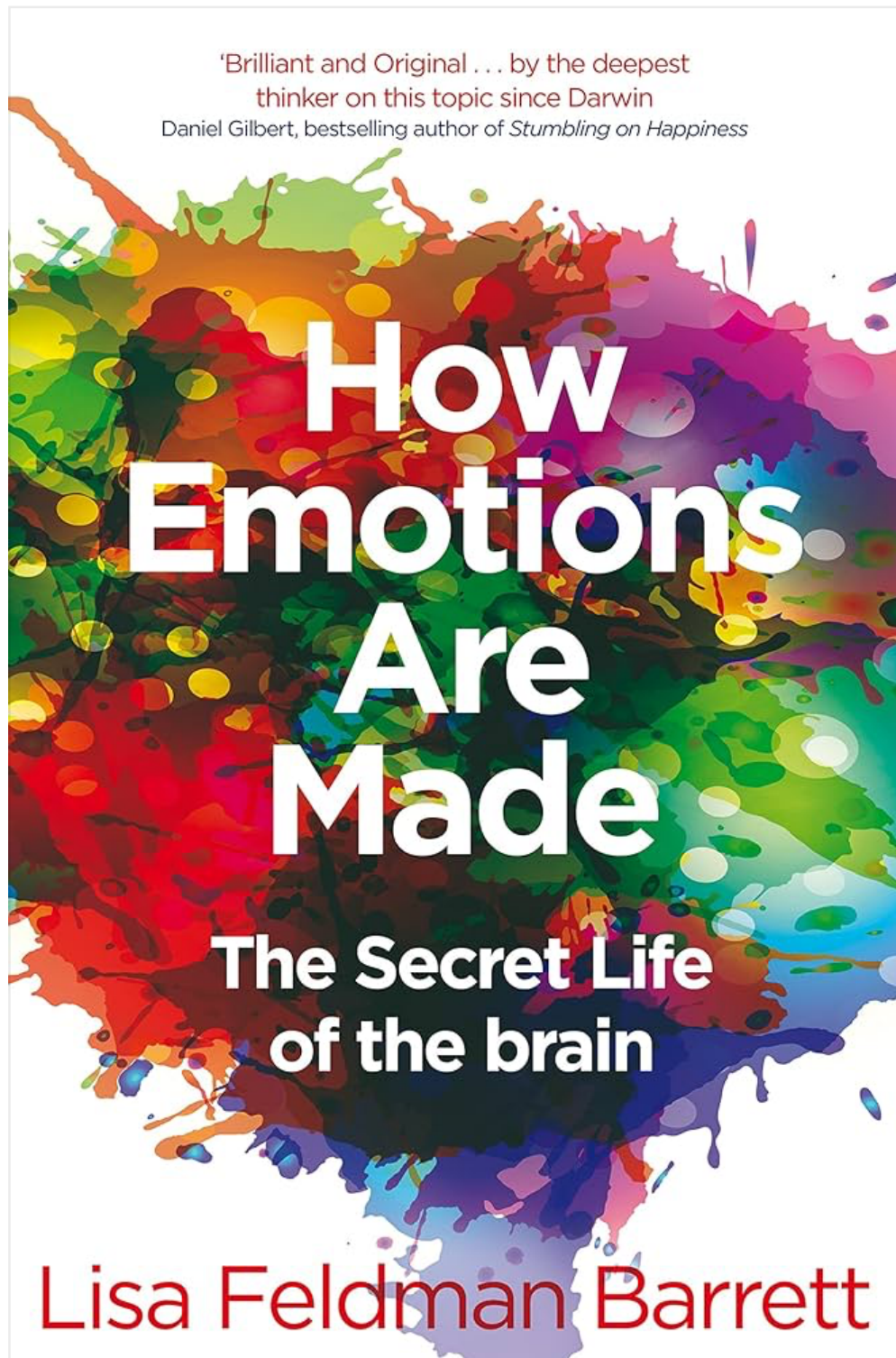


How Emotions Are Made: The Secret Life of the Brain (2017) - Lisa Feldman-Barrett, PhD



About Dr. Lisa Feldman Barrett

Among the top 1 per cent most-cited scientists in the world for her revolutionary research in psychology and neuroscience. She is a University Distinguished Professor at Northeastern University with appointments at the Massachusetts General Hospital and Harvard Medical School. Dr. Barrett was awarded a Guggenheim fellowship in neuroscience in 2019, and she is a member of the American Academy of Arts and Sciences and the Royal Society

of Canada. She is the author of *How Emotions Are Made*. She lives in Boston.

What follows are quotes from the book above. These quotes stood out to psychotherapist Emil Barna in his reading of the book in 2024. They are not meant to be exhaustive nor representative of the entire book. All quotes are to be read in this context and must not replace medical and/or other professional advice. Note: Any typographical errors occurred through the transcription process and do not reflect what may be found in the book.

Note also: Beneath various quotations from the book, I may have added my own comments/things. These will always be in bold italics. Further, where I have made bold text from the quotations below, it's to emphasise a point. My emphasis does not appear in the original text.

