

The energy of the mind is
the essence of life.

Aristotle

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Compass for the Mind

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COMPASS FOR THE MIND



In his book *The Lost Symbol* (First Anchor Books –Random House, 2009), Dan Brown continues his series on symbols, and their supposed hidden powers. His central player, famed Harvard symbologist Robert Langdon answers an unexpected summons to appear at the U.S. Capitol Building. His planned lecture is interrupted when a disturbing object—artfully encoded with five symbols—is discovered in the building. Langdon recognizes in the find an ancient invitation into a lost world of esoteric, potentially dangerous wisdom. When his mentor Peter Solomon—a longstanding Mason and beloved philanthropist—is kidnapped, Langdon realizes that the only way to save Solomon is to accept the mystical invitation and plunge headlong into a clandestine world of Masonic secrets, hidden history, and one inconceivable truth . . . all under the watchful eye of Dan Brown's most terrifying villain to date. It is a thriller first, but the heroine Katherine Solomon is a world expert in noetics, and *how beliefs, thoughts and intentions affect the physical world* (Institute of Noetic Sciences).

There is a long tradition on the **Powers of the Mind** dating back millennia. Humans were pedestalled, but also many animal, plants and natural phenomena. One can consider these beliefs are simple, simplistic superstition, but recent research in diverse areas paint a more complex, diverse, and often exciting, changing landscape.



The Theory of Mind Myth

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'I don't understand what you think that I'm saying.'
(Marital argument, overheard at a local diner.)

"Following a mass shooting, the gunman's next-door neighbors are stunned, and tell reporters that he was a good, kind man. Meanwhile, former classmates and co-workers describe him as a ticking time bomb. Pundits attribute Donald Trump's latest Twitter tirade to unbridled narcissism, early dementia, a bullying father, Machiavellian shrewdness –or a man with a heartfelt mission to make America great again... Show us any human behavior, and we'll drum up half a dozen seemingly common-sense explanations. The underlying assumption: we can know with a reasonable degree of accuracy what is going on in another's mind. Labelled by psychologists as theory of the mind (abbreviated as ToM), this ability to understand that others have separate minds containing potentially different beliefs, desires and intentions is often said to be one of our pre-eminent cognitive skills distinguishing us from other creatures.

"That we have a folk psychology theory of other minds isn't surprising. By nature, we are character analysts, behavioral policemen, admirers and haters. "We embrace like minds and go to war against contrarians. Mind-reading is our social glue, guiding virtually all our daily interpersonal interactions. When trying to decide whether or not a potential gun owner is prone to violence, a mental patient is suicidal, or a presidential candidate is truthful, we are at the mercy of our thoughts about others.

"The fate of democracy depends on our ability to grasp and accept differing mindsets –yet the seemingly near-universal absence of reasonable public discourse suggests that this rarely occurs. We accuse those with conflicting opinions of having character defects, subliminal prejudices, faulty education, cultural brainwashing and a myriad of other '*if only they knew better*' flaws of reasoning. But there's a more basic and frightening possibility. What if we really aren't capable of a sophisticated reading of



other minds? For starters, let's pretend the impossible –that we can step outside our minds and see how ToM might work. A psychologist presents a child with two hand puppets –Sally (who has a basket) and Anne (who has a box). Sally puts a marble in her basket and leaves the room. While Sally is away, Anne takes the marble from the basket, and hides it in her box. Finally, Sally returns to the room, and the child is asked where Sally will look for her marble. By around age four, most children recognize that Sally will look in her basket (where she last had the marble), not in Anne's box. Absent neurodevelopmental abnormalities such as autism, this universal ability of young children to pass various versions of the Sally-Anne test is frequently cited by cognitive scientists as unequivocal evidence that we can know the minds of others.

"To offer further insight, in recent years, neuroscientists have come up with some tempting theories of how our brain might accomplish this feat. The first promising neural mechanism was described in 1992 when the Italian neuroscientist Giacomo Rizzolatti and colleagues discovered that when rhesus macaque monkeys reach for food such as peanuts, individual cells fire in the prefrontal motor cortex. The same cells also fire when the monkeys observe a researcher reaching out for a peanut –as long as the monkey believes that the gesture is intentional and that the experimenter planned to eat the peanut. Since the same cells fire both when initiating and observing an action, they have been labelled '*mirror neurons*'; collectively, the network is called the '*mirror neuron system*'. Because the macaques could tell whether a gesture was made to eat a peanut or to play with it, researchers postulated that the mirror neuron system could detect intention –and that the monkeys possess a theory of mind. During the decade following their discovery, in fact, mirror neurons were frequently touted as the neural basis for empathy, complex social interactions, evolution of language and cultural advances characteristic of the modern human.

The behavioral neurologist V. S. Ramachandran even went so far as to assert that mirror neurons would '*do for psychology what DNA did for biology ... With knowledge of these neurons, you have the basis for understanding a host of very enigmatic aspects of the human mind: "mind-reading" empathy, imitation learning, and even the evolution of language.*'

"Ultimately, cooler heads prevailed, and skeptics downgraded the hyperbolic attributions. Marco Iacoboni, a neuroscientist at the University of California in Los



Angeles and a pioneer in the mirror neuron work, said the system operated at the basic level of recognizing simple intentions and actions –much like what we might do in a high-stakes poker game. You are about to make a bet when you notice that the player to your left is getting ready to push forward a stack of his chips. He might be making this gesture to distract you from another aspect of the game. Perhaps he is trying to distract you from his undercover partner, a player to the right. He might be trying to create a fake ‘*tell*’ to use against you in the future. A diversity of mental states can generate the same motor action. Understanding that your opponent will soon push his chips forward tells you nothing about the purpose behind the motion.

“That hardly stopped scientists from trying to prove a theory of mind. With the collapse of the mirror neuron theory, other brain regions emerged as replacement candidates. In her wildly popular 2009 TED lecture, the cognitive scientist Rebecca Saxe at MIT argues that the right temporo-parietal junction (rTPJ) –the region of brain just behind your right ear– *‘is almost completely specialized. It does almost nothing else except think about other people’s thoughts. Differences in this brain region can explain differences in adults in how we think about and judge other people.’* But we also know that the rTPJ coordinates incoming sensory inputs to create a stable physical sense of self in the environment. Transcranial magnetic stimulation can alter rTPJ function to produce the classic out-of-body experiences. Damaging the region via stroke or brain tumor can result in disordered self-awareness, even lack of recognition of paralysis. Despite this, according to Jean Decety, a cognitive scientist at the University of Chicago, a properly operating rTPJ is also necessary for us to distinguish ourselves from others.

It’s a strange loop: we are asking the same area of brain to both generate a coherent sense of self, and simultaneously step outside this frame of reference to get a fresh, unbiased perspective on another’s thoughts. Talk about running uphill against basic physiology! Despite the inadequacy of these leading neuroscience explanations of ToM, it remains hard to shake the belief that we can step inside another’s mind. Saxe begins her TED lecture with the question: *‘How is it so easy to know other minds?’* To illustrate her point, she shows two photos. The first is a mother gazing at her young child; the second is of a teenager jumping off a high cliff into the ocean below. *‘You need almost no information, one snapshot of a stranger, to guess what this woman is thinking, or what this man is.’* I look at the mother and see a combination of love and



awe. But with a moment's reflection, I realize that I have gathered together some general assumptions about what humans have in common and dropped them into her mind. I have no way of knowing if she is also worrying that her husband might feel neglected by her single-minded devotion to her child, wondering when to enroll her child in preschool, or trying to cement into memory the feeling of unconditional love that she anticipates will be challenged when her newborn morphs into a rebellious teenager. By drawing on innate and acquired beliefs about human nature, I can imagine her mind at the most universal and generic, but not at the particular. The photo of the boy diving off the cliff raises further questions.

Since I'm unaware of any neuroscience literature on the mental states of cliff-divers, let me substitute a study on the world's most famous free-soloing mountain climber, Alex Honnold. Just watch Honnold climb 3,000 feet (900 meters) straight up the vertical face of a Yosemite peak without the use of any safety equipment –no ropes, nets or harnesses. Ask yourself: is Honnold experiencing a great degree of anxiety and fear when he looks down at the "Yosemite floor thousands of feet below –or a moderate amount? Or none? Also, ask yourself how sure you are of your answer, and how you'd know if you are right. In 2016, the neuroscientist Jane Joseph at the Medical University of South Carolina compared Honnold's brain to that of another veteran mountain climber. While in an fMRI scanner, both were shown a succession of 200 supposedly high-anxiety-generating photos –gruesome burnt and disfigured corpses, mangled accident victims, as well as several high-risk mountain-climbing routes. The climber serving as a control demonstrated high-level activation of his amygdala –the area of brain that typically fires when one is fearful, frightened or anxious.

By contrast, Joseph told *Nautilus* magazine, Honnold's amygdala remained entirely silent. When asked about the photos, Honnold was puzzled. '*I can't say for sure, but I was like, whatever,*' he said. Even the 'gruesome burning children and stuff' photographs seemed to him dated and jaded. '*It's like looking through a curio museum.*' Trying to imagine a mental state you've never had is like trying to conjure what an orgasm feels like before you've ever had one. Joseph believes that Honnold's fMRI reflects the absence of the normal primary threat response, as though his fear switch has been turned off. Even so, Honnold does not consider himself fearless. He recalls incidents both related and unrelated to mountain-climbing that he calls scary.



"And now we run into a second problem –the superimposition of language on to mental states. Honnold is quite conscientious and makes meticulous surveys of his climbing routes. He readily acknowledges that a fall means death and describes this possibility as scary. Whether this represents a cognitive understanding of danger or a felt emotion is impossible to say. Given his non-firing amygdala, Alex's '*scary*' is unlikely to be like the type of fear other mortals get when standing near the ledge of a high-rise window, let alone a high cliff. Wondering what Honnold might experience while solo climbing reminds me of the philosopher Thomas Nagel's unanswerable question: '*What is it like to be a bat?*'

"This is not to say that we have no idea of what goes on in another's mind. The brain is a superb pattern-recognizer; we routinely correctly anticipate that others will feel grief at a funeral, joy at a child's first birthday party, and anger when cut off on the freeway. We are right often enough to trust our belief that others generally will feel as we do. Listen to the TED audience wince when shown the photo of the cliff diver as though personally sensing the fear he must be experiencing. And yet, if the cliff-diver has the same non-firing amygdala as Honnold, such impressions will be completely off-base. The insurmountable problem is that we are up against the limits of trying to imagine a mental state that we've never had. (Which is no different than trying to conjure what an orgasm feels like before you've had one...)

"Perhaps I'm dead wrong and my theoretical objections don't do ToM justice. Maybe there is compelling daily life evidence for ToM's central claim that we can know the beliefs, desires and intentions of another.

