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Cognitive neuroscience tends to conceptualize mindfulness meditation as inner observation of a private mental realm of thoughts, feelings, and body sensations, and tries to model mindfulness as instantiated in neural networks visible through brain imaging tools such as EEG and fMRI. This approach confuses the biological conditions for mindfulness with mindfulness itself, which, as classically described, consists in the integrated exercise of a whole host of cognitive and bodily skills in situated and ethically directed action. From an enactive perspective, mindfulness depends on internalized social cognition and is a mode of skillful, embodied cognition that depends directly not only on the brain, but also on the rest of the body and the physical, social, and cultural environment.

cognitive neuroscience, mindfulness, enactive, neural networks, embodied cognition

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Chapter 3

Looping Effects and the Cognitive Science of Mindfulness Meditation

Evan Thompson

My topic in this chapter is the “looping effects” at work in the scientific study of mindfulness meditation practices. I take this term from Ian Hacking (1996). He has shown that when we categorize people—as poor, homeless, obese, gifted, homosexual, and so on—we change them, as a result of how we interact with them using these categories and how they come to think of themselves in terms of these categories. Sometimes we create new kinds of people who did not exist before. Hacking (1986) calls this “making up people.” For example, we categorize ourselves as citizens, but there were no citizens before there were legal criteria and bureaucratic procedures for applying this category. Hacking (2006) has been especially concerned with tracking the looping effects and the ways of “making up people” that happen with clinical categories. He observes—following Michel Foucault—that there are always social and political interests and power dynamics at work in looping effects and in “making up people.” People always get organized in certain ways for certain ends.

There is no reason to think that this is not the case for the modern mindfulness movement. Mindfulness mania is everywhere (Buswell and Lopez 2014). Mindful living, mindful parenting, mindful eating, mindful sex, mindful leadership, mindful coloring books—the list goes on. The headline of a story in *Wired* proclaims, “In Silicon Valley, Meditation Is No Fad. It Could Make Your Career” (Schachtman 2014). A *Forbes*

columnist declares, "Mindfulness Techniques Can Bring You Success in a Wired World" (Booth 2014). The subtitle of a new book, *The Mindfulness Edge*, reads: *How to Rewire Your Brain for Leadership and Personal Excellence Without Adding to Your Schedule* (Tenney and Gard 2016). There is even a place called MNDFL, which advertises itself as "New York City's premier meditation studio."[1] *The Atlantic* describes it as "A Gym for Mindfulness,"[2] while *Vogue* calls it "Manhattan's Must-Visit Meditation Studio" (Kim 2015).

Many Buddhists bemoan this mass marketing of mindfulness. They argue that mindfulness cannot be separated from the rest of the Buddhist way of life. Mindfulness is not an ethically neutral technique for reducing stress and improving concentration; it is a practice for increasing wholesome mental states and behaviors and decreasing unwholesome ones. "Right mindfulness" requires self-restraint and concern for the welfare of others. It is incompatible with greed and consumerism, and should not be marketed as a commodity—"McMindfulness"—for personal or corporate enhancement, which reinforces the status quo (Purser and Loy 2013).

This critique is fine as far as it goes. But it is superficial. Already in 2001, Slavoj Žižek pointed out that the modern fetishizing of what he called "Western Buddhism"—but which, more accurately described, is transnational "Buddhist modernism"[3]—fits

[1] http://mndflmeditation.com

[2] "A Gym for Mindfulness," video by *The Atlantic*, December 31, 2015, http://www.theatlantic.com/video/index/422337/mindfulness-gym/

[3] See Sharf (1995a); McMahan (2008).

perfectly in a consumerist corporate culture that needs to pacify itself from the endless stress of global capitalism (Žižek 2001a). Mindfulness techniques have become a means to achieve this end, and modern Buddhism has been a driving force in making mindfulness into an international marketable commodity (Wilson 2014).