Blurb

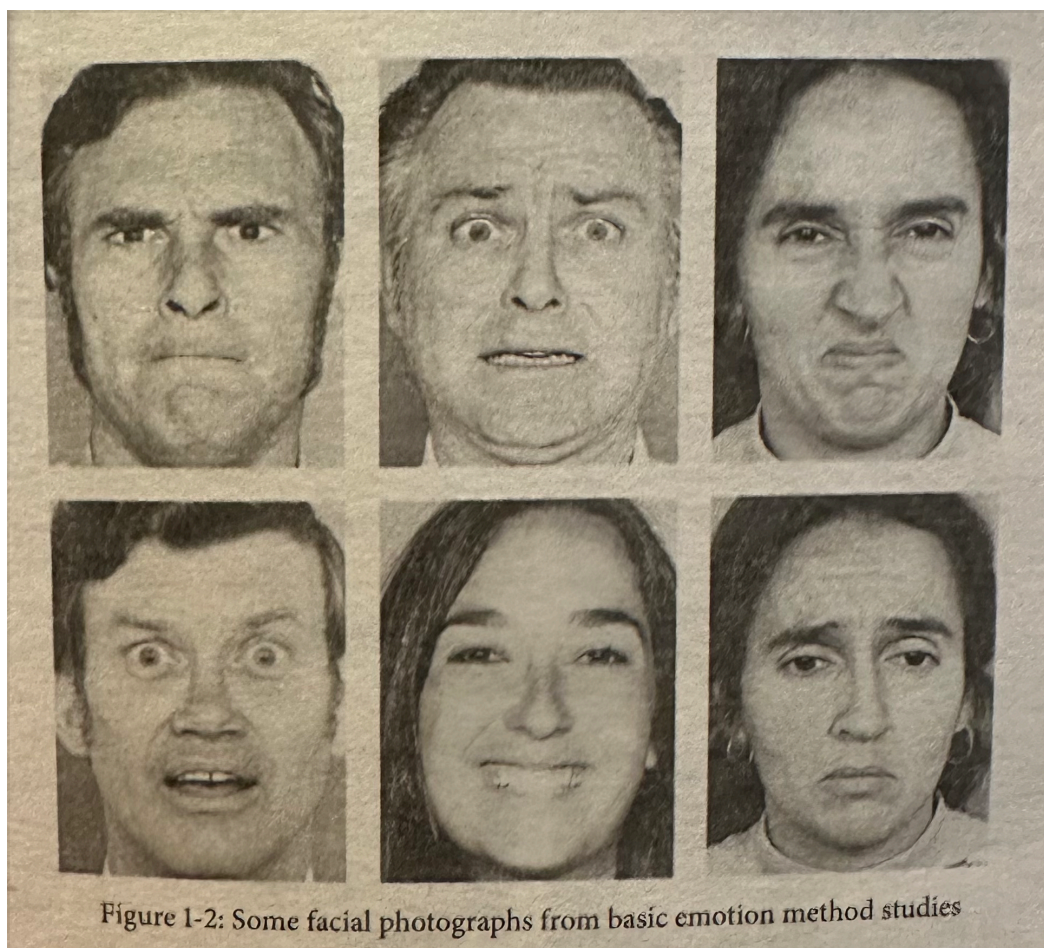
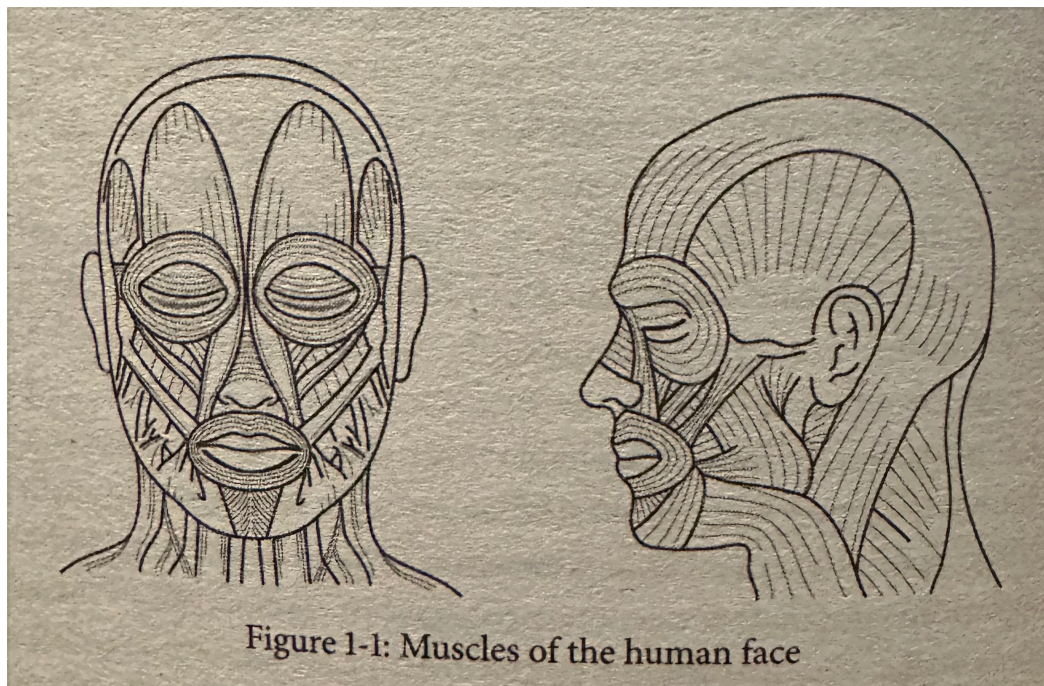
Pioneering psychologist and neuroscientist Lisa Feldman Barrett draws on the latest scientific evidence to reveal a radical truth - that emotions aren't universally pre-programmed in our brain and bodies, as common sense tells us. Shockingly, they are unique experiences and are formed out of our individual environment and personal history. From lust to anger, relationships, health, parenting and even national security, How Emotions Are Made finally explains why this matters, what it means for what you feel and why you feel it.

Introduction: The Two-Thousand-Year-Old Assumption

"emotions are not built-in but made from mere basic parts. They are not universal but vary from culture to culture. **They are not triggered; you create them.** They emerge as a combination of the physical properties of your body, a flexible brain that wires itself to whatever environment it develops in, and your culture and upbringing, which provide that environment."

Chapter 1: The Search for Emotion's "Fingerprints"

"The human face is laced with forty-two small muscles on each side. The facial movements that we see each other make every day — winks and blinks, smirks and grimaces, raised and wrinkled brows — occur when combinations of facial muscles contract and relax, causing connective tissue and skin to move. Even when your face seems completely still to the naked eye, your muscles are still contracting and relaxing."



"Fear takes no single physical form. Variation is the norm. Likewise, happiness, sadness, anger, and every other emotion you know is a diverse category, with widely varying facial movements."

"The search for fear in the brain is an instructive example because for many

years, scientists have considered it a textbook case of localizing emotion to a single brain area — namely, the amygdala, a group of nuclei found deep in the brain's temporal lobe. **The amygdala was first linked to fear in the 1930s** when two scientists, Heinrich Klüver and Paul C. Bucy, removed the temporal lobes of rhesus monkeys. Lacking an amygdala, these monkeys approached objects and animals that would normally frighten them, like snakes, unfamiliar monkeys, or others that they'd avoided before the surgery, without hesitation. Klüver and Bucy attributed these deficits to an "absence of fear." Not long afterward, other scientists began studying humans with amygdala damage to see if those patients continued to experience and perceive fear. The most intensively studied case is a woman known as "SM," afflicted with a genetic disease that gradually obliterates the amygdala during childhood and adolescence, called Urbach-Wiethe disease. Overall, SM was (and still is) mentally healthy and of normal intelligence, but her relationship to fear seemed quite unusual in laboratory tests. Scientists showed her horror movies like *The Shining* and *The Silence of the Lambs*, exposed her to live snakes and spiders, and even took her through a haunted house, but she reported no strong feelings of fear. When SM was shown wide-eyed facial configurations from the basic emotion method's set of photos, she had difficulty identifying them as fearful. SM experienced and perceived other emotions normally. Scientists tried unsuccessfully to teach SM to feel fear, using a procedure commonly called fear learning. They showed her a picture and then immediately blasted a boat horn at one hundred decibels to startle her. This sound was meant to trigger SM's fear response if she had one. At the same time, they measured SM's skin conductance, which many scientists believe to be a measure of fear and is related to amygdala activity. After many repetitions of the picture followed by the horn blast, they showed SM the picture alone and measured her response. People with intact amygdalae would have learned to associate the picture with the startling sound, so if just shown the picture, their brain would predict the horn blast and their skin conductance would jump. But no matter how many times scientists paired the picture and the loud sound, SM's skin conductance didn't increase when viewing the picture alone. The experimenters concluded that SM could not learn to fear new objects. Overall, **SM seemed fearless, and her damaged amygdalae seemed to be the reason. From this and other similar evidence, scientists concluded that a properly functioning amygdala was the brain center for fear. But then, a funny thing happened. Scientists found that SM could see fear in body postures and hear fear in voices. They even found a way to make SM feel terror, by asking her to breathe air that was loaded with extra carbon dioxide.** Lacking the normal degree of oxygen, SM panicked. (Don't worry, she was not in danger.) So SM could clearly feel and perceive fear under some circumstances, even without her amygdalae. "

The case above is covered, too, in James Nestor's Breath where he chats about how the emotion of fear isn't as clear cut as we thought we understood.

Chapter 2: Emotions Are Constructed

"Simulations are your brain's guesses of what's happening in the world."

