when we say the word *stone*, that movement of air molecules that makes the sound *stone*, that's information because it's symbolizing something other than air molecules. And we bring in the s-t-o-n-e. Certainly those linear squiggles we call letters- those are symbols also. So symbolization is what we mean by information.

So energy is the capacity to do something. Information is symbolizing something other than itself. And the mind is the process that regulates the flow of energy and information. It creates patterns, if you will, of energy and information flow. And it does this through relationships and through the body. And so the mind is not just in the part of the nervous system in the skull that we call the brain, which is what a lot of neuroscientists are saying. And they'll say things like, "Oh the mind is just the activity of the brain," which I think is just absolutely not the full story. And believing that gets you really only half the truth. When in fact you could see, that the mind is the process that regulates energy and information flow is both embodied- it's in the body, for sure, not just in the skull but distributed throughout the whole nervous system in the body- and it's relational like is happening between me and you. Because energy and information flow is not just in the nervous system- what we call the big brain, meaning this nervous system distributor throughout the whole body- but it happens also between people, among people. And that's why we can have the mind both relational and embodied.

Ginger Campbell: I didn't really quite get while I was reading your book why you were defining it quite the way you did. I agreed with the definition, but I didn't understand the reasoning behind it. I can see that you now, by using this definition, are avoiding the ambiguity that comes with saying something like, "The mind is emergent from the brain."

Dan Siegel: Yes, exactly. Because you and I, Ginger, we're having a mind-meld right now. I mean we are creating this regulatory process that makes patterns of energy and information flow between you and me. Now die-hard neuroscientists would say, "Big deal, that's just two brains doing it." And I would at least say, "OK fine. Two bodies are doing it." But I don't think that gets you very far because relationships have patterns that happen across the generations. And that's what we study in attachment research. And in a way, you can say- this is different from what you will hear, but I deeply believe it's true- that the mind *uses* the brain to create itself.

Ginger Campbell: I was actually going to ask you about that quote because you have that quote in the book. That was going to be my next question. [laughs]

Dan Siegel: Oh, there you go. See, we're resonating with each other. That's integration, you know. If we had an anthropologist in this conversation with us, she would say, "Yeah, you know, I study the way patterns of energy and information flow- the mind- happen across the generations and that's what we call *culture*." Right? And so there you would see that you could say that the mind, this regulatory process, is using the brain that is born in the next generation to create itself. You see?

Ginger Campbell: Yeah.

Dan Siegel: And that's why that view. I think it's not only true but it's really helpful because then you're not stuck in this reductionistic view, which, I must confess, a lot of scientists- neuroscientists- will say statements like, "The mind is just an emergent property of the brain." "The mind is just the activity of the brain." And it's just only part of the story because the mind *uses* the brain to create itself and it's the activity of the brain that in part- not in full, but in part- influences how the mind is able to function.

Ginger Campbell: And you mentioned also in this context, I think, the importance of the fact that this is a two-way communication.

Dan Siegel: Yeah, and it's two-way- mind-brain, brain-mind. And it's also, in a way, three-way. And I think of it like a triangle, where the three points of the triangle are- one is the mind, this regulatory process that influences the patterns of energy and information flow. That's the mind as one point in the triangle. A second point is relationships, so while mind is the *regulation* of energy and information flow, relationships are the *sharing* of energy and information flow. And then the third point of the triangle is what we're going to call the brain, but when I use the term *brain*, anyway, it's just a shorthand term for the distributed nervous system that extends throughout the entire body. And that's just a lot of words that needed to be said, so I just use the word *brain*, and if I want to talk about the skull part of the brain, I talk about the brain in the skull. But it's just a word. I wish there was a nice name we could come up with for the distributed nervous system extending throughout the whole body, but it's just too long.

Ginger Campbell: What I like about what you just said is that it removes what I was kind of looking at as- or solves the paradox, what I thought was a paradox, of the fact that meditation can change the *brain*. That seemed paradoxical under the traditional definition.

Dan Siegel: You're absolutely right. And see with meditation, which really means a practice that cultivates the mind, that's really all meditation means, and there's lots and lots of forms of meditation. But we talk about, let's say, mindfulness meditation is one particular aspect of cultivating the mind. What you're doing is, you as a human being are deciding *intentionally* to create, let's say, a ten-minute period, where you're going to do two things. You're going to be paying attention to your intention. So my intention is that I'm going to practice mindfulness right now. I have to pay attention to that intention. Right? And I'm also going to be aware of my awareness. That's my intentional stance. I'm using my mind to create that ten-minute period.

Now the way I do that it, let's say I'm going to create some solitude, so I'm going to do it on my own. Well, I'm going to be harnessing certain brain circuits to create those two functions- being aware of awareness, which in science we call that meta-awareness (aware of awareness), and attention to intention, which activates certain specific circuits in the brain which I talk about in the book. And so I'm going to use my mind, that is the regulatory process that is determining the energy and information flow, and my energy and information flow is going to drive the activation of my circuitry throughout my whole body. And we'll talk about the skull part of the brain. And we know, actually, which circuitry my mind is going to be turning on.