Resisting this trend by appealing to the "traditional" versus modern Buddhist understanding of mindfulness is a non-starter, because Buddhism has no single, agreed-upon, traditional understanding of mindfulness. Rather, Buddhism offers multiple and sometimes incompatible conceptions of mindfulness (Dunne 2015; Sharf 2014b, 2015b). For example, some Buddhist schools say that mindfulness is intrinsically wholesome; others say that it is neutral (neither wholesome nor unwholesome). Some say that a minimal degree of mindfulness is always present in our experience; others say that mindfulness comes and goes (Cox 1992). Some approaches emphasize the importance of judgment according to an explicit ethical code; others reject evaluative judgment, downplay moral codes, and emphasize "non-dual" insight. Indeed, "contemporary mindfulness"—the style of mindfulness central to Buddhist modernism—draws largely from these "non-dual" rather than "classical" styles of mindfulness practice (Dunne 2011, 2015).

In addition, the neuroscientists who investigate meditation—many of whom are Buddhists—must bear responsibility for the meaningless mantra that mindfulness "literally changes" or "rewires" your brain. Anything you do changes your brain. Scientific evidence that mindfulness practices induce long-lasting, beneficial changes remains scanty and tentative. Indeed, a recent scientific study suggests that there may be a bias toward reporting positive findings in clinical studies of mindfulness and that

negative results may go unreported (Coronado-Montoya et al. 2016). Moreover, the idea that there is such a thing as a distinct "mindfulness" component, which is isolable from the social context of meditation practice and that functions as an "active ingredient" in the individual mind or brain, is probably misguided, for many of the experienced benefits of mindfulness practices, whether religious or secular, are likely to be inseparable from the social and communal settings of the practice (Rosch 2015; Sharf 2015a).

Scholars of Buddhism, together with cognitive scientists, anthropologists, and philosophers, need to track the looping effects and ways of "making up people" currently underway in the scientific study and clinical employment of mindfulness meditation practices. Making the case for this need is my first aim here. My second aim is to show how the cognitive science of embodied cognition, specifically the "enactive approach" to cognition, can help Buddhist scholars in this effort.[4]

Looping Effects

The modern mindfulness looping effect originates in the following way. First, being mindful is conceptualized as looking inward into one's own private mind and regulating one's own inner emotional life. Mindfulness is conceived as a kind of inner meta-awareness and emotion regulation (e.g., Shapiro et al. 2006). Second, mindfulness so understood is projected onto the brain and endowed with biological reality (e.g., Lutz et al. 2008, 2015; Tang 2015). The result is an individualistic conception of the mindful person, superimposed onto a biological substrate. The looping effect comes from how

[4] For embodied cognition and the enactive approach, see Thompson (2007) and Varela, Thompson, and Rosch (2017 [1991])).

this scientific construct loops back onto how we think about ourselves. For example, scientists and clinicians—and not just journalists—make statements like, "To be a mindful parent or a mindful coworker or a mindful solider, you need to learn how to down-regulate your amygdala through mindfulness training." Mindfulness is conceptualized as inside the individual mind, while the mind is taken to be fundamentally the brain. As a result, we come to think of ourselves, especially our mental lives, through the reified construct of the "mindful brain" (e.g., Siegel 2007).

Hacking's notion of looping effects applies to this construct. Looping effects happen when we create a category, treat it as real, and conceptualize ourselves in terms of the category. Here "mindful" is the category (some people are more mindful than others); it is treated as real by virtue of its purported biological markers in the brain and the rest of the body (e.g., decreased amygdala reactivity [Desbordes et al. 2012], relative deactivation of the default-mode network [Brewer et al. 2013], and slower baseline respiration rate [Wielgosz et al. 2016]); training yourself to be a mindful person is said to be a kind of brain training (e.g., Begley 2007; Hanson 2009).

