

Socially Wired

HOW CULTURE SHAPES OUR BRAINS



MATTHEW W. SCHELKE

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*For my parents, Charles and Linda,
and for Susan*



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FIGURE 0.1 A lateral view of the human brain showing the four main lobes, the basal ganglia, the hippocampus, and the amygdala. From upper left clockwise, the lobes are the frontal, parietal, occipital, and temporal. Structures within the dashed outline are in the interior of the brain; they include the basal ganglia (*white*), the hippocampus (*elongated gray structure*), and the amygdala (*round gray structure just anterior or to the left of the hippocampus*). Copyright © 2025 Tina Pavlatos.



FIGURE 0.2 A medial view of the human brain showing the same four lobes but with medial structures indicated. In the frontal lobe, the large light gray area located anteriorly is the medial prefrontal cortex (mPFC), and the dark gray area just below it is the orbitofrontal cortex (OFC). The three black regions in the center are elements of the motivational and reward circuitry discussed in the text: from left to right, the nucleus accumbens and septal region (*left*), the hypothalamus (*center*), and the ventral tegmental area in the midbrain (*right*). The hippocampus and amygdala are again indicated for reference.

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INTRODUCTION

An amateur chef who stopped making his signature Dominican dishes and instead devoured entire tubs of supermarket ice cream. A journalist who submitted her articles well before the morning edition deadline but struggled to finish essays in college. An art lover who was removed by museum security for playing with the sculptures on display.

These are all patients with neurological illnesses, but they are also humans deeply engaged in their social and cultural worlds. We will meet all three and many others in the following chapters; it is these patients I saw as a neurologist in the hospital and clinic who inspired me to write this book.

There is a gap between the scientific frameworks we use to understand the human brain and behavior and the variety of symptoms I see in everyday practice. Both the scientific literature and the popular imagination portray the brain as the basis of behavior, and much current research seeks the sources of our actions in the flow of information through neurons or in the relationship of brain regions to capacities like memory, decision-making, or language. In this view, the brain's wiring leads us to behave in particular ways.

The basic conviction of this book is that while neuroanatomy plays an important role in human behavior, explaining behavior by reference to neural wiring is at best incomplete. Even if we had a full map of the brain—what neuroscientists call a “connectome”—we would face two problems. First, the connectome for every individual is not only different from that of any other individual but changes across the course of a person’s life. While the main regions and fiber tracts are grossly the same, the aspects of our connectomes that are most important for behavior are constantly changing with experience. This leads to the second, and more important, problem of understanding how the connectome came to be that way. For humans, this critically depends on social and cultural experiences: we are *socially* wired.

Patients and families also see it this way. The family of Eduardo, the Dominican American chef, is alarmed not because he has impairments of executive function or his score on the Montreal Cognitive Assessment (MoCA) is a 23 but because he cannot maintain friendships and has replaced his passion for cooking with supermarket ice cream tubs. Ericka, the journalist we will meet in chapter 2, is concerned not about what we clinically call impaired response inhibition but rather how particular environments like the newsroom allow her to thrive after she struggled in high school and college. Engaging with patients and their families made me realize that our typical psychological and neural languages often seem like artificial ways of describing the actual experience of struggling with a concrete practice in the world.

These sorts of stories have been explored elsewhere, especially in the rich tradition of case studies from Edward Living to Alexander Luria to Oliver Sacks. While illuminating, the focus of case studies on unique or bizarre individual experiences often lacks a broader framework. How do our social and cultural worlds transform our brains? What is the nature of the interac-

tion between neural networks and cultural practices? This book attempts to answer these questions not by exploring rare and unusual cases but by trying to see the everyday experiences of typical patients in a new light.

The chapters that follow all begin with the experiences of neurological patients and then unravel the ways in which neural pathways and the social world interact to form those experiences. While all the chapters are rooted in my practice as a clinical neurologist, I believe that one cannot understand these experiences adequately without the insights of a variety of disciplines: neuroscience, psychology, and cognitive science, of course, but also sociology, anthropology, and philosophy. These provide the broader framework that enable us to examine why patients with the same illness may have extraordinarily different experiences of the world. The brain is important, but we need to understand how brain neuroanatomy and cultural experience shape each other.