"Let's start with the easiest way to study ToM experimentally –lie detection. If we are good at mind-reading, surely, we should be superb lie detectors. But a 2006 review in the *Journal of Personality and Social Psychology* showed that volunteer subjects were barely better than chance at detecting when an actor was lying or telling the truth (54 per cent). A decade later, despite various efforts to improve lie-detection performance, the *Monitor on Psychology* reported that '*people's ability to detect lies is no more accurate than chance or flipping a coin. This finding holds across all types of people – students, psychologists, judges, job interviewers and law-enforcement personnel.*' If we're not so good at lie detection, perhaps we can do better at predicting violent behavior. In 1984, *The American Journal of Psychiatry* reported that psychiatrists and psychologists were vastly overrated as predictors of violence.



Even in the best of circumstances –with lengthy multidisciplinary evaluations of persons who had already manifested their violent proclivities on several occasions– psychiatrists and psychologists seemed to be wrong at least twice as often as they were right when they predicted violence. Nevertheless, the article suggested that new methodologies might improve prediction rates.

“No such luck. Thirty years later, a review article in *The British Medical Journal* concluded that: ‘*Even after 30 years of development, the view that violence, sexual or criminal risk can be predicted in most cases is not evidence-based.*’ Despite being the co-developer of a widely-used evaluation tool for violence risk-assessment, the psychologist Stephen D Hart at Simon Fraser University in Canada is equally pessimistic. *‘There is no instrument that is specifically useful or validated for identifying potential school shooters or mass murderers. There are many things in life where we have an inadequate evidence base, and this is one of them.’*

“Suicide prediction? Same story. According to two recent meta-analyses: ‘*There has been no improvement in the accuracy of suicide risk-assessment over the last 40 years.*’ The UK National Institute for Health and Care Excellence has advised that ‘assessment tools and scales designed to give a crude indication of the level of risk of suicide’ should not be used.

“All good theories are predictive. Sooner or later, they need supporting evidence. If experts cannot tell us who will be violent, or commit suicide, or is lying, isn’t it time for us to reconsider whether there are real and practical limits to our belief in ToM? No wonder Facebook has introduced its own AI system to detect those at increased risk of suicide

“Earlier, I brought up the mirror neuron controversy to emphasize that there are several low-level brain processes that might appear like higher-level functions –but are not. I suspect that the Sally-Anne and other ToM tests are analogous examples. Yes, we know that other people have minds, desires and intentions that are potentially different to our own. But putting ourselves in another’s situation is not even remotely comparable to actually feeling and thinking as another. I might be able to fit into Honnold’s climbing shoes, but I cannot crawl inside his mind.

“As I write this essay, I am reluctant to entirely accept the evidence that I’ve just presented. I cannot shake the gut feeling that there’s more to lie detection than is



revealed in the studies. On the other hand, as an inveterate poker player, I admit to being shaky at detecting bluffs, so try to base my decisions upon player betting patterns. I'm not alone. Given the predictive failures of ToM, psychologists are increasingly looking at big data rather than individual minds.

"A research team led by Stephan Ludwig at the University of Westminster in London developed automated text-mining software that analysed more than 8,000 emails bidding for awards based on a company's performance. They compared the program's ability to detect fibs in the bids against an independent investigation by the company's account managers. The program far surpassed the account managers, achieving a 70 per cent degree of accuracy. The researchers hope that their technique will eventually be able to detect deception in everything from visa applications to dating profiles. Scientists at Vanderbilt University Medical Center in Tennessee gathered data on more than 5,000 patients with physical signs of self-harm or suicidal ideation. By gathering up readily available impersonal healthcare data such as age, gender, zip codes, medications and prior diagnoses, but without directly interviewing the patients, there was 80-90 per cent accuracy when predicting whether someone would attempt suicide within the next two years, and 92 per cent accuracy in predicting whether someone would attempt suicide within the next week. When assessing the likelihood of suicide of 12,695 randomly selected hospitalized patients with no documented history of suicide attempts, the group was able to achieve even higher rates of prediction. With such results, we shouldn't be surprised that Facebook has introduced its own proprietary AI system to detect those at increased risk of suicide.

"The shortcomings of ToM have long been part of public lore –particularly in the criticism of psychiatry. But we have persisted with the belief that the fault is with psychiatry and psychiatrists, not with the basic tenet that we can know what another is thinking and feeling. For me, the final straw, the most unequivocal indictment of ToM, has been the evidence from recent political developments –from the inability to get a handle on Kim Jong-un's mindset and nuclear intentions, to the near-universal failure of political pundits to recognize the pent-up anger, fear and resentment simmering in future Trump supporters.

"I've got to confess, doubts about ToM began early in my neurology career. A young Jamaican woman had strangled her 18-month-old daughter to death. When sent to



the psych ward of San Francisco General Hospital for observation, she had attacked a moaning, wheelchair-bound woman with dementia, breaking her neck before nearby guards could intervene (the victim died of her injuries). The court-appointed psychiatrist wanted to know if this woman's episodes of violent behaviour might have a neurological basis."

"The woman wasn't at all like the person I'd pictured from reading her chart. With her bright smile, easy laugh and lilting accent, she was utterly engaging. I couldn't imagine her hurting anyone, let alone her child. As expected, the hour-long exam revealed no clues to explain her behaviour. Before leaving, I gathered up my nerve and asked her if she had any idea why she'd choked her daughter and attacked the old woman. For a long time, the woman sat motionless. She finally blurted out: *'I hate the sound of crying.'* She folded her hands in her lap and stared at me, shaking her head. Each of us was speechless, acutely aware of the unbridgeable gap between us. I was shaken by the realization that whatever I thought crying triggered in this woman, it would be pure fiction, a story I'd dream up to give some sense of explanation to the inexplicable."

"This wasn't an isolated event. During my career, I've been baffled enough times to fully accept how little access I have to the inner workings of other minds. When a patient died of a mysterious illness, I asked his 30-something son permission for an autopsy. The man agreed on the condition that he was allowed to watch. When I asked him why, his sole explanation was: *'He's my father.'*"

"A middle-aged woman collapsed during the middle of the night. The CAT scan revealed a massive brain hemorrhage that would almost certainly be fatal within hours. When I told her husband, he blinked a couple times, then said without any apparent emotion: *'OK. I think I'll go home and take a shower.'*"

"But the most singularly illustrative demonstration of the limits of ToM occurred during the psychiatry segment of my neurology board-certification oral exam. My test patient was an unkempt man who smelled of mildew.

'How long have you been in the hospital?' I began the interview.

'Three months.'

Surprised that he hadn't been tidied up, I asked again.

'A couple years, give or take. Time is elusive when nothing's happening.'

COMPASS FOR THE MIND



'Could you be more specific?'

'If you pressed me, I'd say most likely I've been here three days.'

'Do you have any prior history of mental illness?'

'Who doesn't?'

'Other members of the family as well?'

'Depends on who you ask.'

'Do you have any idea why you're here?'

'No. Do you?'

'Yes. You're my test patient for the psychiatry portion of the neurology boards. It'd sure be helpful if you at least tried to give me some straight answers.'

'Personal answers are never straight. You learn to couch yourself in yes, but, maybe, and on the other hand. You never know when you might be asked to run for president.'

Hamlet and Anna Karenina are artistic one-offs based not on deep understanding, but on the yarns we spin.

And so, it went – 30 minutes of agonizing head shakes and bobbing and weaving, while my evaluating psychiatrist took copious notes, then indicated that time was up. He excused the patient.

'So,' the examiner asked. 'What do you think?'

'I have no idea. The patient is entirely unreliable.'

'Surely you have some hunches.'

'Not really. I can't even tell if he's putting me on.'

'If passing or failing depends on making a diagnosis, what would you say?'

'Sorry. I'd just be guessing.'

'You're dismissed,' the psychiatrist said with a blank expression that I couldn't interpret.

That evening, after the exam was over, I ran into the psychiatrist. He was all smiles. 'Nice going – you passed with flying colors.'



'You're kidding? I was sure my psych exam was a complete whiff.'

The examiner laughed.

'So, what was wrong with him?' I asked.

'Who knows? He's one of our best; we use him for many of the exams in this part of the country.'

'He's a professional patient?'

'Not exactly. He was formerly hospitalized –though no one was quite sure what was wrong. While on the ward, he acquired this uncanny ability to mimic most major psychiatric diseases. This time, we asked him to portray an uncooperative and unreliable patient.'

'So, he does have an underlying mental disorder?'

The examiner simultaneously shrugged and smiled. 'Have a safe flight home.'

"I've concluded that tragedy can create otherwise unimaginable responses. This is hardly mind-reading. Conjuring a different view of the world is a rare talent requiring an extraordinary leap of imagination: Hamlet, Madame Bovary and Anna Karenina are artistic one-offs based not on deep understanding, but yarns we spin about each other's intentions and motivations. We make up stories about our spouses, our kids, our leaders, and our enemies. Inspiring narratives get us through dark nights and tough times, but we'll always make better predictions guided by the impersonal analysis of big data than by the erroneous belief that we can read another's mind."



Psychokinesis (PK)

Psychokinesis, a linguistic blend, or portmanteau of the Greek language words (ψυχή "mind" and κίνησις "movement"), or Telekinesis (from τηλε- "far off" and κίνηση "movement"), is an alleged psychic ability allowing a person to influence a physical system without physical interaction. It was coined in 1914 by American author Henry Holt in his book *On the Cosmic Relations*. The American parapsychologist J.B. Rhine coined the term 'extra-sensory perception' to describe receiving information paranormally from an external source.

The word 'telekinesis' motion was first used in 1890 by Russian psychical researcher Alexander N. Aksakof; it refers to the movement and/or levitation of physical objects by purely mental force without any physical intervention.

Fictional universes and New Age beliefs do not sit well with the scientific community at large, and numerous evaluations (notably in Physics) have not produced **any** reliable, repeatable demonstration.

Cognitive bias research has suggested that people are susceptible to illusions of PK. These include both the illusion that they themselves have the power, and that the events they witness are real demonstrations of PK. *'Some of the worst examples of confirmation bias are in research on parapsychology (...) Arguably, there is a whole field here with no powerful confirming data at all. But people want to believe, and so they find ways to believe'* (Sternberg RJ et al. 2007).

Magicians (illusionists) have successfully simulated some of the specialized abilities of psychokinesis, such as object movement, spoon bending, levitation and teleportation.



There are many impressive magic tricks available to amateurs and professionals to simulate psychokinetic powers. Metal objects such as keys or cutlery can be bent using several different techniques, even if the performer has not had access to the items beforehand. And there are many ways for faking psychokinetic metal bending (PKMB). These include switching straight objects for pre-bent duplicates, the concealed application of force, and secretly inducing metallic fractures.