The modern mindfulness looping effect is embedded in an unstable way of thinking about who you are in relation to your brain. On the one hand, you are separate from your brain because you can learn to control it through mindfulness training. Training your mind changes your brain. On the other hand, you are your brain because your mind is fundamentally what your brain does. You need to train your brain in order for mindfulness to become a lasting mental trait. To get beyond this oscillation between dualist versus materialist frameworks, we need a way to understand how you are not your brain without being separate from it. The enactive approach to cognition that I present in

the following provides this understanding: You are an embodied being and your brain enables your cognition to take place, but your mind is not the same as, nor is it fully determined by, what happens in your brain.

The root of the problem is thinking that mindfulness is in the head. One version of this idea is that mindfulness is a special kind of inner awareness of your own private mind. Another version is that mindfulness is generated by and located inside the brain. I will argue that mindfulness is not in the head. It is an embodied and embedded cognitive skill and social practice, not a private mental state or a pattern of brain activity.

Mindfulness Is Not in the Head

A vivid illustration of the idea that mindfulness is in the head appears in a figure[5] from a recent *Scientific American* article on the neuroscience of meditation (Ricard, Lutz, and Davidson 2104). This article discusses three kinds of meditation practices—focused attention meditation, mindfulness or open monitoring meditation, and compassion and loving kindness meditation. Focused attention meditation requires keeping one's attention on a chosen object, such as the sensation of breathing, and fosters the ability to remain centered in the present moment while being vigilant of distractions. Open monitoring meditation drops the selective focus on a chosen object, while keeping the attitude of vigilance and fostering the ability to be aware of whatever thoughts, emotions, and sensations arise from moment to moment. Compassion and loving kindness meditation aims to cultivate an altruistic perspective toward others and a readiness to act to relieve their suffering.

[5] The figure derives from an earlier figure in Hasenkamp et al. (2012).

The figure in the article depicts focused attention meditation in terms of a dynamic cycle of mental processes and corresponding activations of specific brain areas. The mental cycle comprises sustained attention, distraction and mind wandering, becoming aware of distraction, reorientation of awareness, return to sustained awareness, distraction and mind wandering, and so forth. Each of these mental processes or cognitive activities is depicted as being tied to the activation of particular brain areas, that is, neural regions understood as crucial nodes of neural networks specific for particular cognitive activities. Mind wandering is tied to activation of the default-mode network (posterior cingulate cortex, precuneus, posterior inferior parietal region); becoming aware of distraction is tied to activation of the salience network (anterior insula, anterior cingulate cortex); reorientation of awareness is tied to activation of the dorsolateral prefrontal cortex and the inferior parietal lobule; and sustaining focus is tied to activation of the dorsolateral prefrontal cortex.

I will present two arguments against this way of thinking about meditation and the brain. The first argument shows that it is empirically unwarranted to map the cognitive functions involved in meditation practice in general, and mindfulness meditation in particular, onto particular brain areas or networks. The second argument shows that it is a conceptual mistake to superimpose mindfulness onto particular brain areas or networks.

Argument One

1. The proper level of description for any cognitive function (e.g., attention) is the whole, embodied subject or person, not brain areas or networks (it is the

embodied subject or person who is, properly speaking, attentive—not brain areas or networks). This is a conceptual point.

2. It is unlikely that there is a one-to-one mapping between particular cognitive functions and particular brain areas or particular neural networks (especially as currently identified using fMRI). This is an empirical point.
3. Therefore, it is empirically unwarranted to map the cognitive functions involved in meditation practice in general, and mindfulness meditation practice in particular, onto particular brain areas or the differential activation of particular neural networks.