"In every waking moment, you're faced with ambiguous, noisy information from your eyes, ears, nose, and other sensory organs. **Your brain uses your past experiences to construct a hypothesis — the simulation — and compares it to the cacophony arriving from your senses.** In this manner, simulation lets your brain impose meaning on the noise, selecting what's relevant and ignoring the rest."

"emotions are made, not triggered; emotions are highly variable, without fingerprints; and emotions are not, in principle, distinct from cognitions and perceptions."

"our present mood, emotions, and somatic sensations (generated for whatever reasons) profoundly influence what we are "remembering." Remembered images and thoughts that appear in our field of awareness are evoked and (unconsciously) selected to match our current emotional state. Our current moods and sensations play a key role in how we remember a particular event—they structure our evolving relationship to these "memories," as well as how we deal with and reconstruct them anew. do not shine forth from the face nor from the maelstrom of your body's inner core. They don't issue from a specific part of the brain. No scientific innovation will miraculously reveal a biological fingerprint of any emotion. That's because **our emotions aren't built-in, waiting to be revealed. They are made. By us. We don't recognize emotions or identify emotions: we construct our own emotional experiences, and our perceptions of others' emotions, on the spot, as needed, through a complex interplay of systems.** Human beings are not at the mercy of mythical emotion circuits buried deep within animalistic parts of our highly evolved brain: we are architects of our own experience."

Chapter 3: The Myth of Universal Emotions

"people see an emotion in a face only if they possess the corresponding emotion concept, because they require that knowledge to construct perceptions in the moment."

"There is one emotion category that people seem able to perceive without the influence of emotion concepts: happiness. Regardless of the experimental method used, people in numerous cultures agree that smiling faces and laughing voices express happiness. So **"Happy" might be the closest thing we have to a universal emotion category with a universal expression.** Or it might not. For one thing, "Happiness" is usually the only pleasant emotion category that is tested using the basic emotion method, so it's trivial for subjects to distinguish it from the negative categories. And consider this fun

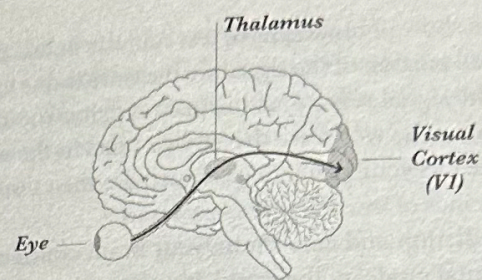
fact: the historical record implies that ancient Romans did not smile spontaneously when they were happy. The word "smile" doesn't even exist in Latin. **Smiling was an invention of the Middle Ages, and broad, toothy-mouthed smiles (with crinkling at the eyes, named the Duchenne smile by Ekman) became popular only in the eighteenth century as dentistry became more accessible and affordable.** The classics scholar Mary Beard summarizes the nuances of the point: *This is not to say that Romans never curled up the edges of their mouths in a formation that would look to us much like a smile; of course they did. But such curling did not mean very much in the range of significant social and cultural gestures in Rome. Conversely, other gestures, which would mean little to us, were much more heavily freighted with significance.*

"Not all cultures understand emotions as internal mental states. **Himba and Hadza emotion concepts**, for example, **appear to be more focused on actions**. This is also true of certain Japanese emotion concepts. The Ifaluk of Micronesia consider emotions as transactions between people. To them, anger is not a feeling of rage, a scowl, a pounding fist, or a loud yelling voice, all within the skin of one person, but a situation in which two people are engaged in a script — a dance, if you will — around a common goal. In the Ifaluk view, anger does not "live" inside either participant.

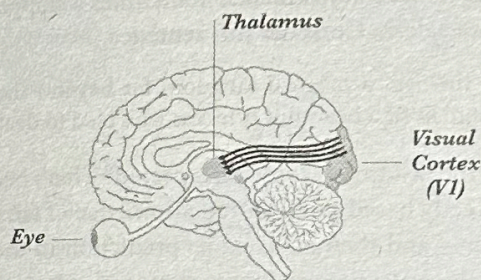
Chapter 4: The Origin of Feeling

"Which combination of my past experiences provides the closest match to this sound, given this particular situation with its accompanying sights, smells, and other sensations?"

This is the question we all ourselves, most often subconsciously, to make sense of the experience before us.



input from
the world of
sensory data



predictions from
other networks in
the brain trying
to make sense
of the input

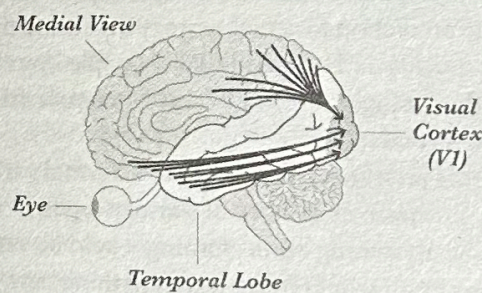


Figure 4-1: Your brain contains complete maps of your visual field. One map is located in your primary visual cortex, known as V1. If your brain merely reacted to the light waves that hit your retina and traveled to primary visual cortex (V1) via your thalamus, then it would have many neurons to carry that visual information to V1. But it has far fewer than one would expect (top image), and ten times as many projections going in the other direction, carrying visual *predictions* from V1 to the thalamus (center image). Likewise, 90 percent of all connections coming into V1 (lower image) carry predictions from neurons in other parts of cortex. Only a small fraction carries visual input from the world.¹³

"A single interoceptive cue, such as a dull ache in your abdomen, could mean a stomachache, hunger, tension, an overly tight belt, or a hundred other causes. **Your brain must explain bodily sensations to make them meaningful, and its major tool for doing so is prediction.** So, your brain models the world from the perspective of someone with your body. Just as your brain predicts the sights, smells, sounds, touches, and tastes from the world in relation to the movements of your head and limbs, it also predicts the sensory consequences of movements inside your body."

There are implications here for treatment: reframing after trauma memory reprocessing. Or during, even. EMDR has what they call 'cognitive interweaves'—the process of challenging a thought or feeling during processing. One must be open and curious to drawing varying conclusions from somatic sensations. For the author, predictions are key here. A common thought experiment is when I ask clients to describe the difference between anxiety and excitement—invariably they describe the same physical sensations.

"Each time your brain moves any part of your body, inside or out, it spends some of its energy resources: the stuff it uses to run your organs, your metabolism, and your immune system. You replenish your body's resources by eating, drinking, and sleeping, and you reduce your body's spending by relaxing with loved ones, even having sex."

What she describes above is what some call 'resource management'.

"every brain region that's claimed to be a home of emotion in humans is a body-budgeting region within the interoceptive network. These regions, however, don't react in emotion. They don't react at all. They predict, intrinsically, to regulate your body budget. They issue predictions for sights, sounds, thoughts, memories, imagination, and, yes, emotions. **The idea of an emotional brain region is an illusion caused by the outdated belief in a reactive brain. Neuroscientists understand this today, but the message hasn't trickled down to many psychologists, psychiatrists, sociologists, economists, and others who study emotion.**

A very interesting claim: there is no emotional centre in the brain; all there is are areas that work together to compete for resources and predict the most utilitarian outcome.

