DAVE VAGO shares his (MIND) BOARD

00:00:00 This is a board.
00:00:19 Ha ha, yes.
00:00:21 With brains.
00:00:23 Definitely a board.
00:00:24 And writing.
00:00:26 And here is Dave Vago.
00:00:30 This is his board.
00:00:31 Now, who are you?
00:00:33 No one really.
00:00:34 No one.
00:00:35 Ha ha, yes.
00:00:37 I mean, what's interesting probably about this board is it just represents some person's
00:00:45 thoughts from the past year or two that, you know, sort of gives you a sort of an external
00:00:53 scratch pad in which to sort of put all your thoughts into one place.
00:00:58 Sometimes it's nice.
00:00:59 It's easier to put it there than to keep it in here, right?
00:01:03 So what you're seeing is, yes, exactly that.
00:01:07 It's the things that have happened in my sort of head for a long time.
00:01:12 But we really just start here with this quote up here.
00:01:15 This happiness is unintended side effect of one's personal dedication to a course greater
00:01:21 than oneself.
00:01:23 That sort of, I think, you know, being on the top sort of fuels the inspiration.
00:01:27 And then, so let's see.
00:01:30 We can start anywhere, really.
00:01:32 What is mindfulness?
00:01:33 I mean, this is something that I'm always asking myself.
00:01:36 I've got a few different versions of what other people have said it is, either self-regulation
00:01:41 and present-centered awareness.
00:01:43 Other people have said, oh, well, it's actually intention, attention, and awareness.
00:01:47 And so using that, I've tried to build upon that and come up with my own ideas, which

00:01:53 are in different areas that didn't fit on the board, have been put in different parts
00:01:58 of this room.
00:01:59 But they sort of relate to this.
00:02:02 If we go to what's happening in the mind when, you know, one is meditating, for example,
00:02:08 these are just two modalities that sort of arise in people's minds.
00:02:14 And it's really talking about what happens if you start to understand how objects of
00:02:19 one's attention, either visual or auditory, arise.
00:02:23 We're going in it instead of a usual attempt.
00:02:26 Time usually goes in that sort of linear horizontal plane.
00:02:31 But here we're doing a vertical plane.
00:02:33 So time is really going down in this direction.
00:02:38 So something arises, a visual object, a mental sort of image arises.
00:02:42 And then it passes.
00:02:44 And so you're able to, once you're able to refine your meditation techniques, you can
00:02:48 start to really notice the change between arising and passing.
00:02:52 And then eventually you get to a point where you can, you see things gone or vanish.
00:02:59 And this can all be actually related to flow.
00:03:02 Flow sort of can be experienced throughout the entire.
00:03:05 What's flow?
00:03:06 Flow is sort of just the dynamic changes of seeing things moving and rippling in time
00:03:12 throughout the entire process.
00:03:14 So it's not static.
00:03:15 It's not ch-ch-ch-ch-ch.
00:03:16 There's a constant change going on.
00:03:19 And actually, so really this is a dynamic board too.
00:03:25 It's just changed.
00:03:26 It's just changed.
00:03:27 It's really rest work right there.
00:03:29 And this flow is, relates to this whole sort of process can be in flow.
00:03:36 But you can actually, once something vanishes, then you can actually rest and observe what's
00:03:41 happening at rest.
00:03:43 And then if something all disappears, then you can have cessation, which is sort of the
00:03:47 road dots, the real true gone, the big G gone.
00:03:51 Big G, is that what you call it?