In support of the first point, consider the cognitive function of attention. Christopher Mole (2010) has argued that the best way to conceptualize attention is not as a distinct process, but rather as a mode in which multiple cognitive processes unfold in relation to each other. His term for this mode is "cognitive unison." The idea is that performing a task—whether it be a perceptual-motor task or a mental one—draws on a variety of cognitive processes, which must operate together in a coordinated, coherent, and sustained way. Attention is not any one of these particular processes, nor is it some collection of them; rather, attention is the unison of their operation in the service of the task performance. As long as the processes continue to operate in unison, the agent is attentive. At the level of the brain, biased competition between neural activities (Desimone and Duncan 1995) or the phase synchrony of neuronal oscillations may facilitate cognitive unison (Engel, Fries, and Singer 2001), but cognitive unison happens at the level of the whole embodied agent performing a task. Just as there is no place in the orchestra where unison resides, so there is no place in the brain where attention resides.

Attention is the agent-level phenomenon of task-relevant, cognitive processes operating in unison.

It would be a mistake to think that task performance and cognitive unison are absent in focused attention meditation practice, in which one aims to keep one's attention focused on a chosen object, such as the in-and-out cycle of breathing or a visualized mental image. On the contrary, focused attention meditation can be analyzed as having a task structure in the relevant sense of the cognitive unison model. First, focused attention meditation requires placing and keeping one's body in a particular position in relation to one's immediate environment, which often includes the social setting of other practitioners. Second, it requires choosing an object of attention, such as the felt sensation of breathing, from one's experiential milieu. Third, it requires having one's interoceptive and cognitive resources operate in unison in order to focus on that object and return to it when one notices that one has strayed from it. These three requirements hold, too, for a purely mental object of attention, such as a visualized mental image. Indeed, the task demands on cognitive unison are greater in this case, because the object must be mentally sustained in order to be attended to, and it must be attended to in order to be mentally sustained.

The case of mindfulness or open monitoring meditation in relation to the cognitive unison model of attention is not fundamentally different. In this type of practice, mindfulness takes the form of "mere non-distraction" in relation to whatever arises, rather than selective focus on a particular object of attention (Dunne 2015). Nevertheless, the overall task structure, with its dynamic cycle of distraction versus non-distraction, remains in place. "Mere non-distraction" requires the unison of moment-to-

moment cognitive and sensorimotor processes, so cognitive unison is operative. From the perspective of the cognitive unison model, mindfulness or open monitoring meditation practice counts as a kind of attentional (cognitive unison) practice.

Given the model of attention as cognitive unison, mapping sustained attention onto a particular brain area, such as the dorsolateral prefrontal cortex, is a category mistake. In certain contexts, activation of that brain area facilitates attention, but it does not generate or constitute attention. Attention is not inside the brain; it is a way in which the whole person (due in part to his or her brain) is engaged in a task—the way of cognitive unison.

Let me turn to the second point of the argument. I rely here on work by Michael Anderson and Luiz Pessoa (Anderson, Kinnison, and Pessola 2013; Pessoa 2014). In an examination of large databases of neuroimaging data, they demonstrate that there is no one-to-one correspondence between particular brain regions and particular cognitive functions; rather, any given region is activated across a wide array of tasks. In addition, they argue that it is highly unlikely that there is any one-to-one mapping between cognitive functions and neural networks; thus understanding the brain in terms of networks rather than individual regions will not make the mapping between brain activities and cognitive functions one-to-one, rather than many-to-many.

For these two reasons—that cognitive functions are modes of activity at the level of the person or agent, rather than being particular brain processes, and that the mapping between brain regions or networks and cognitive functions is many-to-many—it is empirically unwarranted to map the cognitive constituents of meditation onto particular brain areas or networks in a one-to-one way.

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Argument Two

1. Mindfulness (however defined) consists in the integrated exercise of a host of cognitive, affective, and bodily skills in situated action.
2. Brain processes are necessary enabling conditions of mindfulness but are only partially constitutive of it, and they become constitutive only given the wider context of embodied and embedded cognition and action.
3. Therefore, it is a conceptual mistake to superimpose mindfulness onto the differential activation of neural networks.