Research has also suggested that (PKMB) effects can be created by verbal suggestion. Psychokinesis and telekinesis have commonly been used as superpowers in comic books, movies, television, computer games, literature, and other forms of popular culture.

Internationally there are individual skeptics of the paranormal and skeptics' organizations who offer cash prize money for demonstration of the existence of an extraordinary psychic power, such as psychokinesis. Prizes have been offered specifically for PK demonstrations: for example, businessman Gerald Fleming's offer of £250,000 to Uri Geller if he can bend a spoon under controlled conditions. The James Randi Educational Foundation offered *the One Million Dollar Paranormal Challenge* to any accepted candidate who managed to produce a paranormal event in a controlled, mutually agreed upon experiment.



A Third Way: The Aztec One



Courtesy Metropolitan Museum of Arts

Aztec virtue ethics is distinct from 'Western' forms, such as Plato's or Aristotle's in two aspects: the first is that we not overcome our vices so much as manage them. The second is that we do not manage them on our own, but rather do so with the help of another person.

While Plato and Aristotle were concerned with *character*-centered virtue ethics, the Aztec approach is perhaps better described as *socially*-centered virtue ethics. If the Aztecs were right, then 'Western' philosophers have been too focused on individuals, too reliant on assessments of character, and too optimistic about the individual's ability to correct her own vices. Instead, according to the Aztecs, we should look around to our family and friends, as well as our ordinary rituals or routines, if we hope to lead a better, more worthwhile existence. This distinction bears on an



important question: just how bad are good people allowed to be? Must good people be moral saints, or can ordinary folk be good if we have the right kind of support? This matters for fallible creatures who try to be good but often run into problems. Yet it also matters for questions of inclusivity. If being good requires exceptional traits, such as practical intelligence, then many people would be excluded –such as those with cognitive disabilities. That does not seem right. One of the advantages of the Aztec view, then, is that it avoids this outcome by casting virtue as a cooperative, rather than an individual, endeavor. At its core, Aztec virtue ethics has three main elements. One is a conception of the good life as the ‘rooted’ or worthwhile life. Second is the idea of right action as the mean or middle way. Third and final is the belief that virtue is a quality that’s fostered socially.

When we speak about the Aztecs –the people dominant in large parts of central America prior to the 16th-century Spanish conquest– even professional philosophers are often surprised to learn that the Aztecs were a philosophical culture. They’re even more startled to hear that we have (many volumes of) their texts recorded in their native language, Nahuatl. While a few of the pre-colonial hieroglyphic-type books survived the Spanish bonfires, our main sources of knowledge derive from records made by Catholic priests, up to the early 17th century. Using the Latin alphabet, these texts record the statements of *tlamatinime*, the indigenous philosophers, on matters as diverse as bird-flight patterns, moral virtue, and the structure of the cosmos. To explain the Aztec conception of the good life, it’s helpful to begin in the sixth volume of a book called the *Florentine Codex*, compiled by Father Bernardino of Sahagún. Most of the text contains edifying discourses called *huehuetlatolli*, the elders’ discourses. This section records the speeches following the appointment of a new king, when the noblemen appear to compete for the most eloquent articulation of what an ideal monarch should be and do. The result is a succession of speeches like those in Plato’s *Symposium*, wherein each member tries to produce the most moving expression of praise.

At the end of the noblemen’s speeches, the king himself turns to address his people. He tries to articulate the character of excellent men and women, the standard he expects from his subjects. Of men, he says:

And he is revered; in truth [nelly], he is taken to be a defender and sustainer. He becomes like the silk cotton tree, like the cypress tree, by which everywhere



people take refuge ... [Yet] this same [virtuous] one weeps and sorrows. Is there anyone who does not wish for happiness?

The passage is striking because it highlights a fundamental difference between the Ancient Greek and the Aztec approaches to the good life – namely, that the Aztecs did not believe there was any conceptual link between leading our best lives on the one hand and experiencing pleasure or ‘happiness’ on the other. This image of the virtuous man finds its closest Greek analogue in the *Iliad*’s Hector, the person to whom everyone flocked for refuge, the one who supported his whole house, but was nevertheless undone by Achilles.

A common saying among the Aztecs was that ‘the earth [*tlalticpac*] is slippery, slick’. Elsewhere, the meaning is clarified: ‘Perhaps at one time, one was of good life; later, he fell into some wrong, as if he had slipped in the mud.’ The Aztecs held, in short, that it’s unrealistic to think that anyone can lead a perfectly good life, one in which you never slip up. A better goal, then, is to try to lead a rooted life, which they called *neltiliztli*: literally, rootedness. In this kind of life, one can manage the mistakes and slip-ups well, rather than avoid them altogether. The reward is not happiness necessarily, but the promise of a worthwhile life. If we’re convinced by this line of reasoning –that the good life consists in doing what is worthwhile, regardless of whether it makes us happy– the next question becomes: what does it take to lead a rooted life?

For the Aztecs, a rooted life is one that is lived well, with excellence. The traditional word used for this concept in English is ‘*virtue*’. Our word finds its origin in the Latin *virtu*, a metonymic expression that aims to capture what is best about a man (*vir*) – manliness, in brief. The Aztecs also used a poetic expression for virtue: *in qualli in yectli*, meaning ‘*the good and the straight*’. For example, in the confessional rite, which is also recorded as an edifying discourse in the sixth volume of the *Florentine Codex*, the confessor tells the penitent that before committing wrongs:

You were excellent [ca ti-qualli, ca ti-yectli] when you were sent here ... You were cast, perforated like a precious green stone, a bracelet, a precious turquoise.

The idea itself is clear: before vicious actions, one is virtuous, one is like the most precious of things, turquoise and jade. Afterwards, the confessor tells the penitent, one is unbalanced, filthy. Thus, when one’s actions are virtuous, one maintains



balance, is rooted like the tree to whom others flock for cover. These virtues include: moderation, justice, prudence and courage.

What the list of virtues doesn't answer is: just what is it that makes an act courageous rather than rash? The Aztec's answer is that virtuous actions follow the middle path, they strike the mean. In an edifying discourse, a mother tells her daughter about the difficulties of living on the earth (*tlalticpac*):

On earth, we live, we travel along mountain peaks. Over here there is an abyss, over there is an abyss. If thou goest over here, or if thou goest over there, thou wilt fall in. Only in the middle [tlanepantla] doth one go, doth one live. Place this word, my daughter, dove, little one, well within the chambers of thy heart.

As the passage suggests, the mean or middle way (*tlanepantla*) is not so much an exact middle of something as it is a metaphor for the apt expression of a choice, action or feeling. In other passages, the middle choice is the one that represents the right form of dress, with clothes that are neither too shabby, nor too formal. For example, the text presents as bad the case of an overly carnal woman, who conducts and presents herself sexually even when shopping in the marketplace. Our actions are virtuous, then, when they are aptly expressed. This aptness of expression turns on the circumstances (e.g. how formally we should dress), our social position (e.g. male or female, commoner or noble), our social role (e.g. warrior or physician), and whether we are performing a rite of a specific sort. A memorable example of this last kind concerns drunkenness. Public drunkenness was severely punished in Tenochtitlan, the capital of the Aztec empire; for nobles, the penalty was death. But the elderly at a wedding were not only permitted but expected to become drunk.

There was, then, no formal test for the apt expression of an action, but one could learn to develop a sense for it in the way that we might speak today of a person's aesthetic sensibilities. Just as we might say that our co-worker's sense of style is impeccable, we also know of some people who are just good at understanding human relations in a nuanced way, who always seem to know what to do. How we develop this understanding of virtuous action leads us to the final pillar of Aztec ethics.

Recall that for the Aztecs, our lives are led on the slippery earth. Moral education, then, is not something that one completes in childhood or adolescence. Rather, it is something that's needed throughout life. Therefore, even the king is admonished by



the old, and the elderly admonish each other. The virtues, thus, are sustained and retrained throughout life. This training can occur in at least three ways. The first of these is a sort of moral education that parallels what happens in Plato's *Republic* (books 3-4) or Aristotle's *Politics* (book 8). In the third volume of the *Florentine Codex*, for example, there's a detailed set of passages that address education among the young and adolescents. Early in life, up to about the age of six, children are taught at home by their parents, and are to be given a practical education as well as instruction on basic moral teachings. When the children go off to school, they're divided into two groups: those who go to learn a specific trade or become warriors, and those who would go to learn the arts suitable to the noble courts, such as law, astronomy, history, philosophy and religious matters. Of those students who pursued a '*noble*' education, the development of virtues was a primary focus. The reasoning was that a greater level of virtue, especially of moderation, would be required if they ever became a lord. The students would thus have to get up very early in the morning to perform tasks, to gather items in thorn bushes, to sleep in the cold, and to go on fasts. These practices, and others, were set up to enable the students to practice and habituate to moderation in its various forms. Comparatively, one priest remarks, '*the manner of life of the [other] youths was not very good*', since they were not held to the same standards of excellence. After this schooling, virtues were fostered via rites that weren't strictly religious – what might best be called social rituals. For example, when merchants were preparing to travel to another city, they made special preparations. An auspicious day would be selected by a day-sign reader, and the merchants would make a burnt offering to the appropriate divinities the night before. Then, on the dawn of the day of departure, they would ask the leaders of their neighborhood to appear. Seated in a circle that reflected their stature, they would describe the details of their travel, and the leaders would respond with advice about the journey, contingency plans, and urge certain moral virtues so as not to offend others in foreign lands.

While this was a ritualized matter, the practice allowed merchants to put their affairs in order before undertaking what was often a dangerous exercise. This risk explains why they wanted to make their peace with the divine and their community before venturing out. Yet the practice also provided a socially acceptable means to exchange relevant information about the journey, as well as urge certain virtues of character, including moderation and circumspection. It served, in short, as a sort of '*refresher*



course' in moral virtue. Yet the groups themselves were arranged in ways that enabled the merchants to support each other. Mothers and fathers would arrange for their children to travel with others, reasoning that '*perhaps, with their help, he will become prudent, mature, understanding*'. The young, however, carried no heavy merchandise (the Aztecs did not have horses, and so carried much of the burden themselves). The most experienced would lead the group, the others would carry what was appropriate, and each encouraged the others so that they could remain moderate and circumspect. Finally, the merchant ritual highlights something that has been implicit in my argument so far: namely that the excellence of practical reason or prudence (Greek: *phronēsis*) was not primarily a quality that individuals possessed. For Aristotle, for example, the *phronimos* is a rare person who could discern the right means of achieving ends. This explains why Aristotle thought that the best society was a monarchy that was ruled by a single and most wise man. The Aztecs, by contrast, thought that practical reason was best exercised in groups – and one finds evidence for this everywhere, from the merchant rites, to the choice of school for children, to the decisions of the king himself. Moreover, the Aztecs weren't democratic about the matter. Rather than weigh all advice evenly, they gave greater weight in the deliberative process to those with the most practical experience (*ixtlamatiliztli*), who were often the elderly. This explains why the leader of the merchants asks the elderly men and women for advice, even though he is thought to be the principle trainer of the young.