This being said, I am not formally trained in any of these adjacent fields and I cannot do anything close to justice to their scholarship. Any discussion in the chapters that follow is at best a selective use of material that I have found illuminating to highlight particular aspects of the brain-culture interface. Similarly, my use of terms such as *society*, *culture*, and *the social environment* does not engage with the highly contested definitional debates that are ongoing in these areas; this book is not a contribution to those fields. Rather, I use these terms more or less interchangeably to refer to the broader social and cultural environment that forms the context for any human action. As we explore the neurology, different aspects of this environment will come into focus depending on the clinical context.

I am eager to introduce you to the patients, but before we begin, I need to lay some groundwork and highlight this book's

broader perspective. I want to start by showing how the usual model of the brain as a collection of relatively autonomous modules is incomplete, crucially ignoring the social and cultural matrix of our actions. The crux, of course, is how to link this matrix to the individual and the brain, and this leads to the basic framework of the book: its focus on *socially situated intentional action*. Our brains enable us to participate in goal-directed activities, but the social and cultural practices that form the context of those activities in turn shape our brains. The remainder of the book is about how this happens.

BLAMING THE BRAIN

“That patient is delirious because he has Alzheimer’s disease.”

“Her glioma is in the area that controls executive function.”

“I just saw the frontal lobe stroke patient with aphasia.”

Statements like these are heard every day in neurologic clinics and hospitals. While they can function as a useful shorthand to indicate the immediate medical concerns, they also reflect a way of thinking about the brain, illness, and behavior that cannot do justice to the variety of symptoms even with seemingly identical neuroanatomical lesions. In this section, I explore what this tacit model is; in the next section, I introduce a different way of understanding the brain and social experiences that addresses its shortcomings.

The tacit model is that the brain contains a collection of regions, modules, or networks that generate particular kinds of behavior and that injury to these components can explain the symptoms we see in neurological patients. Alzheimer’s disease is causing the delirium; there is an area that controls something called “executive function”; the stroke is affecting a dedicated

language module, hence the aphasia. Francis Crick called the basic idea that our experiences arise from dedicated brain regions the “astonishing hypothesis” in 1994, though it had been a largely taken-for-granted part our scientific landscape for the better part of the twentieth century.¹

It is worth pausing for a moment to suggest just how pervasive this model is. Most overtly, it is a central doctrine in neurological training and in the popular image of neurological illnesses. Generations of residents have learned that the first step of clinical reasoning is to “localize the lesion,” using the combination of symptoms and examination to pinpoint the site of injury to the nervous system. This exercise often forms a centerpiece of teaching rounds and case conferences, with students, residents, and attendings vying for the most ingenious anatomical logic. Popularly, floods of books and articles are published on topics like the “executive brain” located in the frontal lobes, the importance of single transmitters like oxytocin in explaining a wide range of social behaviors, or the neural networks involved in the enjoyment of art.² All are based on a common theme: There is some designated neural circuitry that enables us to reason, express ourselves, contemplate, dance, sing, and live our lives as humans.

Outside of the clinic, basic neuroscience research has introduced nuances to this approach but still gives the impression of relatively discrete anatomical functions. Instead of attributing behavior to discrete modules or transmitter systems, much recent work has focused on widely distributed networks and dynamics of neurons spread across the brain. A distributed network for theory of mind allows us to understand the behaviors of other people, for instance, or a population of neurons across the brain drives thirst.³ Even if not explicitly stated, there is still the sense that understanding a behavior is the same as knowing more about the events occurring within the skull.⁴

For a neurologist with real-world experience, however, this model is at odds with what we see in the clinic every day. First, any neurologist is familiar with many patients whose lesion(s) and deficits do not correlate well: the teacher with Alzheimer's who can still enliven trigonometry for her students; the grandfather who just had a left frontal stroke but continues to regale his grandchildren with their favorite stories. The pathology can manifest in various ways depending on the individual.