"People call cortisol a "stress hormone " but this is a mistake. **Cortisol is released whenever you need a surge of energy, which happens to include the times when you are stressed.** Its main purpose is **to flood the bloodstream with glucose to provide immediate energy to cells,** allowing, for example, muscle cells to stretch and contract so you can run. **Your body-budgeting regions also make you breathe more deeply to get more oxygen into your bloodstream and dilate your arteries to get that oxygen to your muscles more quickly** so your body can move. All of this internal motion is accompanied by interoceptive sensations"

Quite the awakening—cortisol has been spoken of as the stress hormone for as long as I can remember. Instead, its function to help you release energy by signaling your breathing centres to breathe more and pump oxygen to when it's needed most.

"your brain predicts your body's responses by drawing on prior experiences with similar situations and objects, even when you're not physically active. And the consequence is interoceptive sensation."

The implications for traumatic memory here are vast. The brain is a prediction machine.

"people spend at least half their waking hours simulating rather than paying attention to the world around them, and this pure simulation strongly drives their feelings."

Makes sense—better to predict and save energy for where it's needed most than constantly and consistently use energy to focus.

"Interoception did not evolve for you to have feelings but to regulate your body budget. It helps your brain track your temperature, how much glucose you are using, whether you have any tissue damage, whether your heart is pounding, whether your muscles are stretching, and other bodily conditions, all at the same time. Your affective feelings of pleasure and displeasure, and calmness and agitation, are simple summaries of your budgetary state. Are you flush? Are you overdrawn? Do you need a deposit, and if so, how desperately?"

Astute. Here is another paradigm shifted... Interoception isn't about building awareness of the self, much less body awareness to make you a keen observer to your experience. No. Instead it's there to better predict how to use resources, how to assign what's required so the system functions well, so that you survive and operate in a way that keeps you moving, moving, moving.

"When you apply for a job or college or medical school, **make sure you interview on a sunny day**, because **interviewers tend to rate applicants more negatively when it is rainy.**"

"**Affective realism** can [...] lead to tragic consequences. In July 2007, an American gunner aboard an Apache helicopter in Iraq mistakenly killed a group of eleven unarmed people, including several Reuters photojournalists. **The soldier had misjudged a journalist's camera to be a gun.** One explanation for this incident is that **affective realism caused the soldier, in the heat of the moment, to imbue a neutral object (a camera) with unpleasant valence.** Every day, soldiers must make quick decisions about other people, whether they are embedded in a unit during wartime, on a peacekeeping mission, negotiating in a cross-cultural setting, or collaborating with unit members on a stateside base. **These quick judgments are extremely difficult to negotiate, especially in such high-stakes, high-arousal settings where errors are often made at the expense of someone's life.**"

you feel what your brain believes.

"You might think that in everyday life, the things you see and hear influence what you feel, but it's mostly the other way around: that **what you feel alters your sight and hearing**. Interoception in the moment is more influential to perception, and how you act, than the outside world is. **You cannot overcome emotion through rational thinking, because the state of your body budget is the basis for every thought and perception you have, so interception and affect are built into every moment.** Even when you experience yourself as rational, your body budget and its links to affect are there, lurking beneath the surface."

This clearly debunks the cognitive revolution and many CBT-based therapies. Change is achieved from the bottom up and rarely from the top down. I like the following conception: experiences lead to feelings lead to thoughts lead to beliefs (when thoughts are repeated enough) lead to attitudes lead to actions lead to experiences—and the cycle repeats. Come on at any intersection ... enjoy the ride.

Chapter 5: Concepts, Goals, and Words

"**Everything you perceive around you is represented by concepts in your brain.** [...] Without concepts, you'd experience a world of ever-fluctuating noise. Everything you ever encountered would be unlike everything else. You'd be experientially blind [...] incapable of learning. **All sensory information is a massive, constantly changing puzzle for your brain to solve.**"

I often tell my clients when they're unsure how to communicate an idea in their mind to "let it all out like pieces of a puzzle onto the floor and will work together to pick up those pieces and put them together." It's similar to what an archaeologist does in solving the puzzle of the past. This technique helps loosen the person up. They're not in it alone.

"**alexithymia** [...] affects about 10 percent of the world's population. Its sufferers do have **difficulty experiencing emotion**, as the theory of constructed emotion would predict. In a situation where a person with a working conceptual system might experience anger, people with alexithymia are more likely to experience a stomachache. **They complain of physical symptoms and report feelings of affect but fail to experience them as emotional.** People with alexithymia have **difficulty perceiving emotion in others as well.** [...] People with alexithymia also have a **restricted emotion vocabulary and have difficulty remembering emotion words.**"

Remember: alexithymia isn't just about the person's experience of their own emotional world, but also the difficulty seeing and experiencing the emotions of others. In relationships this is difficult to manage as those

without issues in the emotional realm can find those with the condition unfeeling or unempathic or even psychopathic. None of these are right ... but they tease around the real issue: one's difficulty to experience the emotional world as a whole.

Chapter 6: How the Brain Makes Emotions

Every prediction you make, and every categorization your brain completes, is always in relation to the activity of your heart and lungs, your metabolism, your immune function, and the other systems that contribute to your body budget.

"Your brain has a mental model of the world as it will be in the next moment, developed from past experience. This is the phenomenon of *making meaning* from the world and the body using concepts. **In every waking moment, your brain uses past experience, organized as concepts, to guide your actions and give your sensations meaning.**"

"If you categorize the sensations as fear, you are making meaning that says, "Fear is what caused these physical changes in my body." **When the concepts involved are emotion concepts, your brain constructs instances of emotion.**"

"We predict and categorize. We regulate our body budgets, as any animal does, but wrap this regulation in purely mental concepts like "Happiness" and "Fear," that we construct in the moment. We share these purely mental concepts with other adults, and we teach them to our children. **We make a new kind of reality and live in it every day, mostly unaware that we are doing so.**"

Chapter 7: Emotions as Social Reality

"Science [...] tells us that **emotions require a perceiver**, just as colors and sounds do. When you experience or perceive emotion, sensory input is transformed into patterns of firing neurons. At the time, **if you focus your attention on your body, you experience emotions as if they are happening in your body** [...] If you're instead focusing attention on the world, you experience faces and voices and bodies as if they express emotion for you to decode. [...] your brain categorizes using emotion concepts to make these sensations meaningful. The result is that you construct instances of happiness, fear, anger, or other emotion categories. **Emotions are real, but real in the same manner of the sound of a tree falling, the experience of red, and the distinctions between flowers and weeds.** They are all constructed in the brain of a perceiver."

Good news to the curious—if emotions are constructed, we have control over them. The brain perceives what it predicts. Predict positively.

"Make something up, give it a name, and you've created a concept. Teach

your concept to others, and as long as they agree, you've created something real. How do we work this magic of creation? We categorize. We take things that exist in nature and impose new functions on them that go beyond their physical properties. Then we transmit these concepts to each other, wiring each other's brains for the social world. This is the core of **social reality**."

"When you can't find an objective criterion to compute accuracy and are left with consensus, this is a clue that you are dealing with social, not physical, reality."