Now once I'm doing that, here's the secret, neurons which fire together wire together. That's an old statement from- not a quote but it's a paraphrase of what Donald Hebb said in 1949. Neurons which fire together basically tell us, and Eric Kandel got the Nobel Prize for this in 2000 for demonstrating that when neurons are firing repeatedly, they actually harness the genetic machinery and the nuclei of the cell, and they lead the changes in the structure connectivity at the level of the synapse. That's the connection among separate neurons. So you strengthen synaptic connections by activating neurons through what's called neural firing. The way we get neural firing is by pushing energy and information flow through the nervous system, which is what the mind does.

So if I say to you, "Let's practice mindful awareness for two, three weeks everyday," I can show you that your brain will have changed in both it's function, and what's implied in that is that the structures change and we've also seen structural changes with long-term meditators. Those are harder to see, of course, because you have to see pretty significant synaptic changes to visualize them. But you definitely see functional changing in the brain in a few weeks, and certainly the studies on mindfulness-based stress reduction, MBSR, show these changes by eight weeks (it's an eight-week program) that are pretty significant.

Ginger Campbell: This is actually a quote from your book that I wrote down. "Mindful awareness is a form of experience that seems to promote neural plasticity." Can you tell us about the evidence that supports that claim?

Dan Siegel: Yeah, well first the conceptual view is what I just said, that creating this awareness of awareness and attention to intention fires off neurons. That we know for sure. And just conceptually, we know that when you repeatedly fire neurons, you're going to get synaptic change, which is called neuroplasticity. So that's the concept. So now your question is, "Well, you know, what's the scientific evidence that's true?" Well we have a couple of pieces of evidence. One is that you see these consistent functional shifts in electrical firing that from a scientific point-of-view are very likely to come from structural changes, but that's an implied change. We do have one particular study from Sara Lazar out of Harvard and her colleagues, which showed that in long-term meditators, the length of time meditating was proportional to the thickening in these regions of the brain that I call the resonant circuit. They involve this capacity to tune into yourself, basically. To pay attention to your intention, be aware of your awareness, to tune into your body. So areas such as the insula, and aspects of the middle part of the prefrontal cortex are actually thicker. The belief is that the thickening has come from repeated practice and the strengthening of synaptic connections.

Ginger Campbell: Can you say a little bit more about what we know about what happens to the brain

in people that meditate?

Dan Siegel: Sure. One thing to start out with in trying to answer that question is the difference between what's called a state versus what's called a trait. So in your question is, "OK, what happen in a mindfulness meditator." So in anyone, whether today is the first day you decide, after listening to this program, that you're going to start meditating, and this is your first day, or you've been doing it for thirty years. Either way, you take that ten, fifteen-minute period of time and you do, let's say the simple basic practice, which is so universal, of focusing your mind on the breath. And then when your awareness gets distracted by a thought about breakfast or what you're going to do next week or where you're going to go on vacation next year, and then you realize you've had the intention of being aware of your breath, but your attention went to your vacation next year. Then you lovingly and gently refocus your attention to the breath, and then you focus on the in breath, the out breath, the in breath, the out breath. And when you get distracted, as most of us inevitably do, you lovingly and gently, when you become aware that you're not aware of your awareness being on the breath, you redirect your awareness, you see. So you're paying attention to your intention. My intention is to focus on the breath. You're having awareness of awareness. And when you do this, we call it a mindful awareness practice, whether it's your first day or your four hundredth day doing this.

What we believe happens is, you're activating, in that state of mind, this awareness of awareness and attention to intention that activates the part of the brain that allows you to do those things. It's these areas, for example, the anterior cingulate, just in this middle area of the prefrontal cortex, a part of the medial prefrontal cortex gets activated, the insula gets activated, aspects of the superior temporal cortex that are involved in this system I call the resonance circuit, which links to areas that have mirror neurons. There are mirror neurons in the anterior cingulate. These circuitries that I've described in detail in *The Mindful Brain*, are active during that intentional ten-minute period. That, studies have shown. So that's called a state. You, for ten minutes, intentionally create a state.

What happens over time is that if you take a regular practice of creating a state, the state will become a trait. A trait is a long-term aspect of a person's functioning that happens without effort. So I hate to use the word *automatic* because that's got a lot of negative bias to it, but let's just say it happens without effort. So you spend your regular effortful practice- I'm effortfully creating a mindful aware state, but then in the long run, what do you develop?

