Shrink Rap Radio #231, February 26, 2010. The Meditating Brain.

Dr. David Van Nuys, aka "Dr. Dave" interviews Dr. Richard J. Davidson.

(transcribed from www.ShrinkRapRadio.com by Jamie Johnson)

Excerpt: *"…as we learn more about neuroplasticity, it's increasing clear that the brain is continuously being shaped by experience. And so we really have a choice as human beings as to whether we wish to let our brains be shaped willy nilly by the forces which impact upon us or take a more active responsibility for shaping our own brains in ways to promote more positive kinds of qualities. And the current neuroscience oriented research indicates that we can indeed take more responsibility and actively promote the more positive shaping of our brains through the explicit cultivation of positive mental states and challenging negative mental states."*

Introduction: That was the voice of my guest, Dr. Richard Davidson speaking about his research on meditation and the brain. Richard J. Davidson is the William James and Vilas Research Professor of Psychology and Psychiatry, Director of the W.M. Keck Laboratory for Functional Brain Imaging and Behavior, the Laboratory for Affective Neuroscience and the Center for Investigating Healthy Minds, Waisman Center at the University of Wisconsin-Madison. He received his Ph.D. from Harvard University in Psychology and has been at Wisconsin since 1984. He has published more than 250 articles, many chapters and reviews and edited 13 books. He has been a member of the Mind and Life Institute's Board of Directors since 1991. He is the recipient of numerous awards for his research including a National Institute of Mental Health Research Scientist Award. He was the Founding Co-Editor of the new American Psychological Association journal EMOTION and is Past-President of the Society for Research in Psychopathology and of the Society for Psychophysiological Research. He was named one of the 100 most influential people in the world by Time Magazine in 2006. Now here's the interview.

Dr. Dave: Dr. Richard Davidson, welcome to Shrink Rap Radio.

Dr. Richard Davidson: Thank you very much.

Dr. Dave: Well, I'm so excited to have you as a guest. We've had to postpone this interview several times due to your very busy schedule. So I'm feeling particularly lucky that you're able to squeeze this in. It seems like everyone I know who refers to your work, always refers to you as Richie Davidson? We haven't met in person but is it okay if I call you Richie?

Dr. Richard Davidson: Absolutely.

Dr. Dave: Okay. A little presumptuous of me but I hope you don't mind.

Dr. Richard Davidson: Not at all.

Dr. Dave: Okay, great. Your recent work, broadly speaking, seems to explore two domains. One is the neuroscience of meditation, and maybe they're not this separate, but the other is the neuroscience of emotion. Is that a fair characterization?

Dr. Richard Davidson: Well, I see them as intimately related and I don't make a rigid separation. We do, you know, all kinds of other work related to those issues as well.

Dr. Dave: Yes, I was on your website and I saw that in fact you have a really diverse range of projects going. But I thought in the time we have together, I'd like to focus on both of those areas but I'd like to start with your work on meditation. Can I ask you what drew you to that area in the first place?

Dr. Richard Davidson: Well, what drew me to that area was the…first of all, my own personal practice which convinced me that there was something very important there and that we have within each of us the capacity to change our own mind and brain through systematic mental training. And the contemplative traditions have much to offer in delineating specific methods and procedures for training the mind and cultivating certain positive qualities. I also believe that positive qualities like happiness and kindness and compassion are best regarded as the product of skills which can be enhanced through training. And all of that meshes very well with modern understanding of modern science of plasticity and the fact that circuits in the brain can be shaped through experience and training. So, all of this really makes a lot of sense, from both the contemplative perspectives as well as from scientific perspectives.

Dr. Dave: Yes, so you were already a mediator when you began your research. What year did you start doing your brain research on meditation?

Dr. Richard Davidson: Well, I actually dabbled in it in the very early part of my career and published a few papers in the late 1970s from graduate school and immediately post graduate school. But it became apparent that the times were just not right for research in this area. The methods were not sufficiently sophisticated. The cultural climate in science was not particularly receptive. And I then took it up again around 2000 after I met the Dalai Lama for the first time. And he encouraged me to pursue research in this area. So it was really around 1999 or 2000 that we began this work in earnest and kind of the modern era and it's expanded very dramatically since then.