00:03:53 Big G, that's what Shinzen calls it.
00:03:54 Oh, okay.
00:03:55 Big G versus little G, which is just the absence of that thing being there anymore, but the
00:03:59 big G is something that's like complete absence of self and all the strands that make up everything
00:04:05 in consciousness.
00:04:06 But the other thing really that's worth saying about this is, well, that all sort of relates
00:04:14 to what we're going to sort of define as to what is mindfulness.
00:04:17 And then I guess we can sort of move this way, I guess.
00:04:23 This part of the brain is probably one of the most critical pieces, we think, for what's
00:04:27 happening here, because what you don't see here, you see in here, but there's also a
00:04:32 sort of somatic or viscerosomatic aspect of what's happening.
00:04:37 And that viscerosomatic sensation of what's happening inside, putting like a feeling in
00:04:42 the body for all motion, comes from this structure here.
00:04:46 This is called the insula.
00:04:47 It's located sort of deep within the folds of your brain.
00:04:51 So if you were to sort of open up, there's a little prop here.
00:04:55 See, there's a brain.
00:04:58 Oh, a brain.
00:04:59 So if you open up the fold here, actually it's probably better for you this way.
00:05:04 Open up the fold here, this is the lateral fissure, and just open it up, you'll see this.
00:05:08 And so that's the insula.
00:05:10 What's so cool about it is that it represents sort of the whole internal sort of feeling
00:05:16 states from very primary sort of sensory sort of information.
00:05:22 It represents things like homeostatic motor function going on in the more posterior aspects.
00:05:28 And then as you move more interior, you get these environmental sort of things going on
00:05:33 in the body.
00:05:34 And then you start moving to the more human-like things that are very unique to humans in the
00:05:39 anterior portion.
00:05:40 And this portion here is actually 35% larger in humans than it is in macaque monkeys.

00:05:47 So there must be something special about it.
00:05:49 Macaque monkeys actually only have this posterior and mid portion of it, and it's actually that
00:05:54 whole posterior and mid portion is just extended throughout the entire length of the insula
00:06:00 of macaque monkeys.
00:06:01 There's also something really interesting about this anterior portion.
00:06:04 It's more important for hedonic conditions like our motivational, social, cognitive feelings
00:06:10 of other and yourself and how you relate to the world, the sort of more emotional types
00:06:16 of states.
00:06:17 That part's here.
00:06:19 There's also these special neurons here called von Economo neurons.
00:06:22 They're very special types of neurons.
00:06:25 It's possible that autistic children or adults even may not even have that type of neuron
00:06:31 there, and that may be part of the reason that they don't have those type of connections
00:06:36 with others and oneself.
00:06:38 So this is a very special part of the brain anterior insula, which may be very important
00:06:44 for meditation and developing an understanding of oneself.
00:06:47 And so you may need this, and it actually grows in size after only eight weeks of meditation.
00:06:55 How much?
00:06:56 How much can it grow?
00:06:57 I don't know.
00:06:58 I mean, you do have a skull.
00:06:59 Permanently grows?
00:07:00 Yeah.
00:07:01 Will it grow and then go back down if you stop meditating?
00:07:03 We don't know.
00:07:04 That's a good question.
00:07:05 So let's see.
00:07:06 What else we got here?
00:07:07 We got, we can focus right here, which is the stages of insight.
00:07:13 So as you meditate, you can go through different various stages, and these are sort of described
00:07:17 by different various people.
00:07:19 This is described in the Sutta Magga, the path to liberation.
00:07:25 So a traditional Buddhist text.