You actually develop more capacity to regulate your body. So for example, your blood pressure can be improved, your immune system can be improved and its functioning. Science has shown that. That's number 1- regulating your body. You can have the trait- so not just during the ten minutes of meditation, but if you've practiced for these eight weeks, and you keep on practicing, you now develop a trait of regulating your body. You can attune to yourself and others in a deeper kind of way, meaning you resonate with others' states in something you can call compassion- compassionate connection. You're able to regulate your affect of states better- that's what has been shown. You approach rather than withdraw from things, and that's accompanied by what's called a "left shift"- you have more left frontal hemisphere activity. That's the work of Richard Davidson. You also develop the ability to extinguish fear. These are the list of nine mental prefrontal function I'm talking about. You can extinguish fear. That's increased. You have something- a fifth things is what I call "response flexibility," which is the capacity to pause before you act. These are all traits and this trait allows you to have this

kind of spaciousness of mind where you think about your options and choose the most adaptive. You then have more insight into yourself- that's the sixth one. You have more empathy for others- that's number seven. Number eight is you even have more morality, and number nine is you have access to intuition, which is really gaining access to your body's wisdom. There's a lot of neural net processes or these information processors around the heart and around the intestines that have lots of deep wisdom they give us. Usually we ignore it, because it's coming into a part of the brain we haven't learned to really honor. But with mindfulness, people learn to access this more right hemisphere aspect of their awareness. So those are the nine middle prefrontal functions I've just laid out as traits.

And the research suggests- the scientific research suggests all nine of these are promoted by mindfulness practice, and, as I mentioned earlier, coincidentally maybe, or maybe not, and we can talk about that later, but the first eight- everything except intuition has been studied and been shown to be an outcome of secure child-parent attachment, and if you ask mental health practitioners, "What do you think of this list?" they usually say, "This is the most comprehensive description- it may not be a definition, but a description- of mental health. And the list only comes from needing to explain to a family where there was terrible trauma to the brain of a mother in the family- explain why the prefrontal cortex was so important, because it creates these nine functions. It's important for it. It's essential for the mind to create itself using these nine functions. It needs this part of the brain to be intact. And this is the part of the brain that sends fibers out to extensively distributed regions including other people's nervous systems, and so therefore, is considered extremely integrative- it links differentiated aspects of nervous function together. So it links the cortical with the limbic with the brain stem with the bodily and also with the social

Ginger Campbell: I think that's what you called in your book "neural integration."

Dan Siegel: Yes, exactly. I agree.

Ginger Campbell: I was just thinking as you were talking about these nine things that these are the prefrontal functions that make us human

Dan Siegel: Absolutely. And Ginger you could call this the cortex humanitas. This integrative functioning is what defines us as being human.

[music]

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[music]

Ginger Campbell: I thought if you would like we might spend just a few minutes talking about the section of your book that I think you called immersion in direct experience.

Dan Siegel: Yeah.

Ginger Campbell: You described your own experiences with meditation. Would you like to talk a little about how that has informed your work?

Dan Siegel: So the question about immersion in direct experience- for me, getting into mindfulness kind of backwards was, from a conceptual point-of-view, using the word mindfulness but not knowing anything about it as a practice. And then learning about it and then Jon Kabat-Zinn and I did a panel together and he said, "You know, you need to get some direct experience." And so I did. I went for a week-long silent retreat with a bunch of scientists, mostly brain scientists, and there I was able to experience this mindfulness meditation which was derived at the Insight Meditation Society, IMS, in Barre, Massachusetts, derived from Theravada Buddhism, so it had been around for 2500 years and a kind of meditation called Vipassana, or clear-seeing, which got really translated into the concept of mindfulness meditation. And that was my first immersion in it. So I decided to put that in the book because for me not having any in depth experience before, this whole journey into becoming aware of mindfulness meditation as a practice was really a huge eye-opening event, and I wanted the reader to be able to experience what that was like to learn about it as it was happening.

Ginger Campbell: Your first experience was that eight-day silent retreat?

Dan Siegel: Yes- seven-day silent retreat in a meditation center. And I wouldn't recommend that as a way to start, but the opportunity- it was the first time a hundred scientists had ever gotten together to actually sit in meditation together and then, essentially, reflect on their experiences as scientists. So I just couldn't resist that. Even though it was like the dead of winter and the middle of Massachusetts was pretty cold. But it was really something.

Ginger Campbell: Is there one thing you would say stands out as the most important thing I learned from that experience?

Dan Siegel: Well, there were many, many things. But I would say here the most striking thing was at a silent retreat, it becomes a natural thing to wonder why, if you're going to do meditation, do you need to be silent. And the silence is called the "noble silence," which means, of course, you don't speak or make noise- that kind of silence. But it's another kind of silence in that you're also not communicating with all the people around you through non-verbal communication. So though you're surrounded by other people- your teachers, your colleagues- you are in fact keeping yourself isolated. Now, there are moments during the week that you're able to ask brief questions to your teacher, or in group setting listen to a teacher presenting some information, instructions, and things like that. But for the most part, that silence was extremely important because for me, and this is again with my own bias, so I could just be misinterpreting things through my own slanted view, but my experience of it was that my being really wanted to connect with other people. I wanted to talk to other people, I wanted to make eye contact with them, I wanted to connect with them in some way, but the instructions were "no communication." No verbal or non-verbal communication.

