The Extended Mind

What’s in it for me? Discover how your mind extends far beyond your brain.

In 1998, two academics published a paper. It was called “The Extended Mind,” and it opened with a deceptively simple question: “Where does the mind stop and the rest of the world begin?” If your immediate response is something like “My mind is something inside my head, inside my brain, and the world is, well, everything else” – you’d be in good company. Plenty of philosophers and neuroscientists and psychologists would agree with you. But the authors of that paper – the philosopher Andy Clark and the cognitive scientist David Chalmers – would not agree with you. They argued that human cognition had become increasingly entangled with technology. Things like computers weren’t just tools our minds made use of. Not at all. These tools had become an integral part of our minds and how we think. And the paper didn’t stop there. It also explored how the mind extends through our bodies, our environments and our social relationships. These arguments sparked a lively debate between philosophers, neuroscientists, and psychologists. Since then, the extended mind theory has found its way into many different fields and there’s a growing body of research that seems to confirm it. In these blinks to The Extended Mind, by Annie Murphy Paul, you’ll be guided through some of this research and what it has to say about the human mind and how we do some of our best thinking. By the end of it, we hope you’ll see both your own mind and the minds of others in a new light. A note to readers: this Blink was written especially for audio. If you’re trying to decide whether to listen or to read, we highly recommend listening!

Our bodies store subconscious knowledge, and by tuning into our sensations, we can tap into this intelligence.

Imagine a Wall Street trading floor full of people, swarming around like bees in a field of monitors, frantically shouting sales orders into multiple telephones. It’s loud and intense. It’s a challenging environment for a human brain. In the middle of this mayhem is a man named John Coates. He’s been a trader for many years, and during this time he’s noticed something: the traders raking in the most cash don’t seem to be the analysis hounds or the data crunchers. The best traders aren’t the ones with the best educations or even the best ideas. The most successful traders seem to be the ones who know how, in key moments, to listen to their gut. Coates, who came to Wall Street with a PhD in mathematics from Cambridge – and who definitely knows a thing or two about data crunching and complex data analysis – has noticed the same thing with his own trades. Often, what on paper seems like a perfect trade – well-reasoned, logically solid and perfectly executed – fails miserably. It doesn't make any sense. At other times – and this is even stranger – he will have a sudden feeling, a momentary glitch in his consciousness, showing him – in his own somewhat mystical words – “another path into the future.” When he follows this gut feeling, sometimes even against his better judgement, he’s often rewarded. It’s as if his body is somehow one step ahead of him,

and all he needs to do is to listen. Eventually, Coates became so fascinated by this phenomenon that he decided to leave Wall Street and return to Cambridge to become a physiologist and neuroscientist. Since then, he's done research that suggests that his observation on the Wall Street trading floor was correct – that being in tune with your own body can make you smarter. Here's the science in a nutshell: Our senses are always active and they take in an ocean of data that never enters our consciousness. But that doesn't mean this data is lost. It's not. It's processed subconsciously by our brain. And when our subconscious mind notices patterns in this data, our body alerts us through sensations generated in our organs, bones, and muscles. If we're attuned to these signals, recognizing such a pattern around us might come with a slight speeding of the heart, or a twitch in the stomach. This physical, subconscious process is called embodied cognition, and our receptivity to it is called interoception. In 2016, Coates found that traders' success closely correlated with their ability to accurately detect the beats of their own hearts. In other words, traders with greater sensitivity to signals coming from their own bodies made more money than their less sensitive colleagues. On the trading floor, where opportunities vanish in a split second, access to this embodied cognition gave them an edge. Interoception isn't just valuable when trading stocks though. It can give you an edge in a lot of areas. And here's the good news: it's a skill that you can easily practice and become better at. One simple and surprisingly effective way to do so is through an exercise called a mindfulness body scan. The idea is simple. You sit down somewhere quiet, close your eyes and take a few deep breaths. Then you slowly move your awareness over your body, focusing on one body part at a time, all the way from your toes to the top of your head, noticing any sensations or feelings along the way. At the end of these blinks, as a little bonus, you'll find a guided mindfulness body scan, in case you'd like to try it out.

Moving our bodies can help us generate new ideas, sharpen our attention and improve memory.

OK, so we've learned that our bodies can store and process subconscious information and that we can tap into it by increasing our awareness of subtle bodily cues. But here's something you might be pleased to learn: you don't have to wait for subconscious information to rise into your awareness to give your cognition a boost. There's a far simpler way: moving your body! A study by the radiologist Jeff Fidler of the Mayo Clinic shows this in action. It compared the performance of two groups of radiologists examining the same X-ray images. The first group were seated at their desks, and the second examined the images while they were walking on a treadmill. The seated physicians caught about 85 percent of the irregularities in the images. The physicians on the treadmills caught 99 percent! So, what's going on here? Why would movement have this effect on the mind? Well, the answer is probably buried deep in our ancestral past.