The first proposition concerns the understanding of mindfulness. As noted earlier, “mindfulness” has no single meaning or definition in the Buddhist tradition. Buddhist modernists typically interpret “mindfulness” to mean “bare attention,” which they take to be direct awareness of sensations and thoughts as they occur, without making any judgments about them. Such “bare attention” is said to be “non-conceptual.” As a number of Buddhist scholars have noted, however, the traditional Pāli or Sanskrit word translated as “mindfulness”—*sati* (Pāli) or *smṛti* (Sanskrit)—has the sense of continually “bearing in mind,” “remembering,” or “recollecting” something (Bodhi 2011; Dreyfus 2011; Gethin 2011). According to the *Satipaṭṭhāna-sutta*, the scriptural authority on the cultivation of mindfulness in the Pāli canon, one strives continually to bear in mind the body, feelings, mental states, and mental factors (Anālayo 2003). This kind of mental practice requires attention, memory, and metacognition, as well as conceptual understanding, so it is hard to see how mindfulness in this sense could be non-conceptual. Nevertheless, as Buddhism grew and developed in India, Tibet, China, Japan, and Korea,

"non-dual" styles of mindfulness arose that depart from this "classical" conception of mindfulness in various ways (Dunne 2015; Sharf 2014b). In particular, these non-dual styles aim to induce a state in which the subject-object structure of ordinary experience subsides and mindfulness consists in non-conceptual, "mere non-distraction" (Dunne 2015).

From a cognitive science perspective, no matter which conceptualization of mindfulness and which style of mindfulness practice we choose, the first proposition holds: Mindfulness—whether conceptually structured as "bearing in mind," or as non-discursive "mere non-distraction"—consists in the integrated exercise of a host of cognitive, affective, and bodily skills in situated action (where this includes both formal practice sessions and the rest of everyday life).

To bring out the rest of the argument, consider the following analogy. Being a good parent consists in a host of emotional and cognitive skills and putting those skills into play in action. The skills and the behaviors based on them clearly depend on the brain—and improving them changes the brain—but they are not private mental states and do not exist inside the brain. Although it is possible that unique patterns of brain activity correlate with being a good parent in a given context, appealing to their presence would not explain what it is to be a good parent. Parenting does not exist inside the brain; it exists in the social world of human life. Furthermore, what counts as good parenting depends on the social context and the culture. So parenting simply is not visible at the level of the brain. To bring it into view, we need a wider perspective, one that takes in the context of the whole person as well as the social and cultural environment.

Exactly the same points apply to mindfulness. Being mindful consists in certain emotional and cognitive skills and putting those skills into play in the social world. Take the classical conception of mindfulness as “bearing in mind,” or what we could call “recollective attention.” Mindfulness as recollective attention includes attentive observation of the body, monitoring thoughts and feelings, and continually remembering to do these things from moment to moment so that you can bring your mind back to them when it wanders to something else. In cognitive science terms, exercising these mental skills requires being able to integrate awareness, attention, memory, and metacognition. Practicing mindfulness as “mere non-distraction” also requires coordinating these cognitive processes.

The cognitive and emotional skills that constitute being mindful, as well as the behaviors based on them, clearly depend on the brain—and improving them changes the brain—but they are not private mental states, and they do not exist inside the brain. Although it is possible that unique patterns of brain activity correlate with being mindful in a given context, appealing to their presence would not explain what mindfulness is. Mindfulness does not exist inside the brain; it exists in the social world of human life. Furthermore, what counts as being mindful depends on the social context and the culture. So mindfulness simply is not visible at the level of the brain. To bring it into view, as in the example of good parenting, we need a wider perspective, one that takes in the context of the whole person as well as the social and cultural environment. Trying to explain mindfulness or identify at the level of the brain is not only conceptually confused but also bad neuroscience.

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The idea that mindfulness is in the head feeds the current mindfulness mania. It reinforces selfish individualism—all you really need to deal with is your own mind, not the larger social setting. You can practice mindfulness in the privacy of your own office cubicle. The idea that mindfulness is a private practice reinforces consumerism by making mindfulness into a commodity that an individual can acquire.