The first day or two of doing that, I thought I was losing my mind because I really wanted to connect, you know, I really wanted to communicate. But by the third day or the fourth day, all that frustration and, in a sense, desperation, started shifting. And by the fourth day, the fifth day, I think the circuits in my brain that had grown up to be social circuits of the brain, not being able to be used to make social

attunement, if you will, interpersonal attunement, suddenly got focused on the only person around. And that was me. And so the silence permitted a new kind of internal attunement- this intrapersonal form of resonating, that really, for me, illuminated the parallel between developing a relationship with your parents, who are attuned to you, and also developing this really beautiful attuned relationship with yourself. As I said, it's like becoming your own best friend. And by day four, five, everything shifted in this subjective texture of being alone, and then being alone became really rich and full and vibrant in a way I never would have been able to imagine or certainly articulate, and that's what I tried to do in that particular chapter of the book.

Ginger Campbell: I have done a similar retreat at the Insight Meditation place in California at Spirit Rock.

Dan Siegel: Mm hmm.

Ginger Campbell: But I had had several experiences of being alone. Before I did that I'd actually done some vision quests. What really struck me was that I found I was making up stories for everybody around me.

Dan Siegel: Yeah

Ginger Campbell: It made me aware of how much we think we think we know about other people that's just stuff that we're making up ourselves.

Dan Siegel: Yeah it's such a busy, chattering mind we have, isn't it?

Ginger Campbell: Yeah.

Dan Siegel: It's interesting because in neuroscience there's something called the "default mode," that is, when you put a person in a scanner at rest, what we used to think of as no activity, it turns out there's a huge amount of activity. And the parts of the brain that are activated are those parts that the mind uses to explore this social world. So it looks like we have unbelievably social circuitry that is literally continually, even when we're supposed to be just resting, trying to figure out what's going on in our social surroundings. And that's what you were doing in your silence, was making these stories up and trying to make sense of everybody around you. And I had that similar experience too.

Ginger Campbell: Yeah.

[music]

Ginger Campbell: We're kind of running late, so I'm going to shift gears here. I wanted to talk about what you said in your book about how mindfulness might interact with the cortical invariant representations that Jeff Hawkins described in his book *On Intelligence*. I interviewed Hawkins recently, so my listeners are aware of some of his ideas as far as the cortical hierarchy and that sort of stuff. Could you talk about that?

Dan Siegel: Sure. I think Hawkins and Blakeslee's book- *On Intelligence* is the name of the book- it's beautiful. And I highly recommend it to everybody. And I've talked to Jeff Hawkins about some issues of the book and how relevant it is for people in mental health, which was a fun conversation. From a mindfulness point-of-view, my experience was- and then subsequently talking to teachers in it and getting support from their own experience- was that mindfulness, while it's based on being aware of awareness and paying attention to your intention, it starts to bring awareness beneath what Hawkins and Blakeslee would call invariant representations, which in the classical psychological literature would have been called top-down influences. So prior experiences, wherever they are in the nervous system, become embedded in neural connectivity that creates previously existing firing patterns. That's what we call memory. And so a top-down influence means something from the past is now influencing the way you're experiencing, let's say, a present perception.

So we have our sensory world, like let's say going up to a flower on a walk. You go up to a flower and you smell the flower deeply. You could be filled with the bottom-up experience- this raw, in-the-moment sensory data that emerges into awareness. From a cortical point-of-view, the (gap due to sound breakdown in Skype™) primary bottom-up data emerges. But since you've seen a rose before, you have all the prior learning of roses, and certainly what's believed to happen from these top-down influences, these invariant representations, is the concept of *rose* starts to come down from layer I and II and then start crashing at layer III and IV, for example, into the bottom-up data. And depending on how powerful those top-down influences are, you can have the word *rose*, the concept *rose*, just another flower- big deal, I don't care, I'm going to rush. All these things can keep you from living, literally, in the richness of the moment. So that even this flower becomes just "an ordinary event" that's mundane and not noteworthy.

In mindfulness, what we do is we, I think, disengage from the flow of information that's coming from layer I and II and crashing down upon perceptual awareness with a prison, really, a prison of these top-down constraints. And in ways I describe in the book that aren't clear but these are hypothesized ways, we can actually disengage those higher cortical top-down influences so that we amplify the stability and richness and detail of the bottom-up flow from layer VI and V. Now if this is true, what it means then is that we, in a sense, expand time. Because the way we subjectively experience time is that when something has all this freshness to it, like when you travel to a foreign country and are in a new city you've never been to or when you do enter a mindful state and just go for a walk, the ordinary becomes extraordinary. And it's really a way of having the time of your life, you know, it's a way of expanding the time of your life subjectively so that we live longer, literally. We have more in our lives because we're not imprisoned by all these past experiences that have embedded themselves in memory. And so that's the idea of dissolving the top-down prison and liberating ourselves to live fully in the present moment.