00:07:28 Other people have described it who are just more modern sort of Buddhist geeks, I guess
00:07:32 you can call them, like Daniel Ingram or someone like that.
00:07:37 And they sort of describe these stages as thought as a thought, cause and effect, impermanence,
00:07:43 suffering, no self, realizing, those types of things.
00:07:45 That's one stage.
00:07:47 And then arising and passing away would be another sort of stage of realization or just
00:07:53 understanding, anicca, or impermanence.
00:07:55 And it sort of relates back to what this was, because remember I told you that you see arising
00:07:59 and passing of an object, space, but this is just sort of a one-time thing.
00:08:04 You may see the arising and passing of an object over and over and over again, until
00:08:08 you realize, oh my God, everything is arising and passing, including myself.
00:08:11 And that's sort of what this stage is really referring to.
00:08:15 Then eventually you move to dissolution, where everything sort of just dissolves.
00:08:18 And that can be kind of scary.
00:08:20 So you go through these stages, which some people refer to as the dark night, which is
00:08:24 terror, misery, and disgust.
00:08:26 And then once you get past that, which some people get through really quickly, some people
00:08:29 take a long time, in any case then you can move into some aspect of re-observation, where
00:08:35 you re-observe what's going on inside your head and you gain equanimity, which is a powerful
00:08:41 sort of way of experiencing the world, sort of like a sturdy mast in a storm does on a
00:08:48 sailboat.
00:08:50 And then you enter stream entry.
00:08:52 And this may be a little bit overrated, but I'm not sure if this is a goal for everybody.
00:08:58 But it's a state that people describe as sort of a selfless state, where it's a complete
00:09:07 paradigm shift.
00:09:09 And once you're there, it's not likely that you're going to come out of the stream.
00:09:15 But it's one of the stages of developing insight.
00:09:21 However, there's going to be arguments about this.

00:09:24 Let's see.
00:09:25 So where are we at right now?
00:09:26 So we can go up here.
00:09:27 There's a few brain areas.
00:09:28 Oh, good.
00:09:29 Brain areas.
00:09:30 Let's see.
00:09:31 We can talk about the amygdala, which is really one of the areas that we're really interested
00:09:35 in, and how it connects to all these different areas in the frontal lobe.
00:09:38 These are the medial frontal areas.
00:09:42 And there's numbers there.
00:09:43 Like, the numbers all correspond to different sort of sub-systems, really sub-areas of the
00:09:48 brain that have been distinguished by the orientation of really just cells, but have
00:09:54 also functional differences, like Area 25, BA25 is what they call the subgenual cingulate.
00:10:02 It's interesting because you can stimulate this area in people who have intractable forms
00:10:07 of depression, people who just can't be cured by drugs, psychotherapy, ECT, you name it.
00:10:15 They just can't be cured.
00:10:17 They have depression, and they're just in the blues.
00:10:20 They have a lot of problems.
00:10:25 What they found is actually if you stimulate this area with deep brain stimulation, so
00:10:32 electrodes deep into the brain go, suddenly they wake up, and they're happy.
00:10:38 So it's really interesting to think that there can be those sort of substrates in the brain
00:10:42 where you can stimulate, and suddenly people are happy who weren't.
00:10:45 So that's one of the reasons why we do this work, is so we can understand what areas of
00:10:49 the brain are involved with different types of psychopathology and emotion, and then we
00:10:54 can sort of better use these ideas as sort of diagnostic tools, and then for better targeted
00:11:00 therapy.
00:11:02 Then you have DLPFC, which is the dorsolateral prefrontal cortex, which is important for
00:11:08 working memory and sort of goal-directed thinking and sort of concentrations.

00:11:13 Then this whole area can be considered sort of the orbital frontal cortex, that's OFC.
00:11:19 And then the ACC, which is the anterior cingulate cortex, which is also one of the most important
00:11:25 areas of the brain, because you see that area light up for practically everything.
00:11:30 But the dorsal cingulate is probably one of the parts that are really important for meditation.
00:11:36 We've seen that it grows also in size, like the insula, but has a different functional
00:11:40 mechanism.
00:11:41 It's more monitoring, so like awareness, meta-awareness.
00:11:44 Dorsal and anterior cingulate seems to be really important for that.
00:11:49 So we can stay somewhere, let's see, we can move over to here, and we see mindfulness
00:11:58 versus CBD.
00:11:59 So this is sort of just a study that we were thinking of looking at, well, cognitive behavioral
00:12:03 therapies happens to be one of the most effective sort of treatments for depression and anxiety
00:12:09 and different other forms of psychopathology.
00:12:11 Well how does it hold up in a horse race against mindfulness?
00:12:14 If we even know what mindfulness is, we can think of it as an eight week program of learning
00:12:19 how to meditate and doing some Hatha yoga.
00:12:24 So the question I guess here is can it hold up and reduce some of the aspects of psychopathology,
00:12:36 the symptoms that are related to psychopathology that CBT was intended to target.
00:12:41 And so CBT was developed by a guy named Aaron Beck, and he created this triad of things
00:12:47 that are going on in people's world view on his rumination and sort of negative aspects
00:12:53 of processing things over and over again in one's head.
00:12:58 So a very sort of negative self-focus, so thinking about oneself in a negative framework
00:13:04 was his first sort of aspect of his triad.
00:13:08 And the other one was a negative world view towards the present and the future.
00:13:14 Actually all of this together creates his triad.
00:13:17 So if you're thinking about yourself as negative, the world is negative, in the past everything sucked,