Selfish individualism and commodification run counter to the whole point of the Buddhist tradition. Being mindful in any full or rich sense involves societal and environmental change and cannot be effected simply at the level of the individual mind or brain.

For this kind of critique to get at the roots of the problem, however, we need to track the looping effects at work in the encounter between modern Buddhism and the scientific study of meditation practices. My first aim has been to show that the modern mindfulness looping effect, whereby people increasingly come to envision themselves through the reified construct of the “mindful brain,” rests on the misguided idea that mindfulness is in the head, as well as on a conceptually confused and empirically inadequate understanding of the relationship between cognitive functions and the brain.

I turn now to my second aim, which is to sketch a different approach to the scientific study of meditation, one based on the cognitive science of embodied cognition. In particular, the “enactive approach” to cognition, which from its inception has been informed by Buddhist philosophical critiques of reification (e.g., Varela, Thompson, and Rosch, 2017 [1991]), offers a different framework for studying mindfulness meditation practices and for tracking the looping effects at work in the science-Buddhism encounter.

An Enactive Approach to Mindfulness Meditation Practices

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According to so-called 4E cognitive science, cognition is embodied, embedded, extended, and enactive. Thus 4E cognitive science provides a more comprehensive and productive framework for the scientific study of meditation than cognitive neuroscience does on its own.

The idea that cognition is embodied means that it depends directly on the body as a functional whole, not just the brain (Thompson and Cosmelli 2011). For example, studies of visual perception have shown that self-movement directly contributes to the content of visual experience (e.g., Wexler and van Boxtel 2005). When the visual stimulus is held fixed, so that the optic flow is exactly the same, the perception of three-dimensional structure (depth) differs according to whether the perceiver's body actively moves in relation to the stimulus or is passively moved in relation to it. Self-generated motor activity does not merely cause perception, but constitutes it by directly determining its content (see also Noë 2004).

Another example of embodied cognition comes from studies of gesture, language, and thought (e.g., Goldin-Meadow 2003; McNeil 2005). These studies have shown that gesture is not a mere accompaniment to speaking and thinking, but rather is an integral component of them. Gesture is thought in action.

The idea that cognition is embedded means that cognition—especially adaptive, intelligent behavior—relies heavily on the physical and social environment, which serves to scaffold (build and support) ongoing cognitive activity. The body's sensorimotor systems provide the medium through which cognition is embedded. In Randall Beer's (2014) words, "Behavior is a property of the entire coupled brain-body-environment

system and cannot in general be properly attributed to any one subsystem in isolation from the others" (138).

The idea that cognition is extended means that the environment, specifically material and symbolic resources and tools, is not only an outer scaffold for cognition, but also part of cognition itself when it is coupled to the brain and the rest of the body in the right way (Clark 2008; Malafouris 2013). One of Andy Clark's (2008) examples is an arithmetically adept accountant, who can solve problems quickly and reliably by copying numbers to a scratchpad as she works, rather than holding those numbers in her biological short-term memory. Clark argues that the scratchpad functions not as a mere prop or support for her calculations, but as a proper part of her cognitive activity**,** no less so than her biological memory.

Merlin Donald's (1991, 2001) version of this idea is especially relevant for my purposes here. He focuses on the environment of symbolic culture and argues that the human brain is a cultural brain: It is adapted to symbolic culture, and cannot develop and function properly as a cognitive organ unless it is embedded in a cultural environment. Donald proposes that biological memory systems and symbolic memory systems (writing, computers) constitute an extended, hybrid cognitive system. Human memory extends beyond what is contained inside the individual head. Cultural materials and processes are so densely intertwined with the brain's development and functioning that they function as a necessary part of human cognition. Donald further argues that this culturally extended cognitive system makes possible an overall expansion of human conscious capacity, enabling voluntary mental attention and metacognition—precisely the mental capacities required for mindfulness.