In neurology, we often invoke the concept of "reserve" to explain such cases.⁵ The idea is that a certain combination of neural plasticity, life background, educational level, and other factors can preserve function even in patients with significant neurological illnesses. Depending on their reserve, patients with the roughly the same sort of brain injuries can display very different levels of function. Some may have normal or nearly normal memory and language skills; others may be amnesic or aphasic. Some may require twenty-four-hour assistance at home, others may be able to return to work.

While reserve is an essential concept in neurology, it is too global to capture many everyday questions. Why is this patient's memory worse at home and better at work, or vice versa? Why does this patient's speech seem so impaired in the clinic when they were just able to have a normal dinner party with friends? Why does this patient's "delirium" involve pleasant memories of his childhood in Santo Domingo, but this other patient feels that the hospital team is part of a violent conspiracy against her? Behavior and experience come in all kinds and forms, not just overall preservation and loss.

Second, the brain regions themselves are involved in many different behaviors and not limited to a single or even a few "functions."⁶ As we will see in chapters 4 and 5, for example, the frontal and parietal regions, usually described as a "language network,"

are actually involved in everything from language to multistep tasks to music and culturally learned motor skills. We identify them as “language areas” simply because language was historically the earliest identified and most commonly tested activity involving these regions, but this does not mean it is an intrinsic function of these regions.⁷

In other words, the model of brain areas giving rise to specific forms of behavior cannot account for the variety of symptoms we see in the clinic or the variety of behaviors in which any given region or network is involved. Instead, we need to take a more holistic perspective. The role of any individual region or network depends on what is happening in the brain as a whole, and what the brain is doing as a whole depends on the context of the individual’s behavior. For humans, this context is primarily social and cultural: Our brains have been shaped by years of social interactions, and almost all of our activities take place within a cultural matrix. Indeed, as tragic cases of childhood social deprivation suggest, children with anatomically normal brains at birth but a dearth of social interaction early in life can be cognitively devastated.⁸ The social world is the crucial milieu in which a chunk of gray and white tissue becomes a human brain.

Patients often seem to have an intuitive grasp of this. Many neurological symptoms involve not just the patient and their body but relationships between patients and other individuals, and are often interpreted by the patients themselves as modulated by their social world. A father’s aphasia from the stroke was mild because “he’s the neighborhood gossip and will still talk to anyone”; Greg’s imbalance seems to evaporate when he steps onto the dance floor with his friends. Patients locate their symptoms and illnesses in themselves as social beings, not just in their brains.

However, even when the surrounding social and cultural context is incorporated into descriptions of brain function, that

context is often relegated to the role of simply providing “inputs” to the neural systems rather than fundamentally shaping the nature of the neural activity. For example, cultural learning is often described as a form of imitation, in which the brain has to decipher the actions of others by mapping them onto its own motor system. There is a barrier between what happens “inside” the individual brain and “outside” in the sociocultural environment, which makes the nature of their interaction a “mystery” that can only be solved by discovering and invoking networks like the mirror neuron system that map one to the other.⁹ However, these networks are themselves culturally shaped, and the barrier between inside and outside is far more porous than one might imagine. As we will see in chapter 3, for instance, imitation and the mirror neuron system are not innate mechanisms of enculturation but instead arise from networks that have already been shaped by early social and cultural experiences.¹⁰

At the same time, the context cannot be everything. Our brains do have a basic anatomical organization that affects how these social and cultural experiences shape our behavior. We do not just learn from any experience indiscriminately; some experiences or aspects of our experience are more formative than others. One of the errors of a purely social approach to behavior is that it misses the way the brain is structured to select from the mass of incoming inputs it receives every second, which in turn makes specific aspects of social interaction neurologically salient.¹¹ But if this is not a matter of dedicated modules or networks, then what is the relevant anatomy?