You are probably unfamiliar with **an emotion called *liget***. It's a feeling of **exuberant aggression experienced by a headhunting tribe from the Philippines**, the Ilongot. *Liget* involves intense focus, passion, and energy while pursuing a hazardous challenge with a group of people who are competing against another group. The danger and energy instill a sense of togetherness and belonging. *Liget* is not just a mental state but a complex situation with social rules about which activities bring it on, when it is appropriate to feel, and how other people should treat you during an episode. **To a member of the Ilongot tribe, liget is every bit as real an emotion as happiness and sadness are to you.** [...] Think of how useful the concept of "*Liget*" could be in Western culture. **When military cadets train in the art of war, a small percentage of them reportedly develop a feeling of pleasure in killing. They do not seek to kill to feel pleasure; they are not psychopaths. But when they do kill, they experience pleasure.** Their stories of combat often depict intense feelings of pleasure from the thrill of the hunt, or from a **job well-done with comrades-in-arms**. In Western culture, however, killing with pleasure is considered terrible and shameful; it is difficult to empathize with or muster compassion for those who have experienced this feeling. So consider this: **what if we taught the concept and the word *liget* to cadets, including a set of social rules for when *liget* is appropriate to feel?** We could embed this emotion concept in our broader cultural context of values and norms, just like we did with *schadenfreude*. The concept might even allow servicepeople to flexibly cultivate the experience of *liget* when needed for their military duties. New emotion concepts like *liget* could broaden their emotional granularity, improving their unit's cohesion and their job performance, all the while protecting mental health for these members of our armed forces, both in battle and when they come home from deployment."

Cf. Jack Carr's description of killing in the context of war: "From the outside looking in, one would think what Reece had done just a few hours earlier would cause. thoughts of introspection, regret, and possibly even confusion. Movies and books often portrayed soldiers having a difficult time taking a life in combat and then struggling to deal with the psychological aftereffects of their actions. To Reece killing was one of the most natural things one could do; it was hardwired into his DNA. If he were to think about it, Reece would conclude that the only reason he was alive today was that, throughout history, people in his lineage had been good at

fighting to defend the tribe and at providing sustenance for their families. Killing was not so much about taking a life, it was about sustaining life: the lives of your countrymen, your unit, your family, yourself. That Reece did it exceptionally well did not bother him. Killing was what he did better than anything else. He remembered being surprised by the feeling he experienced the first time he killed another man in combat. If one was to trust the experts, he should have felt instant remorse, regret, and confusion, even anger. It was as if society expected those who have taken lives in defense of their nation to immediately require counseling to assist them through their grief. Perhaps that convenient narrative allowed civilized society to better deal with their detachment from the realities of warfare, while sending young men to die in the mountains, jungles, deserts, and cities of foreign lands difficult to find on a map. The truth was less complex. The truth was primal. Reece felt no such remorse. The first time he killed and every time thereafter, he had felt a different emotion: relief. [...] It was relief to be alive. [...] It wasn't that Reece felt no emotion from his years in combat; he was far from a sociopath. In combat units, sociopaths got good people killed and were weeded out as soon as possible." (The Terminal List) It's as if he's read How Emotions Are a Made ... except, he's talking from experience having been a Navy SEAL.

"We don't load culture into a virgin brain like software loading into a computer; rather, culture helps to wire the brain. Brains then become carriers of culture, helping to create and perpetuate it."

Chapter 8: A New View of Human Nature

"You are not a reactive animal, wired to respond to events in the world. When it comes to your experiences and perceptions, you are much more in the driver's seat than you might think. You predict, construct, and act. You are an architect of your experience."

What a claim and call towards personal responsibility. And yet, it doesn't sit right with me as a clinician. People don't choose their emotional reactions from a trauma perspective. Well, perhaps I'm wrong since her whole thesis right now has been explaining something like the opposite of what I've said. Hmmm. I see where she's coming from and @I love the sentiment—we all need to take more personal responsibility where we can. Let's hear her out and see where she goes with this...

"You slam that desk because your brain predicted an instance of anger, using your concept of "Anger," and your past experience (whether direct, or from movies or books, etc.) includes an action of slamming the desk in a similar situation. [...] as an adult, you absolutely do have choices about what you expose yourself to and therefore what you learn, which creates the concepts that ultimately drive your actions, whether they feel willful or not. So **"responsibility"** means **making deliberate choices to change your**

concepts."

"I used to help my clients understand that they've been victimized twice: once in the moment and again because they've been left with emotional suffering that only they can resolve. Due to their trauma, their brains continue to model a hostile world, even after they've escaped to a better one."

Sometimes, responsibility means that you're the only one who can change things.

"essentialism is intuitive, logically impossible to disprove, part of our psychological and neural makeup, and a self-perpetuating scourge in science. It is also the basis for the classical view's most fundamental idea, that emotions have universal fingerprints. No wonder the classical view has such stamina — it's powered by a virtually unkillable belief."

"Broca [a now-dead brain scientist] had scant evidence for his claims [that he'd found an area in the brain responsible for language], and other scientists had plenty of evidence that he was wrong. They pointed out, for example, that other patients with nonfluent aphasia [impaired speech] had a perfectly healthy Broca's area. But **Broca's idea prevailed anyway because it was protected by Darwin's magical cloak reinforced by a healthy dose of essentialism.** Thanks to Broca, scientists now had an evolutionary story for the origin of language — that it's located in "rational" cortex — countering the prevailing belief that language was given by God."

Footnote: "The current consensus is that [language is] part of several intrinsic networks, including the **interoceptive** and **control networks**. Where language is concerned, the control network helps your brain choose between conflicting options, such as the words "your" and "you're""

"Over the next century, Broca's limbic lobe morphed into a unified "limbic system" for emotion, guided by other believers in the classical view. This so-called system was said to be evolutionarily old; to be virtually unchanged from its origin in non-human mammals; and to control the heart, lungs, and other internal organs of the body. It allegedly lay between ancient "reptilian" circuits in the brainstem for hunger, thirst, and so on, and the newer, uniquely human layers of cortex that regulate mankind's animalistic emotions. This illusory hierarchy embodied Darwin's ideas about human evolution — base appetites having evolved first, followed by wild emotional passions, with rationality as our crowning glory."

"Modern neuroscience [...] has shown that the so-called limbic system is a fiction, and experts in brain evolution no longer take it seriously, let alone consider it a system. Accordingly, it's not the home of emotion in the brain, which is unsurprising because **no single brain area is dedicated to emotion.** The word "limbic" still has meaning (when referring to brain anatomy), but the

limbic system concept was just another example of applying an essentialist, Darwin-flavored ideology to the structure of the human body and brain."

This statement will likely ruff up some feathers...

"The classical view often dismisses construction as saying everything is relative, as if the mind were merely a blank slate and biology can be disregarded. **Construction [the theory whereby emotion is *learned*] blasts the classical view for ignoring the powerful effects of culture and justifying the status quo.** In caricature, **the classical view says "nature" and construction says "nurture"** and the result has been a wrestling match between straw men."

"When we peer into the workings of a functioning brain, we don't see mental modules. We see core systems that interact continuously in complex ways to produce many sorts of minds, depending on culture. **The human brain is itself a cultural artifact because it is wired by experience.** We have genes that are turned on and off by the environment, and other genes that regulate how sensitive to the environment we are."

"Psychologists often recount stories of behaviorism in the same chilling tones as a ghost story around a campfire. It declared that thoughts, feelings, and the rest of the mind were unimportant to behavior or might not even exist. During this "dark ages" of emotion research, which lasted for several decades, nothing worthwhile was discovered on human emotion (supposedly). **Ultimately, most scientists rejected behaviorism because it ignores a basic fact: that each of us has a mind, and in every waking moment of life, we have thoughts and feelings and perceptions.**"

More feathers ruffled ... this time the behaviourist's.