Virtue is thus fostered socially among the Aztecs throughout life. This begins in one's early childhood, continues through formal education, advances in one's profession where one is '*refreshed*' by one's peers, and is sustained by social rituals. Even the assessment of '*the middle way*' remains a collective rather than personal effort, since it was believed that practical wisdom worked best in groups that placed a high value on the opinions of the most experienced members. The Aztecs thought all this because they believed that we humans lead lives on the slippery earth (*tlaticpac*). The best guard we have against this eventuality, then, is each other.

Plato's *Republic* ends with the myth of Er, a warrior who dies and returns to Earth to tell others about the afterlife. Like many of the myths in the Platonic corpus, this one expresses not something that Plato holds, but something for which we might hope. In Er's transcendent experience, he sees that in the afterlife the virtuous are



rewarded and the bad are punished for 1,000 years. After this term, they draw lots to determine how they will be reincarnated, and their choices are informed by the states of their character (that is, whether they are virtuous or vicious). Odysseus has bad luck and is given the last pick of lives, after everyone else has been able to go in front of him. Yet he chooses the same life he would have picked if he'd been given first choice. The *Republic* thus ends with a message: if you are virtuous, not only will you be rewarded in the afterlife, but above all, you can beat chance itself.

The Aztecs would never have written such a story! Plato, of course, is replacing the heroic warrior Achilles with the thinking man Odysseus. We saw above that the Aztecs would likely have preferred Hector –the supporting beam for the house of Troy, despite being on the losing side. But this preference suggests a stronger disagreement, since the Aztecs would have held that it is an error to think that virtue can save one from the vicissitudes of chance. No matter how virtuous you are, there's always a possibility that a younger, more skilled, and more impetuous man with a sword will strike you down. And we ourselves are always prone to slipping up, despite our better upbringing. Wisdom in human affairs consists in the recognition that the best that we can do is to learn to stand with the help of others, to alter our circumstances for the better, and to clasp hands so that we can pull ourselves back up when we fall. This is the fundamental insight behind the social dimension of Aztec ethics. As challenging as it seems to 'Western' sensibilities, perhaps there's enough that's right about it to help us lead better, more worthwhile and rooted lives.



Meditation and Neurosciences

Can training the mind make us more attentive, altruistic, and serene? Can we learn to manage our disturbing emotions in an optimal way? What are the transformations that occur in the brain when we practice meditation? In a new book titled *Beyond the self*, two friends—Matthieu Ricard, who left a career as a molecular geneticist-biologist at the Institut Pasteur to become a Buddhist monk in Nepal, and Wolf Singer, a distinguished neuroscientist (my friend too!)—engage in an unusual conversation about meditation and the brain.

Matthieu Ricard (Nepali: मा रु रका) was born 15 February 1946 and is a French writer and Buddhist monk who resides at Shechen Tennyi Dargyeling Monastery in



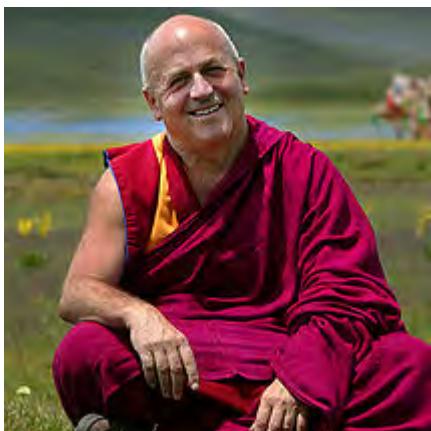
Nepal. He grew up among the personalities and ideas of French intellectual circles; his father Jean-François (*nom-de-plume* Jean-François Revel) was a philosopher, prolific writer and polemicist.

Matthieu worked under the Nobel Laureate François Jacob, and received a Ph.D. degree in molecular genetics from the Pasteur Institute in 1972. He then decided to forsake his scientific career and instead study Tibetan Buddhism with Kangyur Rinpoche and some other great masters of that tradition, and became the close student and attendant of Dilgo Khyentse Rinpoche until Rinpoche's death in 1991. He resides in Nepal and holds French and Nepali citizenships.

Ricard has been called the "*happiest person in the world*" by several popular media. Matthieu Ricard was a volunteer subject in a study performed at the University of Wisconsin-Madison on happiness, scoring significantly above the average of hundreds of volunteers.

He is the author and photographer of *Tibet, An Inner Journey*, and of many award-winning photobooks, as well of the dialogue with his father *The Monk and the Philosopher* that was a best-seller in Europe, as well as many other highly regarded books.

Matthieu Ricard is a board member of *the Mind and Life Institute* and received the French National Order of Merit for his humanitarian work in the East.



Matthieu Ricard & Wolf Singer



Wolf Singer was born in Munich, on 9 March 1943, and studied medicine at the Ludwig Maximilian University of Munich (LMU Munich) from 1965 onwards (as a scholarship holder of the German Academic Scholarship Foundation) and in 1965/66 spent two semesters at the Sorbonne in Paris.

In 1968, he received his PhD from Ludwig Maximilian University with his doctoral thesis on "*The role of telencephalic commissures in bilateral EEG-synchrony*". His doctoral supervisor was Otto Detlev Creutzfeldt of the Max Planck Institute for Psychiatry. During his advanced training in neurophysiology, he spent a year at the University of Sussex in England. In 1970, he received his medical license as a physician while working as a doctor at the University Hospital Munich.

In 1975, he habilitated in Physiology at the Medical Faculty of the Technical University of Munich. In 1981, he was appointed a member of the Max Planck Society and Director of the Department of Neurophysiology at the Max Planck Institute for Brain Research in Frankfurt am Main. There, together with Walter Greiner and Horst Stöcker, he founded the Frankfurt Institute for Advanced Studies (FIAS) as well as the Brain Imaging Center (BIC) in 2004 and the Ernst Strüngmann Science Forum and the Ernst Strüngmann Institute (ESI). He is an honorary professor of physiology at the Goethe University Frankfurt. Since 2011 he has the status of an emeritus and as such continues to operate the "Singer-Emeritus-Department" at MPI Frankfurt.

The aim of the work of his neurophysiological department is to elucidate the neuronal processes in the case of so-called *higher cognitive performance*, such as in the case of visual perception, in memory, or in other ways of cognition. In his institute, among other things, the emergence of visual disorder amblyopia is also being studied.

In the neurophysiological research community, Singer is internationally known for his research and reflections on the physiological basis of *attention and identification procedures*. The institute, with its technically elaborate experiments, is primarily concerned with the binding problem, where the question is at the center of how different sensory aspects of an object - form, color, hardness, weight, smell, etc. - can be combined into a single object experience. The theory is based, among others, on the works by Christoph von der Malsburg. It attaches great importance to the temporal synchronicity of neuronal activity in the cortex. Corresponding oscillator frequencies of the nerve cells would then refer to the same object, while other



frequencies would mark other objects.

Singer's thesis on the **free will** is particularly controversial. He declined to speak of a free will. This he expressed publicly in an article published in the *Frankfurter Allgemeine Zeitung* in 2004, whose subtitling he made in the slightly modified formulation "*Brain structures determine us: We should stop talking about free will*" as the main title of the reprinting of an extensive scientific contribution to the discussion "*Brain as a Subject? (Part I)*" in the German Journal of Philosophy.

Wolf Singer argues that the natural scientific causal model, according to which the world is to be viewed as a closed deterministic whole, excludes freedom. Proponents of the concept of freedom as Peter Bieri argue, however, that the notion of freedom of will is only under certain conditions, contrary to determinism and that these assumptions need not to be accepted.

Singer also demands that the lack of free will must have consequences for our conceptions of guilt and punishment: if no one can decide freely from a scientific point of view, it is not useful to make people responsible for their actions. Socially intolerable persons would have to be "locked away" and "subjected to specific educational programs".

He is the recipient of (too) many awards and honors, honorary doctorates, and a member or fellow on many academies.

Hereunder is an edited version of Ricard and Singer's conversation as initially published in *The Atlantic* on 17 December 2017:

"Although one finds in the Buddhist literature many treatises on "traditional sciences"—medicine, cosmology, botanic, logic, and so on—Tibetan Buddhism has not endeavored to the same extent as Western civilizations to expand its knowledge of the world through the natural sciences. Rather it has pursued an exhaustive investigation of the mind for 2,500 years and has accumulated, in an empirical way, a wealth of experiential findings over the centuries. A great number of people have dedicated their whole lives to this contemplative science.

Modern Western psychology began with William James just over a century ago. In 2003, at the MIT, during the Mind and Life meeting "Investigating the Mind", Stephen Kosslyn (then Chair of Psychology at Harvard) started his presentation by saying, "I want to begin with a declaration of humility in the face of the sheer amount of data that the



contemplatives are bringing to modern psychology." It does not suffice to ponder how the human psyche works and elaborate complex theories about it, as, for instance, Freud did. Such intellectual constructs cannot replace two millennia of direct investigation of the workings of mind through penetrating introspection conducted with trained minds that have become both stable and clear.

What nature gave us is by no means entirely negative; it is just a baseline. Few people would honestly argue that there is nothing worth improving about the way they live and the way they experience the world. Some people regard their own specific weaknesses and conflicting emotions as a valuable and distinct part of their "personality," as something that contributes to the fullness of their lives. They believe that this is what makes them unique and argue that they should accept themselves as they are. But isn't this an easy way to giving up on the idea of improving the quality of their lives, which would cost only some reasoning and effort?

Modern conventional education does not focus on transforming the mind and cultivating basic human qualities such as lovingkindness and mindfulness. Buddhist contemplative science has many things in common with cognitive therapies, with those using mindfulness as a foundation for remedying mental imbalance. As for psychoanalysis, it seems to encourage rumination and explore endlessly the details and intricacies of the clouds of mental confusion and self-centeredness that mask the most fundamental aspect of mind: luminous awareness.

Rumination should be the total opposite of what you do during meditation. It is also well known that constant rumination is one of the main symptoms of depression. What we need is to gain freedom from the mental chain reactions that rumination endlessly perpetuates. One should learn to let thoughts arise and be freed to go as soon as they arise, instead of letting them invade one's mind. In the freshness of the present moment, the past is gone, the future is not yet born, and if one remains in pure mindfulness and freedom, potentially disturbing thoughts arise and go without leaving a trace.

What you must learn then is to adopt a much subtler approach to your internal emotional theater, to learn to identify with much higher resolution the various connotations of your feelings. In the beginning, it is difficult to do it as soon as an emotion arises, but if you become increasingly familiar with such an approach, it becomes quite natural. Whenever anger is just showing its face, we recognize it right away and deal with it before it becomes too strong.