00:13:24 and in the future everything is going to suck, that's basically what's happening when you have
00:13:29 depression in sort of the Beck sort of model.
00:13:36 You may agree or disagree with some of the things I say, but this is just a slice of my thinking on the board.
00:13:42 That's all you're really getting here.
00:13:44 And so some of the things that you see in these types of people across most psychopathologies,
00:13:49 emotional reactivity, people who react to emotional stressor in a way that's maladaptive,
00:13:55 that's perseverative, that stays on all day, you can't let it go.
00:14:00 You can avoid things, that's also a bad emotion regulation strategy,
00:14:04 you just either perceptually avoid things, you don't even look at the things that sort of bother you,
00:14:08 or you just choose not to deal with it when you see it.
00:14:12 Suppress emotion, it's a plunted response, also not good for you.
00:14:18 So CBT, one year relapse rate is about 25%.
00:14:24 So that's interesting, so people who get therapy that sort of focuses on these aspects of the world,
00:14:31 in one year they will actually, only 25% of people will actually relapse back into depression
00:14:35 or some form of psychopathology.
00:14:38 Antidepressant use is 50%, so clearly drugs are not as effective, at least in that sort of context, as CBT.
00:14:50 It turns out that mindfulness, with some CBT, is also as effective in preventing relapse
00:14:58 for people who have experienced at least three episodes of depression.
00:15:02 So that sort of fits into that equation as well.
00:15:04 So we're interested in things like bias, rumination, emotional reactivity and avoidance,
00:15:09 and how do we target these things and measure them.
00:15:12 So that turns into stickies, and adds more to the story here.
00:15:17 The question I guess here is augmentation, can we augment traditional forms of approaches
00:15:22 like CBT and antidepressants with mindfulness as an augmentation strategy.
00:15:27 So we're not just saying no drugs, but we're saying, okay, we'll give you some drugs,
00:15:32 but we want to augment that strategy with something like mindfulness, and that may be more helpful.
00:15:38 Then you see some more little, I think we're moving along here, if we get them, yellow stickies here.
00:15:45 Some of the concepts that I've been thinking about, I guess, for mindfulness,