"The good news is that we're in a golden age of mind and brain research. Many scientists are now on a path forged by the data, rather than ideology; to understand emotion and ourselves. This new, data-driven understanding leads to innovative ideas about how to live a fulfilling and healthful life. **If your brain operates by prediction and construction and rewires itself through experience, then it's no overstatement to say that if you change your current experiences today, you can change who you become tomorrow.**"

Chapter 9: Mastering Your Emotions

"**Typical self-help books focus on your mind.** If you think differently, they say, you will feel differently. You can regulate your emotions if you try hard enough. **These books, however, don't give much consideration to your body.** If there's one thing that (I hope) you've learned from the past five chapters, it's that **your body and your mind are deeply interconnected.** Interoception drives your actions. **Your culture wires your brain.**"

"If you want to feel good, then your brain's predictions about your heart rate, breathing, blood pressure, temperature, hormones, metabolism, and so on, must be calibrated to your body's actual needs. If they aren't, and your body budget gets out of whack, then **you're going to feel crappy no matter what self-help tips you follow. It's just a matter of which flavor of crap."**

Bottom-up, again ... not top-down. Get the body right and the rest will follow.

"Your body budget [...] is regulated by predictive circuitry in your interoceptive network. If those predictions become chronically out of sync with your body's actual needs, it's hard to bring them back into balance. Your body-budgeting circuitry, the loudmouth of your brain, doesn't respond quickly to counterevidence (prediction error**) from your body. **Once the predictions have been off-base for long enough, you will feel chronically miserable."****

This gets closer to an explanation of traumatic stress and other chronic mental health conditions.

"People who practice yoga long-term are able to calm down more quickly and effectively, probably due to some combination of physical activity and the slow-paced breathing. **Yoga [...] reduces levels of certain proteins, called proinflammatory cytokines, that over the long term promote harmful inflammation in your body."**

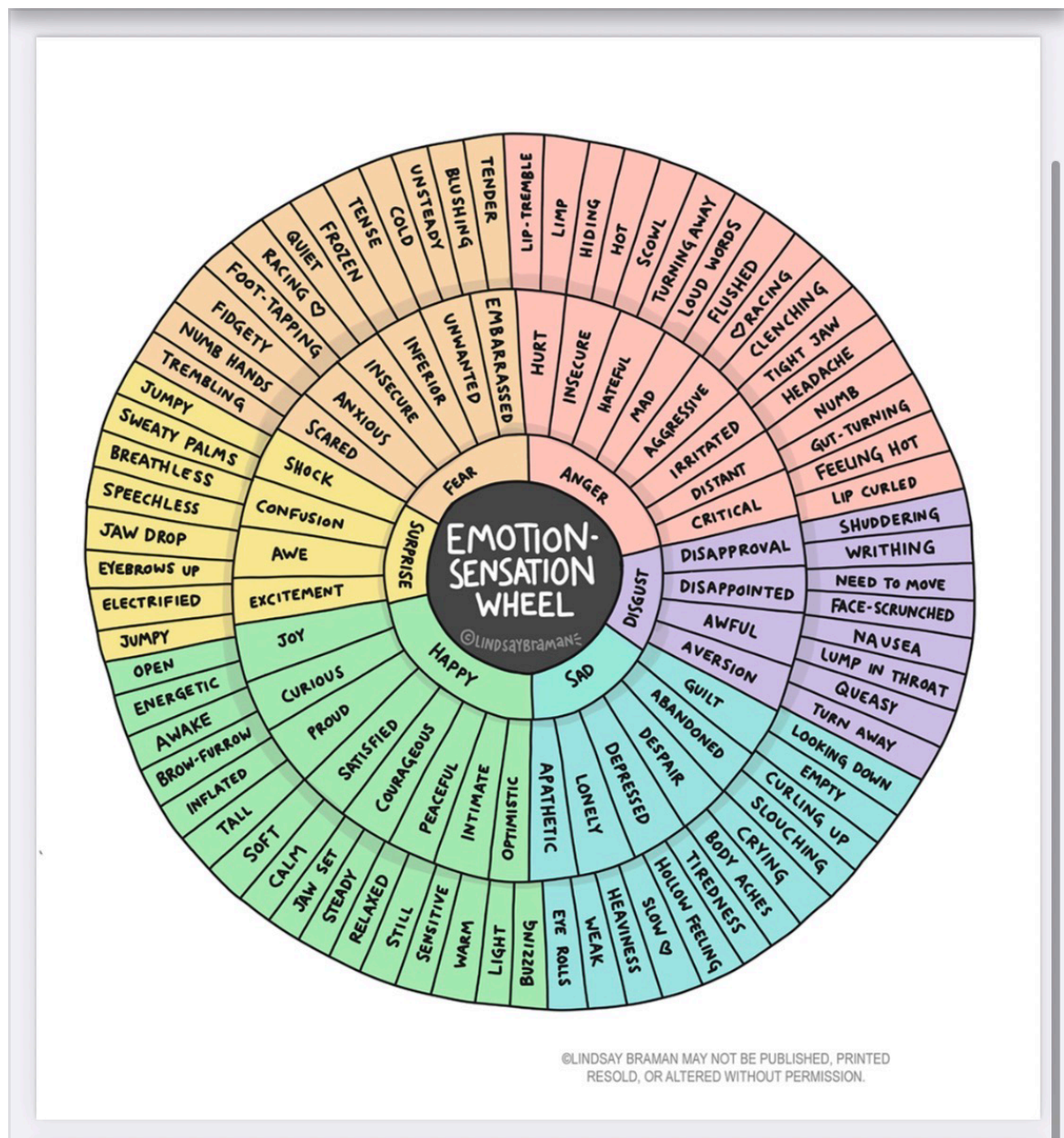
"when you get involved in someone else's story, you aren't as involved in your own. Such mental excursions engage part of your interoceptive network, known as the default mode network, and keep you from ruminating (which would be bad for the budget). If you are not a reader, see a compelling film. If the story is sad, have a good cry"

The more you enmesh with another, the more your own interoceptive resources go to manage the others' situation—and it can't. This will continue to make you chronically miserable.

"Emotional intelligence is better characterized in terms of concepts. Suppose you knew only two emotion concepts, "Feeling Awesome" and "Feel-ing Crappy." Whenever you experienced emotion or perceived someone else as emotional, you could categorize only with this broad brush. Such a person cannot be very emotionally intelligent. In contrast, **if you could distinguish finer meanings within "Awesome"** (happy, content, thrilled, relaxed, joyful, hopeful, inspired, prideful, adoring, grateful, blissful...), **and fifty shades of "Crappy"** (angry, aggravated, alarmed, spiteful, grumpy, remorseful, gloomy, mortified, uneasy, dread-ridden, resentful, afraid, envious, woeful, melancholy ...), **your brain would have many more options for predicting,**

categorizing, and perceiving emotion, providing you with the tools for more flexible and functional responses. You could predict and categorize your sensations more efficiently, and better tailor your actions to your environment."

One of the best resources I provide my clients for expanding emotional vocabulary is the following:



"Perhaps the easiest way to gain concepts is to learn new words [as above]. You've probably never thought about learning words as a path to greater emotional health, but it follows directly from the neuroscience of construction. Words seed your concepts, concepts drive your predictions, predictions regulate your body budget, and your body budget determines how you feel. Therefore, the more finely grained your vocabulary, the more precisely your predicting brain can calibrate your budget to your body's needs."