Ginger Campbell: I liked in your book- you said that mindfulness awareness is literally “a way of calming the past's intrusion on our experience of the present.”

Dan Siegel: Yeah, absolutely.

Ginger Campbell: And that's a quote. Just for the sake of my listeners, I'm not making that up- you did.

Dan Siegel: Oh, thanks. That idea that you pointed out, Ginger, is the notion that we can even be, by the way, mindful of memory. So a bottom-up experience doesn't have to be where the sensory data is coming from the outside world. It can also be from the world of the mind itself. So, for example, if I'm working with a patient who's had trauma, I want to have that patient develop a mindful awareness capacity before we do deep trauma work. And then what they can do is from this mindful place, they have what's called discernment, which means you can sit with an awareness and notice the activities of the mind without being swept up by them as being identified as the totality of who you are.

So I talk about in the book as kind of like this wheel of awareness where you can sit in the hub- this mindful awareness metaphor place- and you can look toward the rim and just notice whatever is going on there. So it might be the smell of a rose, and instead of being imprisoned by, "Oh this is just a rose, just another flower" and get on with in, you know, you can really enjoy the smell of the rose. Or, if I'm working with a patient with trauma, we can say, "Let's get in this mindful place, and let's examine the activity of the mind that's called traumatic memory." And you can mindfully attend to the activity of memory and explore it and let it come in and out of awareness just like you decide to pause, smell the flower, and move on. You can do the same with memory.

So mindfulness is not just about the bodily sensations in the present moment. Not at all. I believe deeply mindfulness includes that, but that's just really a part of a larger issue, which is that mindfulness allows you to differentiate, that is, to notice as distinct, the different streams of awareness, and the different activities of the mind. So rather than being swept up by them, you actually can experience them with what's called discernment. And that allows you to have what's called equanimity or clarity, even in the face of a storm.

And it's very much like the analogy that's been told for generations that the mind is like the ocean. And that deep beneath the surface, you can look up to the surface and whether it's flat or choppy or even a full storm, deep in the ocean it's calm and clear. And when you get a mindfulness of the breath experience going, you can go to the depth of the mental sea and just look upward at the activity of the mind, whether it's the smell of a rose or a memory of a trauma, and you can experience that with clarity and calm. And that's what mindfulness promises and delivers.

Ginger Campbell: That's a great example because, I mean, I'm sort of one of those people who looks at some of the mental health practices like the whole issue of repressed memories and things.

Dan Siegel: Mm hmm.

Ginger Campbell: They seem to just turn people into victims rather than doing them a lot of good. It seems like your approach offers a way of dealing with these problems that could be a lot more productive. And like you said, our first job as physicians is to do no harm.

Dan Siegel: Right, absolutely. And if, as a clinician, you know, we offer the incredibly enriching practice of developing mindful awareness, then whether we're exploring a traumatic memory, or looking at patterns of personality, behavior, or looking at relationships that are dysfunctional. Whatever it is that we're looking at, mindfulness is a starting place for then doing the further work. And so in that

sense, we're really giving a form of- I think it's a form of- mental and brain hygiene that also helps relationships, helps every aspect of this triangle of human experience- mind, brain, and relationships. And so why shouldn't we offer that to anyone who's coming for clinical needs, who are suffering and this helps alleviate- not only alleviate the suffering, which of course is important, but it helps them build the circuitry of resilience.

Ginger Campbell: Well I'm not sure how much more time we have. I want to ask...

Dan Siegel: I'm good if you want to go on so whatever you want to do.

Ginger Campbell: I want to give you a question that someone posted on the forum. I'm going to read the whole thing so you'll have the context.

Dan Siegel: Sure.

Ginger Campbell: This is from a guy on the forum named Rod. He says, "Can you cover what regions and pathways of the brain that are engaged and or not engaged in mindfulness or cognitive behavioral therapy, what the circuitry is that is overriding non-mindfulness hierarchy? Easy to think about watching your thoughts but what specifically do the experts think is going on? That may be an interesting angle into meditation without getting sucked into 'meditation' *per se*." He says, "I spent a few years getting pretty handy at mindfulness. It left me questioning, 'What is watching?' And can you get 'it,' whatever it is, to stay above the rest of the thoughts with practice? But I have not yet found good discussion of what region or neural correlates are 'watching.'"

Dan Siegel: Right, well that's a great question from Rod- thank you Rod. First of all, you ought to read *The Mindful Brain* book, which directly addresses this issue, and also in the Sounds True audio programs, there's a separate program of the same name called *The Mindful Brain* which also explores that in a lot of detail.