It is not unlike a scientific endeavor except that the analytical effort is directed toward the inner rather than the outer world. Science also attempts to understand reality by increasing the resolving power of instruments, training the mind to grasp complex relations, and decomposing systems into ever smaller components.

It is said in the Buddhist teachings that there is no task so difficult that it cannot be broken down into a series of small, easy tasks.

The Western approach, while using the first-person perspective for the definition of mental phenomena, clearly favors the third-person perspective for its investigation. There is nothing another person can look at and judge as valid; the observers can only rely on the verbal testimony of subjective states. You first should rely on the credible testimony of a number of scientists, but later you can train in the subject and verify the findings firsthand. This is quite like contemplative science. You first need to refine the telescope of your mind and the methods of investigations for years to find out for yourself what other contemplatives have found and all agreed on. The state of pure consciousness without content, which might seem puzzling at first sight, is something that all contemplatives have experienced. So, it is not just some sort of Buddhist dogmatic theory. Anyone who takes the trouble to stabilize and clarify his or her mind will be able to experience it.

Regarding cross-checking interpersonal experience, both contemplatives and the texts dealing with the various experiences a meditator might encounter are quite precise in their descriptions. When a student reports on his inner states of mind to an experienced meditation master, the descriptions are not just vague and poetic. The master will ask precise questions and the student replies, and it is quite clear that they are speaking about something that is well defined and mutually understood. However, in the end, what matters is the way the person gradually changes. If, over months and years, someone becomes less impatient, less prone to anger, and less torn apart by hopes and fears, then the method he or she has been using is a valid one.

An ongoing study seems to indicate that while they are engaged in meditation, practitioners can clearly distinguish, like everyone who is not distracted, between pleasant and aversive stimuli, but they react much less emotionally than control subjects. While retaining the capacity of being fully aware of something, they succeed in not being carried away by their emotional responses.



This process requires perseverance. You need to train again and again. You can't learn to play tennis by holding a racket for a few minutes every few months. With meditation, the effort is aimed at developing not a physical skill but an inner enrichment. In extreme cases, you could be in a simple hermitage in which nothing changes or sitting alone always facing the same scene day after day; the outer enrichment is almost nil, but the inner enrichment is maximal. You are training your mind all day long with little outer stimulation. Furthermore, such enrichment is not passive, but voluntary, and methodically directed. When you engage for eight or more hours a day in cultivating certain mental states that you have decided to cultivate and that you have learned to cultivate, you reprogram the brain. In a sense, you make your brain the object of a sophisticated cognitive process that is turned inward rather than outward toward the world around you. You apply the cognitive abilities of the brain to studying its own organization and functioning, and you do so in an intentional and focused way, like when you attend to events in the outer world and when you organize sensory signals into coherent percepts. You assign value to certain states and you try to increase their prevalence, which probably goes along with a change in synaptic connectivity in much the same way as it occurs with learning processes resulting from interactions with the outer world.

Brain development is characterized by a massive proliferation of connections and is paralleled by a shaping process through which the connections being formed are either stabilized or deleted according to functional criteria, using experience and interaction with the environment as the validation criterion. This developmental reorganization continues until the age of about 20. The early stages serve the adjustment of sensory and motor functions, and the later phases primarily involve brain systems responsible for social abilities. Once these developmental processes come to an end, the connectivity of the brain becomes fixed, and large-scale modifications are no longer possible. The existing synaptic connections remain modifiable, but you can't grow new long-range connections. In a few distinct regions of the brain, such as the hippocampus and olfactory bulb, new neurons are generated throughout life and inserted into the existing circuits, but this process is not largescale, at least not in the neocortex, where higher cognitive functions are supposed to be realized.

A study of people who have practiced meditation for a long time demonstrates that structural connectivity among the different areas of the brain is higher in meditators



than in a control group. Hence, there must be another kind of change allowed by the brain. There is ample evidence of this from reeducation programs, where practice leads to small but incremental behavior modifications. There is also evidence for quite dramatic and sudden changes in cognition, emotional states, and coping strategies. In this case, the same mechanisms that support learning—distributed changes in the efficiency of synaptic connections—lead to drastic alterations of global brain states. You could also change the flow of neuron activity, as when the traffic on a road increases significantly.

What changes with learning and training in the adult is the flow of activity. The fixed hardware of anatomical connections is rather stable after age 20, but it is still possible to route activity flexibly from A to B or from A to C by adding certain signatures to the activity that ensure that a given activation pattern is not broadcast in a diffuse way to all connected brain regions but sent only to selected target areas. The results of the studies conducted with trained meditators indicate that they have the faculty to generate clean, powerful, well-defined states of mind, and this faculty is associated with some specific brain patterns. Mental training enables one to generate those states at will and to modulate their intensity, even when confronted with disturbing circumstances, such as strong positive or negative emotional stimuli. Thus, one acquires the faculty to maintain an overall emotional balance that favors inner strength and peace.

You must use your cognitive abilities to identify more clearly and delineate more sharply the various emotional states, and to train your control systems, probably located in the frontal lobe, to increase or decrease selectively the activity of subsystems responsible for the generation of the various emotions.

An analogy for this process of refinement could be the improved differentiation of objects of perception, which is known to depend on learning. With just a little experience, you can recognize an animal as a dog. With more experience, you can sharpen your eye and become able to distinguish with greater and greater precision dogs that look similar. Likewise, mental training might allow you to sharpen your inner eye for the distinction of emotional states. In the naïve state, you can distinguish good and bad feelings only in a global way. With practice, these distinctions would become increasingly refined until you could distinguish more and more nuances. The taxonomy of mental states should thus become more differentiated. If this is the case, then cultures



exploiting mental training as a source of knowledge should have a richer vocabulary for mental states than cultures that are more interested in investigating phenomena of the outer world.

Buddhist taxonomy describes 58 main mental events and various subdivisions thereof. It is quite true that by conducting an in-depth investigation of mental events, one becomes able to distinguish increasingly more subtle nuances. Take anger, for instance. Often anger can have a malevolent component, but it can also be rightful indignation in the face of injustice. Anger can be a reaction that allows us to rapidly overcome an obstacle preventing us from achieving something worthwhile or remove an obstacle threatening us. However, it could also reflect a tendency to be short-tempered. If you look carefully at anger, you will see that it contains aspects of clarity, focus, and effectiveness that are not harmful in and of themselves. If you are able to recognize those aspects that are not yet negative and let your mind remain in them, without drifting into the destructive aspects, then you will not be troubled and confused by these emotions.

Another result of cultivating mental skills is that, after a while, you will no longer need to apply contrived efforts. You can deal with the arising of mental perturbations like the eagles I see from the window of my hermitage in the Himalayas. The crows often attack them, even though they are much smaller. They dive at the eagles from above trying to hit them with their beaks. However, instead of getting alarmed and moving around to avoid the crow, the eagle simply retracts one wing at the last moment, letting the diving crow pass by, and extends its wing back out. The whole thing requires minimal effort and is perfectly efficient. Being experienced in dealing with the sudden arising of emotions in the mind works in a similar way. When you can preserve a clear state of awareness, you see thoughts arise; you let them pass through your mind, without trying to block or encourage them; and they vanish without creating many waves. what we do when we encounter severe difficulties that require fast solutions, such as a complicated traffic situation. We immediately call on a large repertoire of escape strategies that we have learned and practiced, and then we choose among them without much reasoning, relying mainly on subconscious heuristics. Apparently, if we are not experienced with contemplative practice, we haven't gone through the driving school for the management of emotional conflicts.

Complex situations become greatly simplified through training and the cultivation of



effortless awareness. When you learn to ride a horse, as a beginner you are constantly preoccupied, trying not to fall at every movement the horse makes. Especially when the horse starts galloping, it puts you on high alert. But when you become an expert rider, everything becomes easier. Riders in eastern Tibet, for instance, can do all kinds of acrobatics, such as shooting arrows at a target or catching something on the ground while galloping at full speed, and they do all that with ease and a big smile on their face.

One study with meditators showed that they can maintain their attention at an optimal level for extended periods of time. When performing what is called a continuous performance task, even after 45 minutes, they did not become tense and were not distracted even for a moment. When I did this task myself, I noticed that the first few minutes were challenging and required some effort, but once I entered a state of "attentional flow," it became easier.

This resembles a general strategy that the brain applies when acquiring new skills. In the naïve state, one uses conscious control to perform a task. The task is broken down into a series of subtasks that are sequentially executed. This requires attention, takes time, and is effortful. Later, after practice, the performance becomes automatized. Usually, the execution of the skilled behavior is then accomplished by different brain structures than those involved in the initial learning and execution of the task. Once this shift has occurred, performance becomes automatic, fast, and effortless and no longer requires cognitive control.

This type of learning is called procedural learning and requires practice. Such automatized skills often save you in difficult situations because you can access them quickly. They can also often cope with more variables simultaneously due to parallel processing. Conscious processing is more serialized and therefore takes more time. In the teachings of the meditating process, it says that when one begins to meditate, on compassion, for instance, one experiences a contrived, artificial form of compassion. However, by generating compassion repeatedly, it becomes second nature and spontaneously arises, even during a complex and challenging situation.

Julie Brefczynski and Antoine Lutz studied the brain activity of novice, relatively experienced, and very experienced meditators when they engage in focused attention. Different patterns of activity were observed depending on the practitioners' level of experience. Relatively experienced meditators (with an average of 19,000 hours of practice) showed more activity in attention-related brain regions compared with

COMPASS FOR THE MIND

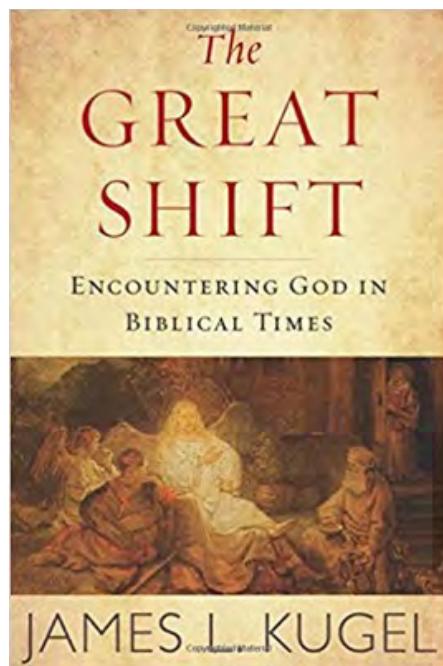


novices. Paradoxically, the most experienced meditators (with an average of 44,000 hours of practice) demonstrated less activation than the ones without as much experience. These highly advanced meditators appear to acquire a level of skill that enables them to achieve a focused state of mind with less effort. These effects resemble the skill of expert musicians and athletes capable of immersing themselves in the “flow” of their performances with a minimal sense of effortful control. This observation accords with other studies demonstrating that when someone has mastered a task, the cerebral structures, put into play during the execution of this task, are generally less active than they were when the brain was still in the learning phase. This suggests that the neuronal codes become sparser, perhaps involving fewer but more specialized neurons, once skills become highly familiar and are executed with great expertise. To become a real expert seems to require then at least as much training as is required to become a world-class violin or piano player. With four hours of practice a day, it would take you 30 years of daily meditation to attain 44,000 hours.”