mind, clearly,
00:15:52 is one of them, dullness, level of dullness is something we need to understand.
00:15:57 Effort, that moves from positive to little, to negative meaning no effort.
00:16:03 Mental defilements, things that cloud your mind and that produce problems,
00:16:11 and negative thoughts. Distraction is also part of, these are actually parts of the,
00:16:17 that came out of the Tanka painting of the Path to Stages of Insight.
00:16:21 I sort of just took the pieces out and put them on the yellow stickies.
00:16:25 So they're all parts of the Path to Insight that sort of arise and you have to deal with them.
00:16:31 And mental awareness, mindfulness just says, what's the outcome, truly,
00:16:36 of a dull mind, a stabilized mind, and insight into one's mind.
00:16:41 And this little loop is sort of my way of describing that you are S,
00:16:46 and as you go through this path, you sort of loop around in this spiral,
00:16:50 and you come out with S prime, something a little different.
00:16:53 And in the back here you see a Chinese, or a Kanji character,
00:16:57 sort of what maybe mindfulness can be described as a Kanji character for presence,
00:17:05 or a Kanji character for heart. Together they create mindfulness, presence of heart.
00:17:09 That may be a good way to think about it.
00:17:11 Oh, and then you have a little Chitta Bhavana, a development of mind,
00:17:15 spiritual cultivation, something else, some more sort of little, I guess,
00:17:18 aspect of what we think about. What else?
00:17:24 So, now we can talk about craving. We talk about craving, for example, for cigarettes,
00:17:31 or even craving from the Buddhist point of view, is sort of an abstract concept.
00:17:37 It's not so simple as just one area of the brain.
00:17:41 And so if you look at all the literature out there, where craving is located in the brain,
00:17:44 whether it's for cigarettes in terms of addiction, or craving in terms of even a loved one that you lose,
00:17:51 so for a loss, there's different parts of the brain that are involved.
00:17:55 So many parts of the brain that it's going to be really hard to try to localize.
00:18:00 If you look here, this is the right hemisphere.
00:18:04 These are all the areas of the brain with little hash marks that, from all the research that we looked at,
00:18:09 have aspects of involvement in craving.
00:18:14 So, this is just the right side, and the left side is down here.

00:18:19 So there's a lot of things going on in terms of the brain, brain activity for craving.
00:18:24 So it's not so simple.
00:18:27 Here you can see some of the things we've listed here.
00:18:32 Oh, this actually, I guess I haven't looked at this in a while, because this,
00:18:36 craving, rumination, self-regulation, emotion regulation, attention,
00:18:42 these are actually some aspects of how we think the arrows, I guess, are working,
00:18:48 that mindfulness may be working.
00:18:51 Reducing craving, reducing rumination, reducing avoidance and reactivity, increasing efficiency of attention,
00:18:58 improving pro-social and ethical development, and maybe working at unconscious levels,
00:19:04 heavy in learning, so sort of associative conditioning, facilitating extinction and reconsolidation,
00:19:12 decreasing resource allocation, so improving the efficiency of your whole brain.
00:19:18 Let's see, what else? Okay, there's two more things on this board.
00:19:21 If you can imagine, I think we've talked enough, but ...
00:19:24 That's great.
00:19:25 Two more things. We've got schizophrenia.
00:19:27 Oh, good. Let's go to schizophrenia.
00:19:30 Okay, schizophrenia is right up here.
00:19:33 So it turns out that we have multiple paradigms that we test schizophrenics on,
00:19:41 and one of them is an emotional memory test.
00:19:44 We give schizophrenics a bunch of words that could be thought-provoking or disturbing to a schizophrenic,
00:19:52 and they show increases in all these brain areas, in the perinepocampal areas, in the amygdala,
00:19:59 in the insula, aminoprefrontal, dorsolateral prefrontal cortex.
00:20:04 And so what does it all mean?
00:20:07 Well, you create a story out of it. I'm not going to go into the whole story,
00:20:10 but essentially you have all these areas that sort of come online related to emotional memory,
00:20:18 which makes sense, and we always compare these brain areas' activation to a normal subject.
00:20:26 So increases in the insular activity may be some sort of emotional reactivity
00:20:33 and an evaluative type of thing going on as well.