Donald's ideas connect to those of other cultural psychologists, notably L. S. Vygotsky and Michael Tomasello. Vygotsky (1978) proposed that all higher mental processes, involving metacognition, appear twice in development—first, socially, and second, internalized individually. Socially, a child participates with others in cultural practices and enacts a shared mental process; with repeated experience, the child internalizes the shared mental process so that it becomes individual. Tomasello (2014) builds on this idea. He argues that voluntary mental attention and metacognition are internalized forms of social cognition, dependent on being able to share intentions, imitate others, and share attention.

The idea that cognition is enactive is that in being embodied, embedded, and extended, it enacts or brings forth a lived world of meaning and relevance. Cognition is sense-making through embodied action (Thompson 2007; Varela, Thompson, and Rosch, 2017 [1991]).

The enactive approach has important implications for the scientific study of meditation. First, under many conditions, locating cognitive processes at the level of neural networks gets the boundaries of the cognitive system wrong. A better unit of analysis is the coupled brain-body-world system. To develop this point, I turn to "cognitive ecology," which uses the tools and perspective of 4E cognitive science to study "cognitive ecosystems."

Edwin Hutchins (2010), one of the principal scientists responsible for cognitive ecology, defines a cognitive ecosystem as a system of relationships among cognitive processes and structures in a community. His examples include preliterate Micronesian ship navigation and reading the sky as a sidereal calendar, and also modern naval ship

navigation (Hutchins 1995, 2008, 2011–2019). Using these cases, he argues that "all high-level cognition is a product of a system that includes cultural practices, habits of attending, [and] ways of using the body in interaction with one's material and social surrounds" (Hutchins 2008, 2013). Cultural practices (navigation) orchestrate cognitive capacities (attention, body awareness) and thereby enact cognitive performances (sea travel).

Hutchins calls attention to the perils of leaving out culture in the analysis of cognition. If two cognitive systems include different cultural practices, the two systems can have different cognitive properties (because of how cultural practices orchestrate cognitive capacities), even when the neural network activations are the same. For example, activation of the dorsolateral prefrontal cortex may be necessary for attention as cognitive unison, but the unison itself resides at the level of the whole, embodied agent performing a task (which is culturally constituted). Thus, it is a mistake to assume that neural activity per se suffices to determine the cognitive properties of the system.

These points apply to the practice of science. Scientific experimentation is a cultural practice. In the case of cognitive neuroscience, every experiment with humans deploys cultural practices in a richly structured, cultural context. Given that cultural practices orchestrate cognitive capacities in order to produce cognitive outcomes, attributing the observed cognitive outcomes in a neuroimaging experiment solely to the brains of the participants is unwarranted (Hutchins 2008, 2012).

These points also apply to meditation and to its scientific study. Contemplative practices require high-level cognition (attention, metacognition). Such cognition is a product of a system (a social community of practitioners) that includes cultural practices,

habits of attending, and ways of using the body. Cultural practices, such as ritual (religious or secular), orchestrate cognitive capacities (attention, mindfulness), and thereby enact meditation as a cognitive performance. Moreover, every cognitive neuroscience study of meditation employs cultural practices in a richly structured, cultural context. Given that cultural practices orchestrate cognitive capacities in order to produce cognitive outcomes, attributing the observed cognitive outcomes in a neuroimaging study of meditation solely to the brains of the participants is unwarranted.

Another important implication of the enactive approach is that the cognitive processes involved in meditation, especially mindfulness practices, are metacognitive and therefore need to be understood as internalized forms of social cognition. In a recent article, "Investigating the Phenomenological Matrix of Mindfulness-Related Practices from a Neurocognitive Perspective" (Lutz et al. 2015), the authors map mindfulness practices onto a three-dimensional "phenomenological matrix" whose axes are "meta-awareness" (awareness of the current contents of experience), "object orientation" (directed and sustained mental attention), and "dereification" (the ability to view the contents of experience as mere mental representations). All three capacities are metacognitive. Another recent article, "Reconstructing and Deconstructing the Self: Cognitive Mechanisms in Meditation Practice" (Dahl, Lutz, and Davidson 2015), differentiates meditation practices into three families or types. The "attentional family" involves regulating attention and meta-awareness. The "constructive family" involves reflection, perspective taking (seeing things from the perspective of another person), and cognitive appraisal or judgment. The "deconstructive family" involves self-inquiry.