The Monk and the Scientist both agreed on much, more than they diverged upon. But, Matthieu Ricard is not *only* a basic Tibetan Buddhist monk, and Wolf Singer is not *only* a famous and respected neuroscientist; both are open-minded, teaching-oriented, always exploring, learning and questioning. As it should be.



The Bible Read Through Neuroscience



The Abrahamic religions have shaped, sculpted and molded the Western world, and colonized its Empires – never for the better, nor the future of the indigenous populations. There must have been a *charm*, a spell, an irresistible fascination to embark an initial handful of rapacious and hated nomad shepherds in very risky expedition, without ever (or seldom) doubt or humility. It succeeded, expanded and ultimately became *THE* reference, *THE* truth, *THE* only accepted faith. It remains *de facto* the unique and universal *Ecclesia*, and the millennial Hebrews have amplified and magnified the conquering, contemptuous, scornful messages of the Torah against all the *Nokri* (נָגוּרִים).

James Kugel has spent his entire scholarly career studying the Bible, but some very basic questions about it still obsess him. What was it about the minds of ancient Israelites that allowed them to hear and see God directly—or at least, to believe that they did? Were the biblical prophets literally hearing voices and seeing visions, understanding themselves to be transmitting God's own exact words? If so, why did such direct encounters with God become rarer over time?



In his new book, *The Great Shift*, Kugel investigates these questions through the lens of neuroscientific findings. First, Kugel uses biblical research to show that ancient people had a “*sense of self*” that was fundamentally different from the one modern Westerners have—and this enabled them to experience and interpret prophecy differently than we do. Then he uses scientific research to show that we shouldn’t assume their view was wrong. If anything, our modern Western notion of the bounded, individual self is the anomaly; most human beings throughout history conceived of the self as a porous entity open to intrusions. In fact, much of the rest of the world today still does.

Kugel cites several studies showing that even now, many healthy people hear voices—as much as 15 percent of the general population. He also cites a recent cross-cultural study in which researchers interviewed voice hearers in the United States, Ghana, and India. The researchers recorded “*striking differences*” in how the different groups of people felt about the voices they hear: in Ghana and India, many participants “*insisted that their predominant or even only experience of the voice was positive. ... Not one American did so.*” “*These results,*” Kugel concludes, “*would suggest that a society’s ‘givens’ have a lot to do with how voice hearing is interpreted*”—cultural conditioning impacts whether a phenomenon like prophecy will be celebrated or pathologized.

Anthropologists who have studied cultures that are very different from ours—in sub-Saharan Africa, South America, and elsewhere—have come to focus increasingly on this elusive item. A people’s “*sense of self*” is the idea that they carry around in their heads about who “*I myself*” am and how I fit into the larger world. What it consists of turns out to vary greatly from one society to another and from period to period.

For the most part, we tend to assume that biblical figures have the same sense of self as we do; when the Bible says that God appeared to Abraham outside his tent or called to Moses out of a burning bush, we have to dismiss such things as some sort of figurative language, or else we just shrug them off: such things happened “*back then*” but they don’t anymore.

But if we go back far enough in biblical history, ancient Israelites seem to have conceived of themselves in terms very different from our own. Getting inside their minds, seeing things the way they saw them, is the key to understanding what the



Bible is trying to get across.

The human mind could be penetrated by outside forces. Not only by God—who is sometimes depicted as going inside people, “*probing their kidneys and heart*” to find out what they’re truly thinking—but by various sorts of “*spirits*.” Some of them were benign, but others were wicked spirits dispatched by Satan to take over. They were like bacteria; you couldn’t see them, but once they got inside of you they would take charge, making you think and do things against your will. So, the Bible and other texts, from the same period, contain prayers specifically designed to ward off these evil spirits. That’s part of what James Kugel means by being *semipermeable*. You couldn’t stop God from entering your mind, but sometimes you could head off a wicked angel.

We tend to think that there is some central part of our brains that acts as a clearinghouse, processing all the outside sensory data that come into our heads via our eyes and ears and so forth and then deciding what to think and how to respond. The problem with this picture is that scientists cannot find anything physical in the brain that seems to act as the clearinghouse. In physiological terms, there is no “*I myself*”; such an entity seems to be a mental construct, something human beings evolved over millions of years but which has no independent, physical reality. This “*I myself*” is not, we believe, identical to our bodies or our brains—we have a body and a brain, but the possessor of these things is somehow conceived to be separate from them, some fictional owner, me. This, as far as most neuroscientists are concerned, is simply a mental construct. Science doesn’t need an “*I myself*” to explain what goes on in our brains, but apparently, we do.

Kugel was particularly affected by one anthropologist’s description of the Dinka people of southeastern Sudan. They have, he wrote, *nothing that corresponds to our idea of the mind as mediating or remembering our experiences*. In other words, there is nothing “*in here*” that stands between whatever happened out there and who I am right now. That outside thing just keeps on being there, and there is no “*I myself*” to put it into perspective or move it into the category of memory. One of the Dinka he studied reported that, after having been imprisoned in Khartoum, named one of his children Khartoum, in part to protect himself from any future misfortune that might come from that place. Khartoum was the still-active actor, and the man was merely an object that potentially might be acted upon again.



Even today, people hear voices (there is an excellent radio show on NPR). Some of them are homicidal maniacs, but others lead perfectly normal lives, they just hear people who aren't there. They even have an organization, the Hearing Voices Movement (with a Network), with an annual convention of hundreds of voice hearers.

The biblical prophets say what they always say—“*God told me to tell you this.*” It’s hard to know, but it seems possible that at least some of them meant precisely that. Of course, as other scholars have argued, the whole phenomenon of biblical prophecy also had a lot to do with the surrounding society and its openness to having a prophet in its midst.

Kugel likes the definition of hallucination recently proposed by a neuropsychiatrist who wrote that it’s not something false, but a “*sensory experience which occurs in the absence of corresponding external stimulation of the relevant sensory organ.*” This is what some biblical texts are talking about. The person thinks he’s seeing or hearing something, but it seems to work a little like a dream. In a dream, the dreamer processes whatever he’s dreaming as if it’s coming from the outside, with his eyes darting around behind his eyelids. When the dreamer wakes up, he’ll say, “*I saw a woman wearing a red dress, it looked as if she was coming from some party, and then I heard a scream*”—but of course, his eyes were closed and his ears heard nothing. This may be a way of understanding biblical hallucinations—though it doesn’t say why people had them, or why they stopped in later biblical times.

So much of the world has changed; in fact, it had begun to change radically even within the biblical period. Ancient Israelites weren’t scientists, but they gradually developed a sense that there are rules that govern what happens in the world, and violations of those rules, miracles, became more and more infrequent. People still encountered God, but there was a definite movement from outside to inside; the soul gradually became what it had never been before, a kind of divine island amid the human body. Most of all, people’s sense of self evolved; the divine no longer began where a person’s fingertips ended, and people were no longer as open to an uncanny surprise just around the corner.

We are not sure what a Martian’s view of our sense of self would be, but many think that James Kugel has an idea of what ancient Israelites might say about us, once the shock wore off. Quite apart from our living in a world in which God plays no obvious

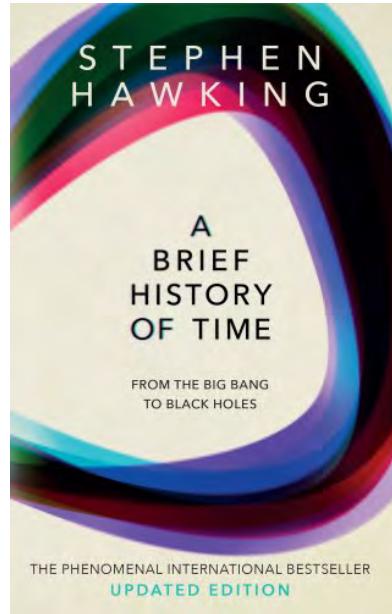
COMPASS FOR THE MIND



part, they would be astounded at encountering a sense of self that is just huge, virtually filling the heavens.

Each of us would seem to them so important, so big! Their sense of self was far more collective than ours; their own existence was tightly connected to that of siblings and cousins and clan-mates far and wide, and who they were (then) was very much defined by who they came from as well as by their inherited social roles. All this, quite apart from semi-permeability, simply made them much smaller than we are today. In fact, from this perspective the semipermeable mind was just another aspect of human smallness. I think the challenge facing religions in the West nowadays is to try to help people shrink down to a more realistic size, and then to let the divine take over where the human leaves off.

But *"There are grounds for cautious optimism that we may now be near the end of the search for the ultimate laws of nature."*



"We are bathing in mystery and confusion on many subjects," Carl Sagan reflected in an interview in August of 1980, *"and I think that will always be our destiny. The universe will always be much richer than our ability to understand it."*



Exactly eight years later, a mind far more scientifically formidable, if not as poetic, ignited in the popular imagination the idea that Sagan's worldview might be wrong - that the universe might, after all, be fully knowable and fully describable in a single elegant theory.

When **Stephen Hawking** (January 8, 1942–March 14, 2018) sent his book proposal for what would become '*A Brief History of Time: From the Big Bang to Black Holes*' to Cambridge University Press - his first book of popular science- his editors cautioned him that it contained too much science to be sellable. Every equation, they admonished, would cut book sales in half. Hawking revised the manuscript until it contained a single equation - Einstein's $E = mc^2$. He transmuted all the remaining equations into a scintillating scientific narrative and completed the book just before he rallied Cambridge into a celebration of the 300th anniversary of Newton's Principia -perhaps the most paradigm-shifting book in the history of science, introducing the theory of gravitation to the world.