Dr. Dave: It's interesting to me that you picked it up in the 70s and then put it down because actually my own doctoral dissertation I did in1970 and attempted to study meditation at the University of Michigan. And of course I didn't have access to any tools for studying the brain and so my approach was really crude. So it's interesting that you took that initial stab and then the technology caught up to where you were trying to go.

Dr. Richard Davidson: Yea, I remembered the study you did. It was something on stimulus independent thought and mind wandering, something like that.

Dr. Dave: Yea, the mind wandering part, I was hypothesizing that attention played a key role and I had people in a sound proof chamber following their breath or following a candle and clicking a counter every time that they needed to bring themselves back to the task. So I'm flattered that you remember that study. Can you take us through the highlights of your brain imaging research with meditators? I know you spoke about plasticity. I think you're one of the key people to help establish that finding.

Dr. Richard Davidson: Well, the work we're doing is really diverse and extensive in meditation. It includes the study of very long term practitioners who've been practicing for tens of thousands of hours across their lifetime.

Dr. Dave: Wow.

Dr. Richard Davidson: And in those studies we have been having the practitioners meditate in the laboratory to learn what we can about the specific neuro-correlates of different types of meditation. We've been doing a lot of work on compassion meditation. And trying to discover what networks might be recruited in the brain during the voluntary generation of compassion and how that kind of practice may transform the processing of emotional stimuli. We've also been looking at the impact of more, of other kinds of meditation practices, ones that involve specifically focusing the attention on circuitry implicated in attention and behavioral tasks that may be sensitive to that such as the intentional blink and other methods for interrogating different aspects of attention. In other work we have looked at practitioners longitudinally over the course of intensive practice and we've done and published several studies over the course of the three month retreat where we have looked at practitioners before and after each three month retreat and looked at changes in the brain and behavior mostly in this case focusing on indices of attention. There have been a number of papers published from that. And we've been able to demonstrate enhancement in different subcomponents of attention and alterations in neural systems that may underlie them. In other work, we have looked at novice practitioners including individuals going through Mindfulness Based Stress Reduction, an eight week course where practitioners attend one 2 ½ hour class per week and then have daily homework. And we have looked at changes in the brain and in peripheral biology, biology below the neck, particularly immune function and also changes in behavior that are associated with this short term practice. And in still other work we have done studies with even shorter term practice on the order of two weeks of daily practice you see whether just a little bit of practice can make a difference. And in those studies which are not yet published, we indeed have found that even short term practice can change the brain and behavior in reliable ways. So that's kind of a thumbnail sketch of what we've been doing and we are continuing with studies in all those domains now to further explore some of these questions.

Dr. Dave: That's a very big thumbnail. (laughter) That's a lot of ground that you covered there. You've studied all these different lengths of time and what are you able to conclude? You know, you've studied novices. You've studied lengths of time as short as two weeks. You've studied people who are relative novices in meditation verses

people who have put in tens of thousands of hours. Is there anyway to make a generalization about that?

Dr. Richard Davidson: Yea, there is a way and I would say that the general conclusions that we've been able to glean for looking at practitioners of varying different lengths of practice is this….One is that even very short amounts of practice in complete novice practitioners has discernable effects. So when people ask if even just a few minutes of practice a day can make a difference, I think the answer is unequivocally yes. The second generalization is that in many cases there is a relation that we've been able to uncover between how much a person practices and the magnitude of changes in different indices. So the second general conclusion is that more practice leads to greater improvements. The third generalization I would say is that some of these relationships are nonlinear. That is it's not necessarily the case that the relationship between the amount of practice and the magnitude of change is a strictly linear one because in some cases you don't find these relationships. And in certain cases there's some reason to believe that the magnitude of change early on may actually be greater because there's more room to see improvement at least on certain measures. So those are general conclusions I think that we can draw from these studies.

Dr. Dave: Are you finding that any particular approach to meditation appears to be more impactful neurologically than others?

Dr. Richard Davidson: You mean specific meditation practice?

Dr. Dave: Yes

Dr. Richard Davidson: No, I would not say that. I wouldn't say more impactful. I would say that different practices are differently impactful. But I wouldn't say that there's one practice which may be more impactful than others. And I would hasten to add that one of the things that I think is going to be true is that one size does not fit all. And what's impactful for one person may not produce any change for another person. I think one of the most important questions that needs to be addressed in scientific research in this area is which individuals benefit most from which kinds of practices. And that's something that we really don't have a lot of evidence on yet but I expect that within the next few years there'll be more relevant data.