Life for our early ancestors on the African savannah was one long journey after another. In order to find food and water, and to stay out of danger, they had to constantly be on the move. For them, thinking meant having heightened recall, an eye to subtle signs of danger in the environment, and the ability to make quick decisions, all of which were deeply connected to motion. This is what their brains evolved to help them with. OK, back to the modern world and those radiologists on the treadmills. The reason they outperformed their colleagues probably came down to the fact that the acuity of our

visual system heightens when we move forward, exploring an environment. In short, we become better at seeing things around us when we're walking. While few of us today hunt for food, or have to be constantly looking over our shoulders for sudden dangers in our environment, we still carry the same neural makeup as our earliest ancestors. And, as this example shows, our minds can still benefit from it. But there are other interesting connections between movement and the mind as well. For instance, when learning new things, making movements that match a concept has been shown to forge more durable neural pathways in the brain. A good example of this is children learning addition through hopscotch. Making our movements imaginative and dramatic can also help us come up with novel solutions to a problem. Jonas Salk, the creator of the polio vaccine, famously used to move about in his lab while imagining that he was a virus attacking an immune system, and vice versa. Now, you don't have to resort to hopscotch whenever you're learning something new, or stage imagined battles like Salk when you're trying to solve a problem. As we'll explore next, you can give your thinking a boost with something as small as a gesture.

Gesture is our first language, and we can use it to explore, form and convey complex notions.

Christian Heath, a communications researcher, collects tapes of people interacting. He's filmed and studied hundreds of interactions, and he's come to pay special attention to a particular body part: the hands. In one interaction, a doctor has prescribed a patient an anti-inflammatory drug. To explain the medication, he gestures downward three times. The patient nods, signaling that she understands even before the word "inflammation" has passed the doctor's lips. The patient in turn wants to tell the doctor that she's overwhelmed with bills and she begins moving both hands in circles, but before she can say that the bills have her going "round and round" the doctor begins nodding in sympathy. Heath and others doing similar research have come to a simple and powerful conclusion: in thought and communication, hands precede words. This concept, known as gestural foreshadowing, makes a lot of sense. After all, long before you learned to speak, you conveyed your needs and feelings through gestures. If you have kids, you'll know all about this. According to linguists, your distant ancestors' first language was likely a language of the hands. So, here's some more practical advice on how to tap into your extended mind. Next time you're speaking to someone, let yourself really gesture. Don't hold back. As your hands fly about, you'll likely notice that they will either mime the meaning you seek to express, or they'll act as markers of emphasis, pointing, underlining, highlighting. You'll also notice that your gestures often arrive at an idea before your conscious mind has found the right word for it. This is gestural foreshadowing in action. Which brings us to the most interesting part, which is this: by scouting ahead within your thoughts, your hands actually unburden your brain of some of its cognitive work, allowing your thoughts to move along even faster. In other words, through gesturing, you can speed up your thinking. Of course, there are other benefits to using gestures too. They help make the abstract physical and more comprehensible to your audience, who, like you, also speak hands and are ready to receive your message in both words and gestures. Before we move on to the next blink, let's just quickly recap some of the key ideas and concepts we've gone over so far. First up, embodied cognition. This is the subconscious ability of your brain to pick up patterns in the information coming from your senses, interpret that information and then generate

signals in your body that you might experience as physical sensations. Next, interoception. This is quite simply the activity of listening to these signals. It's that gut feeling that gives some traders an edge on the trading floor. Then there's this nifty concept: you can give your cognition a boost by moving your body. Remember those radiologists on the treadmills who outperformed their seated colleagues? Exactly. And last, we learned about gestural foreshadowing, which is just another way of saying that when we communicate with others, our hands have often already delivered the message before the words exit our mouth. The important point is that gestures not only improve communication; they can even ease your cognitive load and make you think faster. OK, that was it for the mind and the body. Now it's time to follow the extended mind one step further and out into the world. We'll start in 1940s New York.

Natural landscapes have a unique power to refresh and open our minds.