A related note from Dr. Dan Siegel's Brainstorm: "In the brain, naming an emotion can help calm it. Here is where finding words to label an internal experience becomes really helpful. We can call this "Name it to tame it." And sometimes these low-road states can go beyond being unpleasant and confusing—they can even make life feel terrifying. If that is going on, talk about it. Sharing your experience with others can often make even terrifying moments understood and not traumatizing. Your inner sea and your interpersonal relationships will all benefit from naming what is going on and bringing more integration into your life."

"people who could distinguish finely among their unpleasant feelings — those "fifty shades of feeling crappy" — were 30 percent more flexible when regulating their emotions, less likely to drink excessively when stressed, and less likely to retaliate aggressively against someone who has hurt them."

"keep track of your positive experiences each day. Can you find anything that can make you smile, even briefly? Each time you attend to positive things, you tweak your conceptual system, reinforcing concepts about those positive events and making them salient in your mental model of the world. It's even better if you write about your experiences because, again, words lead to concept development, which will help you predict new moments to cultivate positivity. In contrast, **when you ruminate about something unpleasant, you cause fluctuations in your body budget.** Rumination is a vicious cycle: each time you dwell on (say) a recent breakup of a relationship, you add another instance to predict with, which expands your opportunity to ruminate."

Proponents of Positive Psychology talk about 'balanced realism'. This is how I explain it to my clients: "If you hyperfocus on the bad, your brain will teach itself to pay attention to the bad. The opposite is also true. It's not about positive thinking, per se—it's about recognising and sitting with any small positive thing that happens for you. And since the brain picks up on the negative pretty quickly, you must sit with the positive a little longer for it to sink in. It's about balance. Any time something negative comes to mind, think of a few real positive things to balance it out."

Every experience you construct is an investment, so invest wisely. Cultivate the experiences you want to construct again in the future.

"infants develop concepts well before you realize it is happening. So look children straight in the eye, widen your eyes to grab their attention, and speak about bodily sensations and movements in terms of emotions and other mental states. "See that little boy? He is crying. He is feeling pain from falling down and scraping his knee. He is sad and probably wants a hug from his parents."

"All animals use motion to regulate their body budgets; if their brain serves

up more glucose than their body needs, a quick scamper up a tree will bring their energy level back into balance. Humans are unique in that we can regulate the budget without moving, using purely mental concepts. But when this skill fails you, remember that you too are an animal. **Get up and move around, even if you don't feel like it. Turn on some music and dance around your home. Take a walk in a park. Why does this work? Moving your body can change your predictions and therefore your experience.** Your movements may also help your control network to bring other, less bothersome concepts into the foreground."

I think drug addiction is often a misguided attempt to relieve the suffering from a body budget that's chronically out of whack.

"students achieve higher scores when they recategorize anxiety as merely a sign that the body is coping. People who recategorize anxiety as excitement show similar effects, with better performance and fewer classic symptoms of anxiety when speaking in public and even when singing karaoke. [...] The **U.S. Marine Corps** has a motto that embodies this principle: **"Pain is weakness leaving the body."**

"If the self is a concept, then you construct instances of your self by simulation. Each instance fits your goals in the moment. Sometimes you categorize yourself by your career. Sometimes you're a parent, or a child, or a lover. Sometimes you're just a body. **Social psychologists say that we have multiple selves, but you can think of this repertoire as instances of a single, goal-based concept called "The Self" in which the goal shifts based on context.**"

Internal Family Systems therapy takes this kind of language and runs with it full pelt.

"one part of you has remained constant: **you've always had a body.** Every concept you have ever learned includes the state of your body (as interoceptive predictions) at the time of learning. Some concepts involve a lot of interoception, such as "Sadness", and others have less, such as "Plastic Wrap", but they're always in relation to the same body. So **every categorization you construct — about objects in the world, other people, purely. mental concepts like "Justice," and so on — contains a little bit of you.**"

If you have atrophy in your default mode network, as happens in Alzheimer's disease, you eventually lose your sense of self.

"recategorize your thoughts, feelings, and perceptions as physical sensations, which are easier to let go of. You can use meditation, at least at first, to prioritize categorizations that focus on the physical, and deprioritize those that add more psychological meaning about you or your place in the world."

"People who report feeling awe more frequently also have the lowest levels of those nasty cytokines that cause inflammation (though nobody has proved cause and effect)."

"Cultivate opportunities for your brain to wire itself to the realities of your social world. **If you feel unpleasant in the moment, then deconstruct or recategorize your experiences. And realize that *your perceptions of others are just guesses and not facts.***"

Chapter 10: Emotion and Illness

"when scientists place a cold virus into the noses of one hundred people, only 25-40 percent get sick. [...] if you are an introverted or negative-minded person, you're more likely to develop a cold from a noseful of germs."

Oh, wow, what a powerful finding! Pessimism isn't just emotionally uncomfortable—it's also physically dangerous!

"When you have an injury or illness, your cells secrete cytokines that draw blood to the affected region, raising its temperature and causing swelling. These cytokines can make you feel fatigued and generally sick while they go about their job of helping you heal. Proinflammatory cytokines can also become bad guys, however, given the right conditions for debt collection. This is particularly true when your body budget is chronically unbalanced [...] **Cortisol normally suppresses inflammation (that's why hydrocortisone cream relieves itching, and cortisone shots reduce swelling).** When you have too much cortisol in your blood for a long time, inflammation flares up. You feel devoid of energy. You might run a fever. If someone placed a cold virus into your nose, you'd be one of the people who gets sick."

"Inflammation in your brain is very bad. It affects your predictions, in particular those that manage your body budget, sending your budget into overdraft."

"Chronic stress is dangerous to your physical health. It literally eats away at your interoceptive and control networks, causing them to atrophy, as your chronically imbalanced body budget remodels the very brain circuitry that regulates the budget."

"In studies, **when patients said that they frequently categorize, label, and understand their emotions, they were less likely to have increased cytokines during recovery from prostate cancer, or after a stressful event, and the highest levels of circulating cytokines were found in men who expressed a lot of affect that they didn't label.** Female breast cancer survivors who explicitly label and understand their emotions also have better health and fewer medical visits for cancer-related symptoms. This means that

over time, people who effectively categorize their interoceptive sensations as emotion might be better protected against chronic inflammatory processes that lead to poor health."

"your nervous system sends sensory input to your brain when your muscles or joints are injured, or your body tissues are damaged by excessive heat or cold, or in response to a chemical irritation like a pinch of pepper in your eye. **This process is called nociception."**

"When you are expecting pain, like the moment just before an injection, your brain regions that process nociception change their activity. That is, **you simulate pain and therefore feel it. This phenomenon is called the placebo effect."**

Chronic pain, based on this thesis, becomes more intelligible. I get it. When I counsel a person with chronic pain I often see a change in the pain threshold when we incorporate various (different) therapies—it's higher. They feel less pain and can tolerate it more when it comes to! This happens when they refocus on other areas or use other mental (and physical) functions like imagery or becoming mindful about another part of the body that's not in pain or tensing another muscle group or even talking about something that brings joy. It makes sense that this might be due to other brain regions becoming activated and therefore taking the focus off the pain. So much more has been written about this, but the most useful has been Norman Doidge's The Brain's Way of Healing, in particular the first chapter.