So where to begin on those very interesting points that Rod is bringing up. The first thing to say is that it's a new science, so we have to keep very open-minded about what new discoveries will be found. I have tried in *The Mindful Brain* to summarize as best I could the reliable scientific studies that were done clarifying the distinction between studies of mindfulness states versus mindfulness traits. So to start with the states, it looks like the circuitry that's active when you're becoming involved in a practice of mindfulness, let's say of the breath, are these circuits that I ended up calling the resonance circuits. So those include aspects of the area behind your forehead- this middle part of the prefrontal cortex, which, for those who want the details, is the anterior cingulate gets activated, and aspects of the orbital, frontal, and medial prefrontal cortices get activated. Another set of studies would suggest also in certain aspects of mindfulness practice, if you will, the ventrolateral also gets activated. And those are studies not published yet, out of UCLA, by David Creswell and colleagues about a certain action that's done in a functional imaging thing.

So those areas of the anterior cingulate, the orbital frontal (behind the orbit of the eyes), the medial prefrontal (right down the midline of the forehead going up and down), and the ventrolateral, which would be the middle of forehead going side to side. I just call those the English term, the middle

prefrontal cortex. So we have a lot of data now to say that a mindfulness state is activating aspects of the middle prefrontal cortex. Now in addition, with mindfulness of the breath you're activating an area called the insula. And the insula is like a highway that permits information to go from the cortex downward. So when we resonate with other people, attune to other people, it's very active. But it also brings data from the body, including where you're sensing respiration, and brings that data upward and deposits it in the middle prefrontal area- the medial prefrontal cortex, especially on the right side. So we know the insula is active.

In several unpublished studies of mindfulness of the breath, the superior temporal cortex was also activated. And that region does a number of things. It's activated with something called "biological motion." It's involved in the mirror neuron complex that works to create basically maps of one's own and other people's intentional states. So we say you're paying attention to intention. It wouldn't be a surprise that that mental effort would activate the superior temporal cortex, which is essential for mapping out intention. And I talk about this, again, in the book.

So what I suggest in the book is that this combination of middle prefrontal activation, insula plus superior temporal cortex, that circuitry doesn't have a name so I just made up a name and I call that the resonance circuitry. It's the circuitry that's active when you're resonating with another person. And I believe that's interpersonal attunement, and I believe it's the same circuitry that's activated when you have intra- or internal attunement- attunement with yourself. So that's the circuitry piece for states.

We have evidence from Sarah Lazar's work- and we need to look at more studies in the future- that aspects of these, the middle prefrontal area and the insula, are actually thicker- the insula on the right side, bilateral for the middle prefrontal cortex- and there's reason to believe that neural firing in those areas leads to neural synaptic increase in growth. And that's what the increased thickness means. So that would be for a trait.

We're not talking about this fantastic work by Ruth Baer or colleagues in Kentucky naming these five different mindfulness traits, because the question is about the brain. But what we've done at UCLA, David Creswell's group has done some really interesting work looking at those with mindfulness traits, for example who name a distressing emotion they see on the face of someone when they're in a brain scanner, and those people with mindfulness traits activate their middle prefrontal areas- the ventrolateral and the ventral part of the medial prefrontal cortex- this is all part of the middle prefrontal cortex. And they actually activate that, and it looks like they squirt inhibitory peptides- GABA is what comes from these areas- to regulate the lower limbic areas- the amygdala in particular. And so people with mindfulness traits, when they name a feeling, they actually tame their reactive limbic firing. And that's only in people with mindfulness traits. So we have reason to believe that those areas are especially functional to regulate lower affective firing patterns in people with mindfulness traits.

Ginger Campbell: What about the whole who's watching you watch question?

Dan Siegel: Yeah, it's a great question. It's a fantastic moment to be in this field, because we can say there's millions of things we just don't know. Before we get into the brain part of that, from just the experiential point-of-view, I think there's a powerful view that there is activity of the mind which is like a thought, feeling, a memory- something like that. And then there's awareness. And that awareness is

not an activity of the mind but actually experience of the mind. Now I know that sounds like picking- what is it you pick when you- it's like making a little out of nothing, or something, but it's a really important distinction because especially, let's say, with patients, when you can give them the actual subjective experience, that they can sit in awareness and allow different activities of mind- of memory of a trauma, a thought about a worry they have, a feeling that washes over them- to arise, stay present, and then fall away. A lot of my patients have said, "Well who am I if I'm not that thought?" And for us in the therapy session, they think- and this is the way they've expressed it, a number of patients have said this- they feel that they are their awareness and part of their identity is to have thoughts come and go, but it's not the totality of their identity. So they come to feel that awareness is who they are.

Now, in Rod's question, you can say, "Well, who's is being aware?" Well you could say then that, "OK, I live in awareness as this essential me, this core self, this true nature, this ground of being, this soul, this essence of who I am." All those are things people have talked about. "And in that awareness, I ride the wave of different activities that come and go, whether it's awareness of my breath or interactions with other people or memories or thoughts or whatever it is, and then I am awareness." When you do that, you come to realize that the mind has kind of a spacious quality to it- a sort of infinite potential, if you will, and we explore this in something called the Mindful Brain Immersion. That is a three-day seminar I do and I recorded one of them.