In the early 1940s, Jackson Pollock couldn't get his abstract paintings into the galleries of New York City. Worse, he struggled with depressive exhaustion and alcohol abuse. In 1945, he and his wife, the artist Lee Krasner, made an important decision. They left Manhattan for a rundown farmhouse on Long Island. From their new home, Pollock would look out on green fields and marshes, the light falling through the trees. He'd taste the salt air sweeping in from Long Island Sound. Then, he'd retreat into a barn that he'd converted into a studio. There, he tapped into something larger than himself and created paintings unlike any that had ever been seen before, paintings that were at once serene and wild. The restorative power of nature, and trees in particular, is the kind of common wisdom that's also backed up by an increasing amount of empirical evidence. A view of trees from a hospital room, for example, has been shown to reduce patients' need for painkillers. A walk through a wooded park, as opposed to a walk down an urban street, correlates with a decline in negative thoughts among people with depression. But nature's effect goes beyond relieving distress. As it turns out, being in nature can also give your cognition a boost. Researchers from the University of Chicago found that study participants who took a stroll through an arboretum scored 20 percent higher on a working memory test than participants who made a circuit through city streets. So, why is that? Well, nature's effect on our cognition may have something to do with its simultaneously busy and soothing visual field. It confronts the eye with a complex interplay of layers and light, and yet that complexity tends to form patterns. Think of fern leaves, ripples in water, or mountains in a range. Shapes within nature repeat, growing or diminishing in scale. Another study found that exposure to these natural occurring, repeating patterns, also known as fractals, sharpens our ability to navigate and judge distance. Which brings us back to Pollock and his paintings. Perhaps the breakthrough he experienced after moving to Long Island came down to experiencing the enlivening effect of nature's patterns. Inspired and liberated by the natural environment around him, he filled his landscape-sized canvases with fractals of splattered paint. But there's something else that may have caused this change in Pollock. Gazing out on Long Island Sound, gazing at this vast, wild piece of water, he may have felt a particular emotion – a feeling of awe. Awe opens the mind. Think of that particular brand of astonishment you feel when looking at, say, a big mountain or a deep canyon. It's a feeling akin to joy – but it's tinged with fear. It's a sensation of insignificance and possibility all mingled up, all mixed together, and this feeling of awe seems to have a mind-opening effect. According to research by Dacher Keltner, a psychologist at UC Berkeley, feelings of awe correlate with a drop in our dependence on

preconceived notions. But that doesn’t mean that nature is good for all kinds of thought. Sometimes you need a refuge.

The ideal built environment for sustained and challenging thought offers us refuge and empowerment.

Let’s stay on Long Island for a while longer and follow Pollock into his barn-turned-studio. It was here, after all, that he painted his most famous paintings; he wasn’t out in the fields with his brush. He was here, inside, in the refuge of his studio. Pollock’s studio was full of his paints, jugs of turpentine, sticks that he had collected, and of course his brushes and painting knives. Everything was arranged just so – in an order that reflected his highly personal needs. His canvases, in various states of completion, covered much of the walls around him. The door was closed, and the life of the village, not to mention the bustle of New York City, was far away. Pollock’s studio was undeniably his own. This is important. It cultivated a sense of privacy and ownership. And this is precisely the sort of environment that’s most conducive to sustained creative and analytical thought. One study in particular confirms this. Psychologist Craig Knight and Alex Haslam exposed participants to four types of office environments that differed in the amount of control the participants had over the space. Far and away, the highest gains in productivity and well-being came from an office that gave workers total freedom to decorate and arrange as they pleased. In short, a sense of ownership improved people’s work. Other research into office spaces has shown that a sense of privacy – so, for instance, a door and control over who enters – empowers workers, which in turn encourages creativity.

These findings do not bode well for the open-office plan that became popular toward the end of the twentieth century. In fact, evidence suggests that an office without walls, and where the workers have less autonomy, depletes concentration, erodes trust, and inhibits creative thought. As many office workers can tell you, reading and writing with conversation in earshot is exceedingly difficult. All those words, flying around, are competing for the same brain space. Likewise, the human mind finds it difficult to ignore a face that enters our field of vision. This tendency has evolutionary roots. Given our social nature, we can't help but glance at the eyes of passersby and follow their gaze for potential opportunity and danger. This constant monitoring of social information, and the sense that we too are being monitored, can be exhausting. And, a tired mind resorts to canned answers, stereotypes, and lazy logic. In other words, open offices make us less intelligent.

Such offices became popular in part because they’re cheaper, but also because they promised to boost collaboration. As we’ll see later, collaboration is immensely valuable to the extended mind. But first, we’ll spend a little more time on our own spaces and how they can reflect and encourage our thought processes.

When struggling with abstract concepts, transform ideas into objects.