Again, these mental capacities are metacognitive and therefore need to be understood as internalized forms of social cognition.

I belabor this point in order to emphasize that in practicing meditation, one is making use of social cognitive skills. Meditation is social, not just in the sense that it is a culturally orchestrated practice carried out in a social community (which, it bears emphasizing, is true even for hermits: they are socially supported in various ways, and the meaning they attach to their practice is socially and culturally constituted). In addition, the cognitive capacities that meditation employs are social. Therefore, to conceive of meditation as a kind of private introspection is wrong. Meditative introspection is not inner perception of an independent and preexistent, private mental realm; rather, it is metacognition (internalized social cognition) of socially constituted experience.

In making this point, I do not mean to imply (and it does not logically follow) that everything pertaining to awareness or consciousness is socially constituted. In particular, I leave open the question of whether awareness is intrinsically "reflexive," that is, whether all awareness involves a non-metacognitive awareness of itself, or to put it another way, whether all experiencing involves non-metacognitively experiencing that very experiencing. This question has been extensively debated in both Buddhist philosophy and Western philosophy (e.g., MacKenzie 2007; Strawson 2013; Thompson 2010). Dignāga (ca. 489–540 C.E.) argued that reflexive awareness (*svasaṃvedana*) is the non-conceptual awareness of being aware in being aware, and that it is required for being able to access one's mental states via metacognition (Kellner 2010). This concept of reflexive awareness is especially important for the philosophies underpinning non-dual

styles of mindfulness practice (Dunne 2015). I have argued for the importance of this concept elsewhere (Thompson 2010, 2015). But it is important not to confuse reflexive awareness with the meta-awareness and metacognitive monitoring practiced in mindfulness meditation. My point here is that these metacognitive processes are constitutively social. Even if it is possible to "rest" in "pure non-dual reflexive awareness," the minute one thinks about or conceptualizes this experience (which, of course, has already happened in describing it this way), one is in the domain of metacognition and hence social life.

In summary, from an enactive perspective, science needs to move from investigating mindfulness-related practices from a *neurocognitive* perspective to investigating them from a *cognitive ecology* perspective, and it needs to move from investigating *cognitive mechanisms* in meditation practice to investigating *culturally orchestrated cognitive skills* in meditation practice. At stake is nothing less than leaving behind the misguided idea that mindfulness is in the head.

This effort should also include a reflexive understanding of scientific experimentation as itself a cultural practice. To this end, I would like to make the following two recommendations. First, every scientific study of meditation should have a cognitive anthropologist and "lab life" ethnographer as part of the scientific team. Second, every scientific paper on meditation should have a reflexive treatment of the experimental investigation as a cultural practice that contributes to constituting the phenomena being studied.

Conclusion

Evan Thompson, “Looping Effects and the Cognitive Science of Mindfulness Meditation,” in David L. McMahan and Erik Braun, eds. *Meditation, Buddhism, and Science* (New York: Oxford University Press, 2017), pp. 47-61. SEE PUBLISHED VERSION FOR PAGINATION AND CITATION REFERENCES.

My concern here has been to call attention to the looping effects at work in the science of meditation and to offer an alternative perspective to correct their deleterious effects. The point is not to do away with looping effects; on the contrary, looping effects are always present and are constitutive of any organized human activity (Noë 2015). Precisely for that reason, we have an epistemological and ethical duty to track them. I hope to have shown how cognitive scientists and Buddhist scholars can work together on this task.

Notes