Stephen Hawking (Photograph: Gemma Levine)

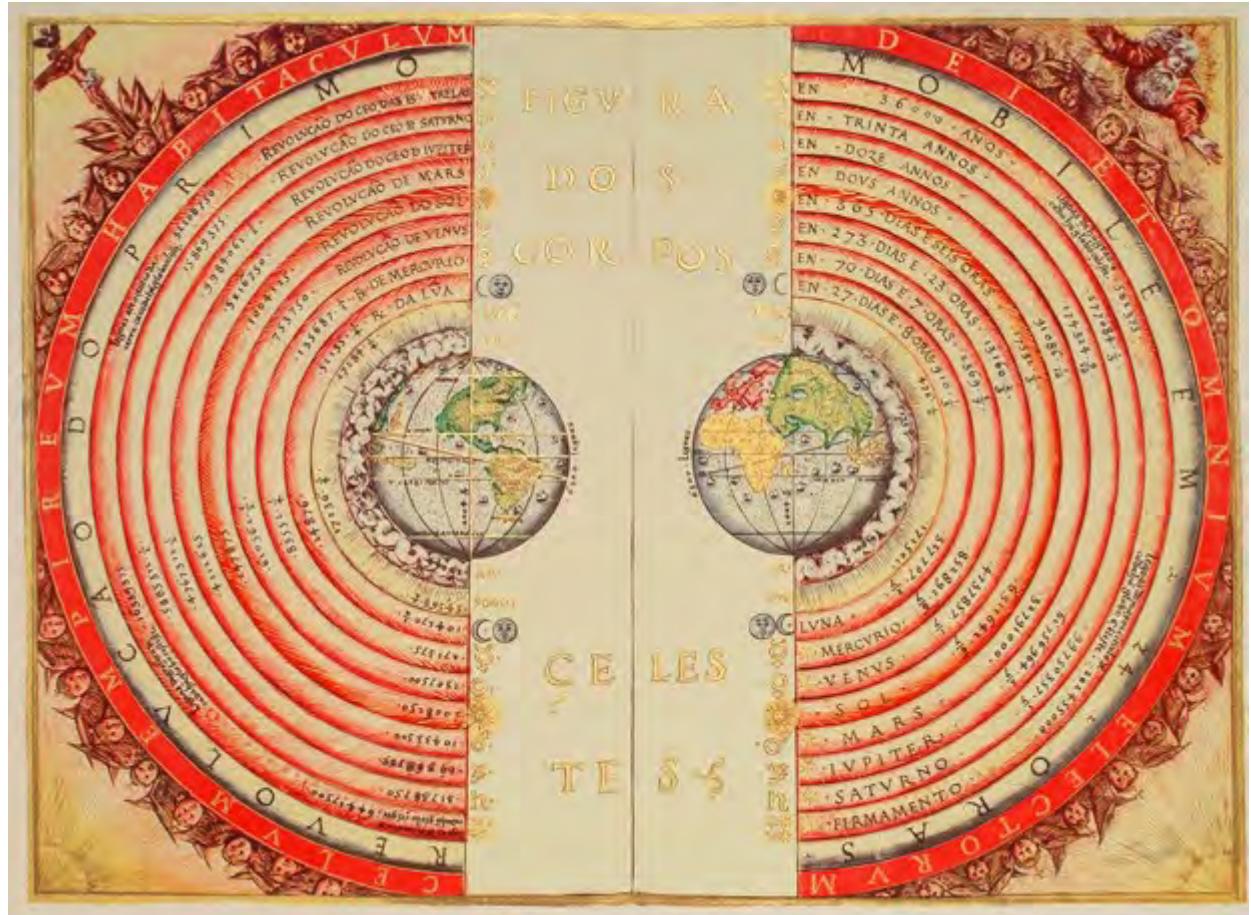
A Brief History of Time was published on April Fool's Day 1988. In the introduction,



Carl Sagan extolled Hawking as a “*worthy successor*” to Newton and lauded the book as replete with “*lucid revelations on the frontiers of physics, astronomy, cosmology and courage*.” Its accelerated ascent up the bestseller list stunned even Hawking himself. Within months, millions of copies had sold and the book was being translated into multiple languages- success so rapid that it entered the *Guinness Book of World Records*. (Hawking was amused that his American-made speech synthesizer struggled with the word, pronouncing it *Guy-ness*.) A “*phenomenal international bestseller*” for decades to come, in the words inscribed on the cover of the most current edition at the time of Hawking’s death, *A Brief History of Time* went on to shape the way generations comprehend the universe. One of the most abiding aspects of the book is Hawking’s succinct description of what makes a good theory. In a sense, it parallels pioneering psychologist Jerome Bruner’s framework of what makes a good story. With an eye to Karl Popper’s famous assertion that “*knowledge consists in the search for truth...not the search for certainty*”, Hawking writes:

Any physical theory is always provisional, in the sense that it is only a hypothesis: you can never prove it. No matter how many times the results of experiments agree with some theory, you can never be sure that the next time the result will not contradict the theory. On the other hand, you can disprove a theory by finding even a single observation that disagrees with the predictions of the theory. As philosopher of science Karl Popper has emphasized, a good theory is characterized by the fact that it makes a number of predictions that could in principle be disproved or falsified by observation. Each time new experiments are observed to agree with the predictions the theory survives, and our confidence in it is increased; but if ever a new observation is found to disagree, we have to abandon or modify the theory.

COMPASS FOR THE MIND



A

1568 illuminated illustration of the Ptolemaic geocentric system -

100 Diagrams that Changed the World

In her excellent biography, '*Stephen Hawking: An Unfettered mind*', Kitty Ferguson builds upon Hawking's formulation of a good theory and offers her own, more expansive and poetic definition:

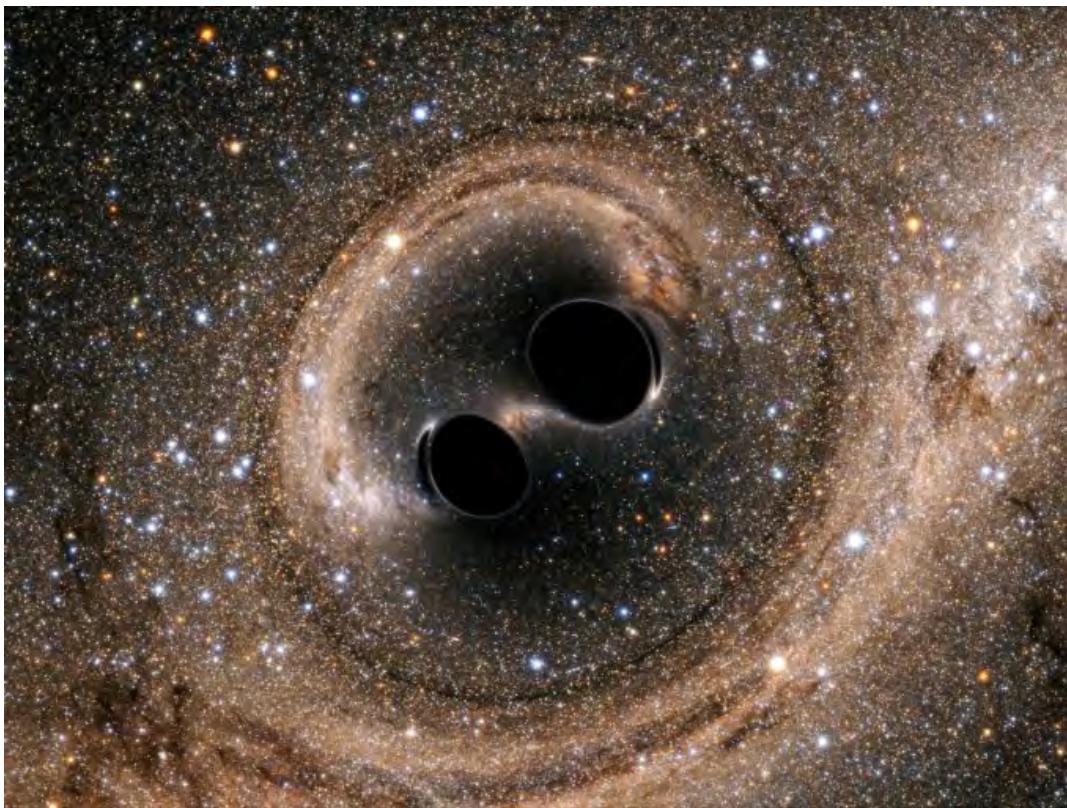
A theory is not Truth with a capital T, not a rule, not fact, not the final word. You might think of a theory as a toy boat. To find out whether it floats, you set it on the water. You test it. When it flounders, you pull it out of the water and make some changes, or you start again and build a different boat, benefiting from what you've learned from the failure.

Some theories are good boats. They float a long time. We may know there are a few leaks, but for all practical purposes they serve us well. Some serve us so well, and are so solidly supported by experiment and testing, that we begin to regard them as truth.



Scientists, keeping in mind how complex and surprising our universe is, are extremely wary about calling them that. Although some theories do have a lot of experimental success to back them up and others are hardly more than a glimmer in a theorist's eyes — brilliantly designed boats that have never been tried on the water — it is risky to assume that any of them is an absolute, fundamental scientific "truth."

It is important, however, not to dither around forever, continuing to call into question well-established theories without having a good reason for doing so. For science to move ahead, it is necessary to decide whether some theories are dependable enough, and match observation sufficiently well, to allow us to use them as building blocks and proceed from there. Of course, some new thought or discovery might come along and threaten to sink the boat.



Simulation of two black holes colliding to produce a gravitational wave — the landmark event detected by LIGO in 2016, arguably the most significant astrophysical discovery since Galileo's day, building heavily on Hawking's work.



Hawking's own life was animated by one particular theoretical pursuit -the search for a theory, colloquially known as a "*a theory of everything*", that unifies Einstein's general relativity, the gravity-based science of the very large, and quantum mechanics, the science of the very small, based on three non-gravitational forces: the weak, strong, and electromagnetic forces. In the penultimate chapter of *A Brief History of Time*, Hawking considers this unholy grail of physics against the backdrop of the history of science:

The prospects for finding such a theory seem to be much better now because we know so much more about the universe. But we must beware of overconfidence — we have had false dawns before! At the beginning of this century, for example, it was thought that everything could be explained in terms of the properties of continuous matter, such as elasticity and heat conduction. The discovery of atomic structure and the uncertainty principle put an emphatic end to that. Then again, in 1928, physicist and Nobel Prize winner Max Born told a group of visitors to Göttingen University, "Physics, as we know it, will be over in six months." His confidence was based on the recent discovery by Dirac of the equation that governed the electron. It was thought that a similar equation would govern the proton, which was the only other particle known at the time, and that would be the end of theoretical physics. However, the discovery of the neutron and of nuclear forces knocked that one on the head too. Having said this, I still believe there are grounds for cautious optimism that we may now be near the end of the search for the ultimate laws of nature.