00:20:40 Decreased PCC, which may represent some sort of decreased representation of self
00:20:45 or autobiographical nature of oneself.
00:20:47 So we don't know exactly how it all pieces together.
00:20:49 You sort of have to read the paper to get the sense of really how it all fits together,
00:20:53 or else you just see a bunch of arrows.
00:20:55 But then there's another paradigm called ...
00:20:57 Read the paper? What paper?
00:20:58 The paper will probably come out eventually on schizophrenia.
00:21:05 We did a CBT intervention with them, actually, and so it turns out schizophrenics can respond to CBT.
00:21:11 Remember CBT?
00:21:12 Yeah, yeah, yeah. Thank you.
00:21:15 AT, that means anticipatory threat.
00:21:17 We looked at how schizophrenics sort of anticipate threat.
00:21:23 So it turns out that they have these really interesting increases in activity and visual association areas.
00:21:29 What does that mean?
00:21:30 It could be that they're really processing threat at a very sort of primary level of sensory processing.
00:21:42 Much more activity going on there than a normal individual would,
00:21:46 and that could also facilitate how one processes threat.
00:21:50 If there's increased sensory processing, then that could also lead to increased interpretation of threat.
00:21:58 And amygdala and hippocampus go up, too.
00:22:00 That means that there's also increases in sort of autonomic reactivity to the threat.
00:22:08 And when they're in safety, when they know that they can be safe and that there's no threat,
00:22:13 there's still increased processing and the visceral sort of activities going on
00:22:18 and some of the precuneus activity as well.
00:22:20 So what does that mean?
00:22:21 I mean, we're not sure for sure, but there's definitely some extra processing going on that's probably unnecessary
00:22:28 in trying to interpret what's happening.
00:22:31 Okay, so there's one last thing here that we can really sort of focus on, I guess, for this board.
00:22:37 And I think it's probably this little board thing here.
00:22:41 This is the default mode network.
00:22:44 We hate the default mode network because it's confusing.

00:22:48 Who hates it?
00:22:50 I hate it because it represents what happens to your mind when it's wandering.
00:22:55 And they call it stimulus-independent thought.
00:23:00 So what you do when you're thinking, when you're not really doing anything else.
00:23:05 It's not goal-directed. It's very passive.
00:23:08 But when it's passive, it's actually doing a lot of things.
00:23:11 It's self-reflecting about the past and the future.
00:23:14 And Randy Buckner's group has sort of parsed apart the, or sort of used very highly advanced statistical modeling techniques
00:23:25 to say that there's actually two subsystems within the default mode network.
00:23:29 One could be the DMPFC network, the dorsal medial prefrontal cortex network.
00:23:36 That involves the TPJ, temporal parietal junction, also a very interesting area.
00:23:41 Even if you're bored already, this is an area that if you're stimulated, you would have an out-of-body experience.
00:23:46 It's a very dissociative area. So TPJ is actually quite interesting.
00:23:49 And the lateral temporal cortex and the temporal pole.
00:23:52 That's one network.
00:23:54 And the other one would be the medial temporal lobe network, which involves ventral medial prefrontal cortex.
00:24:00 And what's so cool about that area, it's evaluative in nature.
00:24:04 In the sense that whenever you evaluate anything, the ventral medial prefrontal cortex comes online.
00:24:11 But it also involves posterior inferior parietal lobe, hippocampal formation.
00:24:17 So areas that are more related to memory, that autobiographical memory.
00:24:23 And it turns out that that subsystem is more important for maybe thinking about oneself in the future.
00:24:29 Whereas this network is more important for thinking about oneself in the present.
00:24:34 Whether it's oneself or other.
00:24:36 Can you see these different networks when you look at the brain?
00:24:39 Yeah, exactly.
00:24:41 Activate separately.
00:24:43 So that's what we're hoping to disambiguate them from what people are doing when they're doing nothing.
00:24:47 It's not a default mode.
00:24:49 Everyone has different things that they think about when they're not thinking about anything.
00:24:53 And meditators happen to have a problem thinking about or wandering really

far.
00:24:58 So that they're going to look very different from a lot of people.
00:25:02 Especially the people who ruminate.
00:25:04 They look very different.
00:25:07 There's also this area here, which actually is two nodes of the default mode network that are shared between these two subsystems.
00:25:15 That's the anterior medial prefrontal cortex and the posterior cingulate cortex.
00:25:20 They just happen to be the connections for the whole default mode network.
00:25:24 Okay, well thank you for coming.
00:25:26 Thank you very much. That was great.
00:25:28 Insert applause here.