You'll hear this as people as people actually try this they'll experience the spaciousness of the mind as kind of this infinite potential, if you will, if we want to talk about it in brain terms, this infinite potential of brain firing patterns, because you have a hundred billion neurons, 10000 average connections of one neuron to the other. You can have trillions of connections that all have on/off firing patterns that are possible. If you tried a different firing pattern every second of your life, you'd never use up the possible firing patterns there are. So while it may not be "anything is possible," in a lifetime you never have to repeat anything. And so in that sense, it's infinite. So the infinite possibility of firing patterns can be experienced as this incredible spaciousness of the mind as wide as the sky, as deep as the ocean. And when you experience it like that, then when an activity of the mind arises, it has the sense of a crystallization of infinite potential into actualized momentary experience- like a thought, "I'm thinking about my foot" or "I'm thinking about my vacation" or whatever it is, the infinite becomes condensed into the actual. And that's what a mental activity is. And it arises and falls. Because the infinite potential is always there and within it, within that space of the mind, the mind can manifest itself. You, in terms of what Rod is asking, you are the awareness of that. You are the infinite and the awareness of the infinite. You are the actual and the precipitated crystallization of infinite potential into actual lived experience as a mental activity. And you're the awareness of that. So you're all those things. It's what makes life so rich.

And the last thing I just want to say about it is the ability to differentiate those different aspects of mental life is what mindfulness is all about. It isn't that it's just one or the other or one's better than the other. It's just that awareness is distinct from mental activity. And when we come to deeply experience that, life becomes filled with equanimity.

Ginger Campbell: Because we're not attached to the individual experiences?

Dan Siegel: Exactly. You become more attuned with the infinite than just being swept up by the

crystallization of that. Like instead of being a cork bobbing up and down on the surface of the sea, which is, when people identify with their mental activities, is who they are, as all that they are, life is just strewn from here to there. When you develop this deep place within your mental sea, suddenly you become a part of the infinite. And there's this clarity that emerges from that where the mind becomes profoundly stable as the richness and detail and the focus become beautifully enhanced. And that's why mindfulness is not about emptying the mind by any means, even though people say that. Mindfulness is more about stabilizing the focus of attention so that all these rich details of the mind become crystal clear.

[music]

Ginger Campbell: Before we close, one thing I wanted to say that I really liked about your book was the fact that you really put a lot of emphasis on the importance of coming up with testable hypotheses.

Dan Siegel: Yeah.

Ginger Campbell: Would you say something about that before we close?

Dan Siegel: Sure. In this wonderful discussion you and I have been having, Ginger, there's these two aspects of our lives as humans that we're talking about. One is the subjective immersion in the structure and fabric of the mind. And that's part of something I call mindsight, which is this ability to see the mind of yourself and others. So important in our world today to increase compassion is to help develop mindsight, insight, and empathy. And so much that's happening in our technology is actually going against that. So we have a lot of work to do [laughs] to keep the circuits of compassion for the self and others active and growing. That's a whole other topic for you to talk about sometime. But in terms of this subjectivity then, we have to honor that. That's just a really important place to begin- honoring our own internal world, bringing that curiosity, openness, acceptance, and love. This coal state (c-o-a-l) curiosity, openness, acceptance, and love is really a mindful state toward ourselves and others.

Now in the practical world if we're going to institute something in, let's say, clinical practice, or we're going this to educators' attention and say, "Hey- can we start teaching mindfulness practices to your students," we have to have more than just subjective reports. That's just the reality of our lives. And so we bring science for a number of reasons. We bring science to it because first of all, it helps illuminate the nature of truth. Science isn't everything, but it's an important method for bringing truth and knowledge into the world. We also bring science because it helps us validate whether what we're doing is helpful or harmful. We gotta make sure we do no harm, and we have to make sure that what we're doing is helping. So we have to be rigorously scientific for that reason.

Another reason we bring science into the fore is because if we can actually do what His Holiness the Dalai Lama suggested at this meeting I was in called The Seeds of Compassion, and you can actually watch it on the internet. It's seedsofcompassion.org. I was the last half hour of the first two-hour scientific morning on the science of compassion. You'll see me ask His Holiness a number of different questions about the science of compassion and about developing it, and he said a number of really interesting things, but the point I want to say here is that at the end of our discussion, he points at the four of us- the scientists on the panel- and he says, "It's up to you in science to develop a secular ethic,

a secular value system that can help promote more compassion in the world."