Dr. Dave: That sounds like a fascinating line of research. Now you were also talking about below the neck and the immune system. Can you say something about the significance of that work and those findings?

Dr. Richard Davidson: Sure, to give a very concrete example first. In one study that we published several years ago we demonstrated that individuals going through an eight week Mindfulness Based Stress Reduction course had significantly enhanced antibody titers in response to an influenza vaccine compared to a control group. So this is a good measure of systemic amino competence it's an *in vivo* measure. And what it means is that simply going through eight weeks of meditation actually enhanced a person's

response to the vaccine. So that if these groups are exposed to comparable levels of virus, the individuals who went through the meditation training would more likely demonstrate greater resistance to the virus from the vaccine. And we also found in that study that the magnitude of changes in certain aspects of the neural response among the meditators predicted how much change they exhibited in the immune system. These data demonstrate that the changes that are induced by meditation practice are not just in the mind and the brain but they also affect bodily systems that are intimately connected in a bidirectional way to these neural systems and certainly the immune system is…or aspects of the immune system are I think are going to turn out to be extremely important in this regard In very recent work which is not yet published we're intensively studying immunological contributions to inflammation and looking at different cytokines that have been implicated in inflammatory processes to examine in a very detailed way how meditation may impact these systems.

Dr. Dave: I recently had the privilege of interviewing Sarah Lazar about her brain imaging studies of meditators. What are the similarities and/or differences in your approaches and findings?

Dr. Richard Davidson: Well, I think the approach that we're taking is broadly similar. I assume Sarah was talking about her structural imaging findings mostly. I think that those are very, very interesting and raise the possibility that meditation that may lead to structural changes in the brain. Of course, comparing two different groups on structural brain measures and finding differences doesn't necessarily mean that it's meditation that produced those differences. That's a criticism which is also relevant to studies we've done on functional changes in the brain. So it's not unique to structural changes but it's particularly important in examining structural changes to look at longitudinal changes over time within the same individuals which would give us a more definitive understanding of how meditation may lead to structural differences.

Dr. Dave: You know, speaking of criticism, I'm under the impression that there's been some criticism of the fMRI and maybe the EEG, I'm not sure, as rather blunt instruments that have led to unwarranted claims. A friend sent me a reference to a report in Science News that raises questions about the underlying assumptions and statistical techniques used with fMRI, for example, the assumption blood flow reflects neural activity. And some critics have evidently referred to the research as "the new phrenology". Can you comment on this?

Dr. Richard Davidson: These are general criticisms of research with human brain imaging method. They weren't criticisms specifically of the research in meditation. Unless you're referring to something I don't know about.

Dr. Dave: No, no.

Dr. Richard Davidson: I think that the criticisms of the methods used in brain imaging research are important to acknowledge and many of them are valid and need to be…and some conclusions need to be tempered in light of the fact that they are very blunt and

coarse in terms of what can infer from them. The bottom line is though that they are the best we have right now for non invasive measurement. So we can go on and on about that and there are a lot of technical issues that are interesting and important but I suspect that would really be not that relevant to the average listener.

Dr. Dave: Okay. You've touched on this a bit already but from a scientific point of view, what big questions or challenges remain relation to the neuroscience of meditation?

Dr. Richard Davidson: Well, I think that one of the big challenges is one related to…which is the idea that it is likely that one size does not fit all. How can we better understand an individual's unique cognitive and emotional style and make predictions about what specific kinds of practice may be most efficacious for a given individual with a given style? That's something that's really important. And it's particularly important because antidotal evidence suggests that most people who start with a particular style of meditation don't stick with it, although those data are very hard to come by. But it's my impression, for example, that the majority of people who take the Mindfulness Based Stress Reduction course, although by their own report get a lot out of it, most people don't stick with it as daily practice. And so this leads to the question, how can we optimize the match between a person's cognitive and emotional style and a method for mental training that may harness their individual differences? That's one big challenge. I would say the second big challenge that we haven't spoken at all about is how can we develop or optimize methods of meditation training for children in a way that is developmentally appropriate? We know that the brain is more plastic earlier on in life and there is a lot of reason to believe that if this kind of training begins earlier in life it will produce more enduring changes. And that's something a number of people including our group is currently working on. I think we'll be hearing a lot more about that within the next decade. So that's another big area. And I'd say a third big area is how meditation might induce changes in gene expression? The field of epigenetics is just blossoming now and understanding how genes are regulated by environmental factors is something at the forefront of molecular genetics. And understanding how meditation can induce changes in local gene expression in the brain is something that is a major frontier and I think the prospects for new discovery there are enormous.