The framework I propose in this book is rooted in *intentional action*. Perhaps the most important function of our brain, and that of all our vertebrate ancestors, is generating goal-directed behaviors like finding food or avoiding predators. The vertebrate brain has specific networks that enable these behaviors, but in

humans these networks are uniquely shaped by social practices. We don't just seek out food, but follow and hand down old family recipes; we don't just fight for status in a dominance hierarchy, but play sports and games with elaborate rules and scoring systems. Our possibilities for action depend on the dynamics of the neural networks but, at the same time, on how these networks have been transformed through our cultures. Before turning to the patients, I want to describe exactly what I see as the major components of this system and how they interact.

CLIPPING ON AND TAKING OFF

Anyone who has experienced a zip line knows they are thrilling. You clip your carabiner onto a thin wire and then fly through the forest or down from a peak to an unfamiliar destination. I think this is a good metaphor for how our brains become enculturated. Human brains are specialized to include basic mechanisms that allow us to engage with others and participate in shared activities—"clipping on" to the social wire—but then these interactions and the larger practices of our culture take us to destinations that are impossible to see in advance. The difference is that, unlike the zip line, the journey is never straight and there are infinite possible branch points along the way. This means that when the clip is loosened, as happens in neurological illness, it's not always a matter of staying on or falling off but often about switching to a different trajectory.

What forms our neurological clip? Before answering this question, we need to understand some fundamental aspects of our nervous system. Our brains are still built on the basic blueprint of the vertebrate nervous system, which has been conserved over five hundred million years.¹² The function of this

nervous system, taken as a whole, is to guide our interactions with the world. In particular, it is to generate what the neuroscientist Walter Freeman described as *intentionality* or *intentional action*: action directed toward a goal, whether the organism is aware of the goal or not.¹³ Our ancestor the lamprey, for example, has one of the simplest vertebrate nervous systems but can perform a variety of seemingly goal-directed behaviors, including avoiding predators and searching for live fish on which to prey. Humans obviously have a much wider range of intentional actions, though we also tend to avoid predators and some even gravitate toward raw fish on occasion.

Humans engage in intentional actions throughout our lives.¹⁴ From birth, infants look, touch, kick, and flail, and learn how to support all of these actions against the pervasive force of gravity. What they find at the end of their gaze or limb depends greatly on their surroundings, and, through repeated interactions with the world, their actions begin to take on more precise trajectories toward specific objects and ways of manipulating them. As we mature, these sorts of actions become shaped into the culturally specific intentional action patterns of our various social roles, which can extend over long periods of time and involve extensive planning, from imagining one's next home to creating a new dish in the kitchen. We will next break down what this process entails, first in vertebrates then in humans.

In order for the brain to generate intentional action in the world, a few components need to be present. First, there must be a way to *motivate* action, broadly understood. There must be something that allows an organism to act rather than not, and to act in a particular direction—generally speaking, some variant of approach or avoidance. Motivation is much more general than the popular use of someone being “motivated” or not,

though there is some overlap of meaning. Anytime I do anything, whether reaching for my coffee cup or planning a lifelong project, motivation shapes the basic intensity and direction of my behavior. When we familiarly call a person “motivated” or “driven,” this just means that their intensity and direction are a little more obvious than the average in their culture.

Second, there must be a way for the organism to respond in real time to changes in their situation. If a predator is chasing game through the forest, for example, it needs to not only maintain the overall trajectory toward the prey but also dodge any obstructions and shift direction in relation to the target. These adjustments may be very different from chasing game across an open savannah, though the general motivational direction (“toward dinner”) is similar. Many of these adjustments are unconscious and extremely rapid, like maintenance of posture or narrowly avoiding incoming objects.

Finally, these two systems need to interact constantly in order to allow the motivational context to shape the ways in which the organism responds to its environment (figure 0.3). During the forest chase, the animal avoids trees and rocks as obstacles because its current intentional action is aimed at the game; if the weather suddenly turns, it might approach those same trees and rocks as possible shelter. The ecological psychologist James Gibson called these sorts of action possibilities *affordances*: A rock, for example, affords stepping on, picking up to throw, or adding to a wall, among other possibilities.¹⁵ The interaction between these systems allows motivation to shape the affordances that are active at any given time. Chasing after game requires a very different set of affordances than looking for shelter. This term is one of the few technical words in the book, but it is necessary because it so nicely fuses the perception and action dimensions