And so from a scientific point-of-view, I think- and this is in the writings of *The Mindful Brain* and also *The Developing Mind* and a program called *The Neurobiology of We*- all these, I kind of describe this in detail. I think there's a secular ethic that if we point to health as a value system, that you can deeply say that mindfulness as a practice promotes brain hygiene. Mindfulness as a practice promotes mental health. Mindfulness as a practice promotes relational well-being. And so in all these ways, from a scientific point-of-view, you can argue that we need this form of mental training- mind training- focusing the mind, so that it goes beyond, hopefully, the love that people have gotten and their families. So they have this kind of immediate kind of compassion for each other, but it develops this widening in our, what Einstein called, circles of compassion.

So in many ways we dissolve the top-down constraint that's telling us we're all separate from each other- that's kind of a cortical, what Einstein called, an optical delusion. I think an outcome of our brain development is that we think we're all separate, when in fact we're all interconnected like cells in the body. And so with mindfulness practice, we can actually use science to dissolve this optical delusion or separateness so we come to feel the truth, which is that we're all deeply interconnected and interdependent. And so in that sense, from a scientific point-of-view, bringing science to bear can help us say that we need people that this form of mindfulness training so that in this very interconnected and highly technological planet we're on now, we can have human beings with the ethic of realizing how connected we all are so that we bring kindness and compassion to the center of how we are with ourselves and each other as a way of promoting well-being for individuals or relationships for families, for communities, and even for the entire planet.

Ginger Campbell: Well I was going to ask you if you had any closing remarks that you wanted to make, but I have a feeling those might have been them.

Dan Siegel: [laughs] Hope I didn't jump the gun! I gotta tell you, it's a pleasure to talk to you about this stuff because every time there's a chance really to connect deeply with someone who's thinking about these things, you come to realize we're in this great moment of science to illuminate the nature of our contemplative opportunities. I am so optimistic about the possibilities for human beings to use their cortex humanitas to actually raise levels of integration, which we haven't talked about much today, but to raise these levels of integration so that people can actually change the course of cultural evolution and we can in fact have this emergence of a very positive state of our species on earth.

Ginger Campbell: But I think we need more people like you helping to get the word out.

Dan Siegel: Well, that's what we're all here together to do and it's definitely a team effort.

Ginger Campbell: Well, Dan, I want to thank you again for coming on the podcast today. I really appreciate it.

Dan Siegel: Oh my pleasure Ginger. This was really a pleasure.

[music]

Ginger Campbell: I want to thank Dr. Siegel for being on the podcast, and I hope that you enjoyed the interview. Be sure, if you have any questions or comments, to post them up on the discussion forum at brainscienceforum.com or send me e-mail at docartemis@gmail.com. Also, don't forget to go to the website for a link to Dr. Siegel's book *The Mindful Brain: Reflection and Attunement in the Cultivation of Well-Being*.

Also on the website, you can get the RSS feed, which will allow you to get posts that I put up in between podcasts, and there's information on the website for subscribing to the podcast if you're not already subscribed. There are links to our Facebook group, our FriendFeed, and our Flickr group. There's also a tab on the website for making contributions. You don't have to have a Paypal account to make a contribution to the *Brain Science Podcast*.

I want to thank everyone who's already made contributions, and I'm hoping that I might be able to create some extra content soon, maybe when I'm at Dragon*Con since I'm doing a presentation in the science track that is separate from the live podcast that I've mentioned before. I'm hoping I'll be able to record that and provide that as extra content to those of you who are helping support the show. Even if you can't afford to contribute anything to the podcast- and I've got it set up on there so that you can do the smallest amount that you want- but even if you can't afford to give anything, you can help to support the podcast by telling other people about it. Word of mouth is the most important that I have for helping the podcast grow. Thanks again to everyone who has contributed to support the *Brain Science Podcast*.

Some of you are probably wondering what happened to the transcripts that I promised. And I have hired someone to do transcripts, but I haven't had a chance to get those up onto the website yet. But those should be appearing, hopefully, before I get off to Dragon*Con.

If you're looking for other good science podcasts, I hope you'll remember to go to sciencepodcasters.org. And I'm still looking for some more good science podcasts to add to the lineup. So if you are a science podcaster, I hope you will contact me.

My other podcast, *Books and Ideas*, will be back in September. Meanwhile next week, as I mentioned, I will be at Dragon*Con in Atlanta, Georgia. If you're going to be at Dragon*Con, be sure to drop me an e-mail or look for me in the podcasting track. I will try to get my entire schedule up on the website so that you'll know where I'm going to be and what presentations I'm doing.

The next episode of the *Brain Science Podcast* is going to be an interview with Dr. John Ratey from Harvard. He's going to be our first returning guest, and in this interview we are going to be talking about attention deficit disorder. This is a topic that has a lot of misinformation out there, so I hope you will tune in, even if you think you're not interested in attention deficit disorder because I bet you'll learn something. I know I'm looking forward to it because this is a topic that I really don't know that much about.

[music begins]

Thanks again for listening. I look forward to talking to you again in a couple of weeks.

[music]

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