Dr. Dave: Okay. Thanks. Those each sound like very fascinating areas. In relation to the first, I think that I myself am one of those sort of off again, on again meditators in terms of developing the discipline. At the same time, I feel like I've integrated an attitude of mindfulness in my life where in daily life I feel like I'm being more "mindful", more aware of my attitudes and thoughts and kind of monitoring them. And I don't know if you're able to assess whether that counts or not?

Dr. Richard Davidson: Well, you know, my own intuition is that it counts. Just how to measure it is a big challenge.

Dr. Dave: Sure.

Dr. Richard Davidson: You know, that's another area where I think scientific development will be very important that is in measuring qualities of mindfulness in an objective way.

Dr. Dave: And you mentioned children and it made me think of children in Tibetan monasteries that there might be a subject population right there. Have you in fact done any studies with children at this point?

Dr. Richard Davidson: Not children in Tibetan monasteries. We are doing studies with children in the U.S. who are being taught some practices in a developmentally appropriate way. Young children in Tibetan monasteries actually are not taught meditation. Most people assume that the young children meditate but they don't.

Dr. Dave: Yea, I had assumed that.

Dr. Richard Davidson: Formal meditation is not introduced until the teens.

Dr. Dave: That's interesting. And what's the rational for that? I'm sure they have some understanding of why that's developmentally appropriate.

Dr. Richard Davidson: Well, you know, there are other kinds of skills which are cultivated prior to formal meditation They apparently have sort of arrived at a sequence that they think may be optimal but whether it's optimal for children across cultures is not known. And the Dalai Lama has encouraged us to explore the possibility of modifying these practices in ways that may be useful for children in western context.

Dr. Dave: I had announced on a previous show that I was going to be interviewing you and I asked listeners to submit questions and so I got one from one of my listeners here. It's got a little bit of a long introduction but here it is. This listener writes, "I'm an undergraduate student pursuing a BS in psychology. I sometimes find myself disenchanted with the shallow explanations my textbooks offer to explain aspects of human experience that seem to elude current scientific knowledge. For instance, Francis Crick famously proclaimed that your joys and your sorrows and your memories and your ambitions, your sense of personal identity and free will are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules. Others have claimed that feelings of compassion and transcendence often labeled mystical experiences are no more than excessive activation of specific circuits in the temporal lobe of the brain. What do you think? Can the entirety of the human experience be encapsulated in scientific explanations? If not, do you think your research on how experiences like compassion and mindfulness during meditation occur at a neurological level sometimes contributes to a reductionist belief by the general public that we are only our brains?" Did you follow that question?

Dr. Richard Davidson: Yes, basically. I think it's a good question and I appreciate where it's coming from. I have a mixed response to the question. I think that as a scientist I have a sense of awe and wonderment about the brain. And to say that it's *just* a

brain is to do the brain, I think, just a tremendous disservice because it doesn't really explain anything. We don't know how it is that we can voluntarily move our hand let alone generate feelings like compassion and have these extremely complex mental processes. And so the brain is still very much a huge mystery. And I don't think it does anyone a service to say, "well, it's just the brain" because "just the brain" is in fact the most complex, least understood and most important pieces of matter that exists on the planet. And so I think it should be with a sense of awe and reverence that we consider the complexity of the brain and underscore how little it is that we actually know about the brain and cultivate a sense of humility about it. So that's kind of how I'd respond. I know it's not exactly a direct response but I think that at this point in time it really is the appropriate response.

Dr. Dave: You can decline this next question if you like, but I think maybe it's a spin off of the previous question. "Do you think consciousness exists beyond the neural activity of the brain? Or beyond the body, I guess?"