The American journalist Robert Caro is in the middle of something big. Over the last four decades, he has completed four volumes of his biography of US President Lyndon

Baines Johnson. You know, Lyndon B. Johnson, the guy who signed the Civil Rights Act into law – this guy: At present, Caro is about 3,500 pages into the biography. His books are full of scrupulously researched detail, and yet it all goes down as smooth as a scotch and soda made with Cutty Sark whiskey – Lyndon Johnson's favorite drink. Point is, though: Caro's process involves reams of research and thousands of hours of interviews. And Caro, who is 85 years old, is still hard at work on volume five. So how the heck does he keep track of everything – let alone weave it into a compelling story? Well, to chart a course through this ocean of material, Caro pins notes to a corkboard that spans an entire wall of his office. He steps back and views it as a whole. He re-pins new trajectories and steps back, repeating the process until the impenetrable wall of data becomes a map. Only when he has a starting point, a path, and a destination, he begins to write. Caro's process comes with at least three beneficial strategies of the extended mind. First, he's offloading. In other words, he's transferring important information from his brain into his environment. He's putting it up on that corkboard, and lightening his brain's cognitive burden in the process. Second, by being able to step back from the board, he enjoys something called detachment gain. Detachment gain is just a technical term for that insight, that little bit of wisdom that we can sometimes get when we have some distance from our own thoughts. Third, he is taking advantage of interactivity. By turning ideas into physical objects, into notes on a corkboard, he can think not only with his brain, but with his eyes and his hands as well. By his own account, Caro couldn't write his epic biographies without a map across his wall. In its raw form, the research he compiles is simply too immense and daunting. Until he has it on the map, it simply overwhelms him. As we've already discussed, the talents of the human mind tend to line up with thinking that once helped us survive. Until very recently – evolutionarily speaking – the ability to manipulate objects and navigate through our surroundings put more food on the table than being able to juggle concepts. In other words, our spatial reasoning trumps our capacity for abstraction. So, you shouldn't feel any shame in relying on things to do your best thinking. Caro, after all, is frequently lauded as a genius.

Social interaction is a powerful driver of human intelligence.

Ok, we've covered a lot of ground in these blinks so far. We've learned some of the ways in which the mind extends through our bodies and through our environments. So here, in this final blink, we'll look at the last of the three areas Clark and Chalmers explored in their Extended Mind paper, namely, how the mind extends through our social relationships and through other human brains. To do that, I'm going to tell you the tale of Carl Wieman – and his teaching difficulties. As far as physicists go, Carl Wieman is top of the line. In 2001 he was awarded the Nobel Prize in Physics for his part in creating an extreme state of matter known as the Bose-Einstein condensate. In short, Wieman excelled as a physicist. But as a teacher he often failed miserably. The problem was this: No matter how hard he tried, he couldn't get his undergraduate students to think about physics the way that he himself thought about physics. Their ability to solve problems remained on a rudimentary level at best. While many of them knew a lot of physics, their thinking was rigid and narrow. When it came to coming up with their own hypotheses and ways to test them, they struggled. Wieman was at a loss. But then something hit him. It was an observation he had made about the graduate students who joined his lab to do their PhDs. In the beginning, they resembled the undergraduate students – that is, they knew a lot of physics but struggled to think independently. But

gradually, their thinking would transform, and suddenly they were brimming with innovative ideas and creative ways of testing their hypotheses. So, the question was: Why? What had changed? Then it hit him. The PhD candidates spent a lot of time discussing and debating with each other. It was in these discussions that their own minds started generating important new angles and approaches. The way he was teaching the undergraduates physics had none of these elements. So, he decided to change things up. Instead of just giving traditional lectures, he divided his undergrads into groups and challenged them to solve a specific problem together. If they were going to find an answer, they'd have to hash it out with each other. To solve the problem, the students had to find out what the other students knew. In compiling that knowledge, they filled in each other's gaps, occasionally taking the role of teachers, which, as any teacher can tell you, is a great way to learn a subject. The students motivated one another and kept each other focused. In the event they disagreed, they had to debate and push each other towards finding a solution. Research into this method of teaching, now commonly known as "active learning," shows that it's remarkably effective, especially in the STEM fields. Not only does it increase the students' understanding of the topic; it also increases their exam scores and significantly lowers drop-out rates. Maybe this shouldn't surprise us. After all, we're deeply social creatures and it makes sense that we evolved to think together with other humans.

Mindfulness body scan exercise

This blink contains a guided mindfulness body scan. If this sounds like something you'd like to try, please switch over to audio. You can also come back to it later, if you'd like.

Final summary

Ok, those were the blinks to The Extended Mind, by Annie Murphy Paul.
Whether you're now an extended mind convert or not, if you take away only one thing from these blinks, let it be this: Your mind is not some lone ranger inside your skull, disconnected from the rest of the world. It extends far beyond your brain, through your body, through the environment and the objects around you and through other people. From high frequency traders picking up on subtle bodily cues to guide their decisions; to famous artists and scientists using their environments to get creative and solve problems; to physics students developing truly independent and novel ways of thinking through interacting with other students: The human mind does its best work when it extends out of the brain and into the world.