"The pathways sending nociceptive predictions down to the body, and those bringing nociceptive input up to the brain, are closely related to interoception. (It's even **possible that nociception is a form of interoception.**)"

"When people experience ongoing pain without any damage to their body tissue, it's called chronic pain. A few well-known examples are **fibromyalgia**, migraine headaches, and **chronic back pain.**"

"think about what would happen if your brain issued unnecessary predictions of pain and then ignored prediction error to the contrary."

What would happen is, I think, the pain becomes embedded deeply into the system ... and the brain this remembers its importance.

"It's possible that the brain of a chronic pain sufferer received intense nociceptive input sometime in the past, and as the injury healed, the brain didn't get the memo. It keeps predicting and categorizing anyway, generating chronic pain. It's also possible that predictions about inner-body movements are turning up the volume for nociceptive input as it heads from the body to the brain."

"you're not crazy. There is something wrong with you. **Your predictive brain, which is indeed located "in your head", is generating authentic pain that continues past the point when your body has already healed. It's similar to phantom limb syndrome"**

"Emotion, acute pain, chronic pain, and stress are constructed in the same networks, the same neural pathways to and from the body, and most likely the same primary sensory region of cortex, so it is completely plausible that we distinguish emotion and pain by concept — that is, via the concepts the brain applies to make sense of bodily sensations. **Chronic pain is likely a misapplication of the concept "Pain" by your brain, as it constructs the experience of pain without injury or threat to your tissue. Chronic pain seems to be a tragic case of predicting poorly and receiving misleading data from your body."**

"Twenty-seven million Americans take daily antidepressants, yet more than 70 percent continue to experience symptoms anyway, and psychotherapy is not effective for everyone either."

"your affect is out of whack: you experience debilitating misery, fatigue, or other symptoms of depression. Simultaneously, your body is quickly metabolizing unnecessary glucose to meet those high yet nonexistent energy needs, leading to weight problems and leaving you at risk for other metabolic-related illnesses that co-occur with depression, including diabetes, heart disease, and cancer."

Metabolic depression? There is a relatively new field in psychiatry called 'metabolic psychiatry'—a great podcast to listen to that explores this field in depth is here: <https://open.spotify.com/episode/7rna5P3GHZeG8dl5JqcBrx?si=bvrdDAIMRbC9UYUzx2Bzng> (DOAC: Dr. Georgia Ede)

"A depressed brain is effectively locked into misery. It's like a brain in chronic pain, ignoring prediction error, but on a much larger scale that shuts you down. It **puts your budget chronically in debt, so your brain tries to cut spending.** What's the most efficient way to do that? Stop moving and don't pay attention to the world (prediction error)."

Chapter 12: Is a Growling Dog Angry?

"The natural chemicals that relieve suffering within our own nervous systems, **opioids, are found in fish, nematodes, snails, shrimps, crabs, and some insects. Even tiny flies might feel pain;** we know that they can learn to avoid odors that are paired with electric shock."

"From now on, any time that you read an article about animal emotion, watch for this pattern. If a scientist labels a behavior like freezing using a mental state

word like "fear," you should think, "Aha, the **mental inference fallacy!**"

From <https://lisafeldmanbarrett.com/2017/05/24/mental-inference-fallacy/>: "Scientists who claim to find circuits for emotion in animal brains are doing what Dr. Frankenstein did. They're discovering circuits for actions — running, teeth-baring, freezing in place, and so forth. But instead of recognizing these actions as collections of movements, the scientists perceive them as emotional, and write about them as emotional. Objectively speaking, these actions have no inherent emotional meaning. Freezing does not equal fear. Teeth-baring does not equal anger. I call this error the mental inference fallacy. It means mistaking an action for an emotion in a scientific setting." This is interesting ... and on point. Just because a particular action makes you feel a particular thing does not mean it equates to emotion as is. It's a physiological response to an environmental trigger—you're the one who makes meaning of it. Think to Peter Levine's SIBAM where he incorporates sensations, images, behaviours, affect (categorical emotions), and meaning in his Somatic Experiencing approach.

"You do have **survival circuits** for behaviors like the famous "**four F's**" (**fighting, fleeing, feeding**, and mating [**f—king**]); they're controlled by body-budgeting regions in your interoceptive network, and they cause bodily changes that you experience as affect, but they are not dedicated to emotion. For emotion, you also need emotion concepts for categorization."

Chapter 13: From Brain to Mind: The New Frontier

"humans use concepts to build social reality, and social reality, in turn, wires the brain. Emotions are very real creations of social reality, made possible by human brains in concert with other human brains."

"**Affective realism**, the phenomenon that ***you experience what you believe***, is inevitable because of your wiring. The body-budgeting regions in your interceptive network — your inner loudmouthed, mostly deaf scientist with a megaphone — are the most powerful predictors in your brain, and your primary sensory regions are eager listeners. Body-budget predictions laden with affect, not logic and reason, are the main drivers of your experience and behavior. [...] **When a soldier in a warzone perceives a gun in someone's hands when no gun is present, he might actually see that gun; it's not a mistake but a genuine perception.** [...] Anytime you have a gut feeling that you know something to be true, that's affective realism. When you hear some news or read a story that you immediately believe, that's affective realism too."

Gut feelings ... they're real. Consider Siegel in Brainstorm again:
"Paradoxically, intuition plays a very important role in making good decisions. This is because our intuitions, or gut feelings and heartfelt sensations, tend to focus on positive values, like the benefit of staying in

school or driving at the speed limit or keeping fit. Many teens can be too rational, and need to incorporate the non-rational input of their intuitive gut feelings and heartfelt sensations, feelings that enable them to focus on positive values versus mythical rewards that, in reality, are often just out of reach."

"The best defense against affective realism is curiosity. I tell my students to be particularly mindful when you love or hate something you read. These feelings probably mean that the ideas you've read are firmly in your affective niche, so keep an open mind about them. Your affect is not evidence that the science is good or bad."

Curiosity is the best antidote to overwhelm.

Final thoughts: This book shifts paradigms. What you thought you knew about emotions seems, at least in this instance, wrong. Of course, the more we learn the more we ought to expect paradigms to shift—it's a byproduct of progress, of science, of the accumulation of knowledge. But what struck me as curious was that while what we seemed to understand about emotions has remained relatively consistent at a popular level (that emotions are hard-wired and that all cultures experience them in a similar way), in the scientific world researchers have known for decades that emotions aren't fixed, that meaning depends on the situation at hand, that we predict (at an unconscious level) in order to feel an emotion, and that emotions can be learnt and unlearnt if you change predictions and expand your emotional vocabulary. As a clinician, this book expanded my mind, especially in the prediction/sensation/conceptualisation front. It's given me a good argument to present to clients that emotions are malleable and that although we cannot change what has happened to us, we're can change our responses and meanings drawn from the experience, allowing us to find new and different ways to heal. Overall, a highly dense read ... but worth the time if you're a clinician or just a scientifically-minded layperson. I understand, now, why scientists tend to stay in their lane and how what was known for decades is often not spoken of outside scientific circles—difficult to communicate and gain traction when paradigms are entrenched. In this regard, Feldman-Barrett does a good job in her podcast appearances, scientific publications, and books. When paired with her very brief (and popular) work *7 1/2 Lessons About the Brain*, you're well set to understand yourself (and others) deeper ... and better.

These notes were collected by psychotherapist and author Emil Barna in 2025 in his efforts to assist with professional development and further education for himself and those who read them. You can find out more about Emil by visiting www.barnacc.com

"A text without a context is a pretext to a proof text."

—Dr. Don Carson