Dr. Richard Davidson: I have no idea and I don't think that we're remotely close to being able to address that scientifically at this point in time.

Dr. Dave: Okay, okay. On a slightly different topic, do you have any experience or opinions on binaural audio brain driver software that purports to facilitate meditation? Do you know what I'm talking about?

Dr. Richard Davidson: I do. I don't know the claims in detail. I also don't believe there are any really good data to support those claims. So I am open but skeptical.

Dr. Dave: Okay, okay. You mentioned the Dalai Lama earlier and I see that you're on the board of the Mind and Life Institute which seeks to promote a dialog between western science and eastern contemplative traditions. And through reading and so on I know that you've had quite a bit of contact with the Dalai Lama. Can you say something about your impressions of him as well as his interest in promoting scientific investigation of Buddhist practices?

Dr. Richard Davidson: Well, with respect to the later question, he is deeply curious, intensely interested. Really has made a rather remarkable and extraordinary commitment to interacting with scientists and encouraging scientific investigation of these questions. He spends more time with scientists than I think the elected body of heads of state the western world. It's truly a remarkable commitment. In terms of my own impressions of the Dalai Lama, I think he is a really extraordinary person. You really feel his compassion when you're in his presence, in my experience. He is someone who I find is just able to teach by example in a very powerful way. I think that whenever I can it's wonderful to bring other scientists into contact with him because I find that they always learn something very important through their interactions with him because he so powerfully conveys by example what the further reaches of human transformation I think are.

Dr. Dave: You know synchronistically I just discovered that there's this PBS Nova series out, the third episode of which actually you're in it and the Dalai Lama is in it and so on. It's called This Emotional Life. It's fascinating. In there it's recounted that an initial invitation from the Dalai Lama that you packed up a lot of gear and took it off to India to do brain measurements there only to discover that they weren't as open to it as you had hoped but later the Dalia Lama sent monks to this country so that you could study them intensively.

Dr. Richard Davidson: Right.

Dr. Dave: All of that was really fascinating. Well, let's turn our attention to some of the other work you're doing. You're the director of a major lab on effective neuroscience and I see from your website that you tackle a broad range of issues there. What's currently hot in your lab sort of non meditation wise? For example, I say references to resilience and aging which is of interest and relevance to me. I saw work on mood and anxiety disorders. What sort of front and center right now?

Dr. Richard Davidson: A major issue front and center right now is to better understand the nature of emotion regulation. We believe that the capacity to regulate emotion both consciously and well as non consciously or we might say through voluntary means verses through more automatic means is something that lies at the heart of individual differences in emotional style, emotional reactivity and is also central to understanding why certain individuals may be vulnerable to particular kinds of psychiatric disorders in the face of adversity while other individuals may be resilient and be relatively immune to the development of such disorders. So we have been very interested in better understanding the neural basis of emotion regulation and also how individual differences in emotional regulation relate to peripheral biology, health and so forth. Some of those studies are done in older individuals because this is where there are variations in emotional regulation can become sort of manifestly expressed in variations in health status. So those are all questions we are actively pursuing in other aspects of our laboratory's work.

Dr. Dave: Well, as we begin to wind down here I wonder if there's any or a final statement that you'd like to make or perhaps there's something you sort of hoped to say that I haven't elicited in my questioning.

Dr. Richard Davidson: Well, I would just conclude by underscoring the fact that as we've learned more about neuroplasticity it's increasing clear that the brain is continuously being shaped by experience. And so we really have a choice as human beings as to whether we wish to let our brains be shaped willy nilly by the forces which impact upon us or take a more active responsibility for shaping our own brains in ways to promote more positive kinds of qualities. And the current neuroscience oriented research indicates that we can indeed take more responsibility and actively promote the more positive shaping of our brains through the explicit cultivation of positive mental states and challenging negative mental states. Doing so leads to systematic changes in the brain which can be enduring and may be important not just for our emotional well being but for our physical well being as well.

Dr. Dave: Well, that's a terrific wrap up. So Dr. Richie Davidson thanks so much for taking time out of your very busy schedule and for being my guest today on Shrink Rap Radio.

Dr. Richard Davidson: You're most welcome. It was a pleasure to talk with you today.