Complement this with this 150 seconds animated cartoon:
https://www.youtube.com/watch?time_continue=29&v=D6lFGJdwRyo

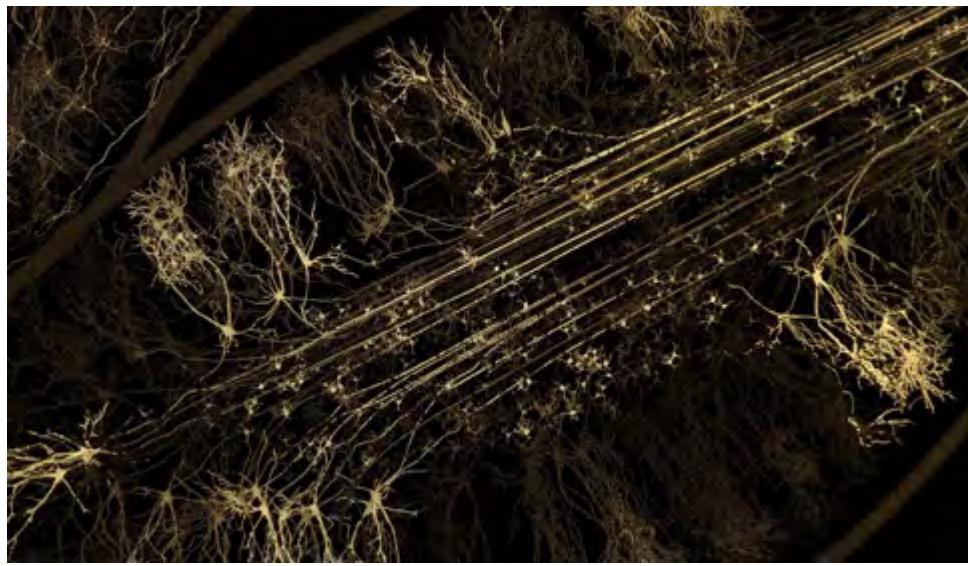


Self-Reflected

Currently, and until spring 2018, the Franklin Institute with the University of Pennsylvania and the National Science foundation present a mesmerizing, breathtaking, unique exhibition *Self-Reflected*.

“Follow the light as it moves across the golden surface. What you see is a portrait of your brain—the communication happening in your own head at this very instant. Self-Reflected is your brain perceiving itself.”

Dr. Greg Dunn (artist and neuroscientist) and Dr. Brian Edwards (artist and applied physicist) created *Self Reflected* to bridge the connection between the macroscopic perception of the brain as a wrinkled, mysterious, three-pound organ and the microscopic behavior of brain cells, or neurons. Together, the functions of the brain at both levels underlie the very essence of our consciousness. Dunn and Edwards wanted to capture the brain as realistically as possible. The result—an unprecedented insight of the brain into itself—shows the movement and dynamic communication of information as the brain is visually stimulated by a work of art.



Self-Reflected was created to remind us of our common humanity that stems from the inner workings of our minds.



This image in the artwork represents one very thin slice of a human brain, 22 times larger than life. Encompassing over 500,000 neurons, the image is based on an oblique sagittal slice (angled from right to left) through the brain. As the light moves from left to right, we see motion through functional regions of the brain including the cerebellum (motor control), thalamus (sensory processing and information sorting), olfactory system (sense of smell), basal ganglia (initiation of movement), pons (motor processing), and many regions of the multifunctional cerebral cortex: frontal, motor, sensory, and visual. The movement of light illuminates the patterns created by the firing of electrical signals, or action potentials, in the brain over 500 microseconds of time.

SelfReflected is a reflective microetching, a technique invented by Dunn and Edwards to microscopically manipulate the reflectivity of a surface. This creates a third dimension of information that can be used to create animations in a seemingly two-dimensional surface. The technique combines a complex array of hand drawing, scientific data, computer simulation, photolithography, gilding, and strategic lighting design.

To make the piece, different types of neurons in each region of brain were characterized and painted by hand. They were then digitized and assembled into anatomically correct regions by painting large swaths of them at a time. These neurons were then connected together using Edwards' specialized computer algorithm that can simulate the chaos and order of how the brain actually wires itself during development to program in the "choreography" of neural activity. The result: networks of neurons that fire in sequence to illustrate the flow of information in our brains.

The creation of a microetching is like the process of printing computer chips, where light is used to carve very complex designs into photoresist (a material that is sensitive to ultraviolet light). A hatching pattern was superimposed on the artwork, defining the shape of each neuron or axon by a series of black and white lines whose angles encode the position from which the viewer will see that part of the image. This design was then printed at ultra-high resolution onto transparencies. The final step involved coating the surface with gold leaf to increase its reflectivity and beautify its surface.



To get a seamless microetching at 8' X 12', the artists had to work with extreme precision in controlling the lithography and gilding conditions. Fabrication of the microetching plates had little room for error, involving tolerances of just a few microns—small fractions of the width of a human hair. In addition, *Self-Reflected* is made up of 25 individually created microetched plates, which had to align perfectly to reduce the seams between plates as much as possible.

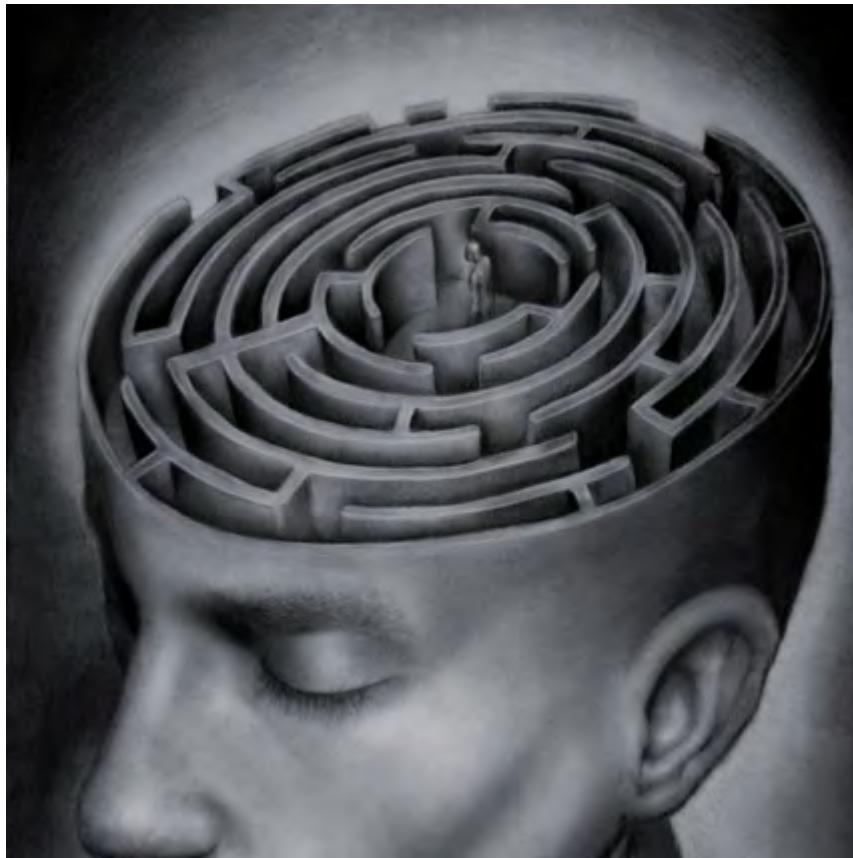
The artwork took two years to create from conception to completion. It contains 32 gigabytes of binary data in the artwork used to print the etchings (a two-hour film in high definition is around 20 gigabytes). It required two weeks of dedicated rendering time on a high-powered computer to solve the complex math that went into creating the network choreographies and hatching patterns. Finally, the artists hand applied 1,750 leaves of gold onto the microetching.

Self-Reflected is the most complex piece of art on the brain in the world, yet it pales in comparison to the true complexity of the brain. Hard working and ever changing, the brain creates everything we see, hear, feel, and think. *Self-Reflected* aims to show us a mirror image of who we are.

Here's the link to a short (3'17") video that will tell you much more: <https://vimeo.com/216052850>. Watch it full screen.



Is There a Compass?



Possibly since hominins migrated out of Africa millennia ago, hunting and gathering scarce resources and dangerous animals, they found that life was *a tale told by an idiot, full of sound and fury, signifying nothing*" (Macbeth); they were surrounded by lava belching volcanoes, unpredictable tsunamis, frequent horrible earthquakes, alternating deluges and desertifying drought, an ice age and –soon- internecine lethal fights. Most pregnancies resulted in miscarriages and few children reached the early age of five; then all kinds and sorts of bacterial, parasitic, fungal or viral plagues kept the dogma of the *survival of the fittest* (or the luckiest!) a basic truth.

No wonder then that they searched for a *meaning*, comfort and solace, intercession and dialogue with all these forces of the most hostile natural environment. Their skills were embryonic; their tools nonexistent –for centuries; their panic blinding.



WHO to turn to? Since language was barely above primate level, though was still most crude. Their only solace was to turn inwards first during the nights full of invisible –but very loud- dangers. Hence these not -yet- *Sapiens* questioned themselves –but got few answers.

It took several thousands of years to sedentarize large, organized populations in specific parts of the world; some of these countries established a class of *priests* or *wiser men* (and *women*) who kept wisdom, knowledge, spiritual power under strict control: only the selected, then initiated had access to these *mysteries*. All this “power” resided in the *mind*; the *initiated* kept the keys, the signs, the symbols, the codes carefully. Those who betrayed were killed –or died of “consumption”, shame and ostracism.

It started around 3000 BCE and reached its golden age in Egypt c. 1500 BCE with its priests, *the source of all mystical wisdom* for the Greeks. Then came the Eleusinian Mysteries of Demeter and Kore (c. 600 BCE) near Athens, and the counterbalancing rise of philosophy with Socrates (c. 400 BCE) and Laozi (c. 500 BCE), actors and witnesses of the global spread of introspection, critical thinking, with later a return to the capture of the mind by the Abrahamic established religions – with many underground exceptions e.g. Sanātana Dharma, the Kabbalah, the Antiochene Fathers, Sufism, and more recently the Illuminati or –as mentioned the Tantrism-derived Vajrayana Tibetan Buddhism; and these days the Esalen Institute...

This long, immensely long quest is now in our genes (but where?) and underlies our cultures from the Arctic First Nations to the Papua New Guinea isolated valley tribes. The separation of *life* (understandable) and *death* (unapproachable) is always in our minds and nags us. The transition states are (generally) one-way. A primal fear that overwhelms during the nights.

The Progress in Neurosciences is amazingly recent and stunningly rapid; but we are far from possessing and mastering the tools, instruments, methods, algorithms, proper interpretations that will create the next step, the new era when humans that do not die early anymore, control more maladies and scourges every day, control our environment to allow (soon) 9 billion fellow-being to prosper on our *blue planet*. The era of demiurges may be around the corner.



Acknowledgements

Despite the repudiation of rumination by Matthieu Ricard (and Wolf Singer), and despite the fact that I am no cattle, dusk and night rumination is my frequent companion. Just as most *Sapiens* humans. This essay is an attempt to free myself from this Tunic of Nessus -at least a first attempt.

My sources –as usual- are listed; I copied many *verbatim*. Yves P. Huin managed to squeeze time to edit, correct and format it to find its resting place on the website.



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