



The Quantum Brain
by Jeffrey Satinover

This book is not an easy read. It is a profound one. In *The Quantum Brain*, Jeffrey Satinover weaves in everything from quantum mechanics to microbiology and computer processing to help explain: 1) the current scientific understanding and, 2) its implications for the future, including computer processing, artificial intelligence and the reality of our own free will. Fortunately, the author is able to satisfy the needs of a wide audience, both scientific and those, like me, who are less so but who enjoy learning about science. In this summary I will share some musings from the book.

Perhaps the fundamental question asked by this book is: Is it true that what we like to call “will” is at most the inevitable by-product of the brain’s mechanics. Mechanics which were set into motion for all time at the Big Bang, which leads to the statement of Harvard Astronomer Margaret Geller: “Why should [the universe] have a point? What point? It’s just a physical system, what point is there?” The same can be asked about us. Are we simply machines? Do we really have any more free will than the rest of the universe does? Has science rendered the concept of God pointless? Are we simply nothing more than an especially complicated assembly of molecular machinery? As Satinover states, “Our understanding of who we are, where we came from, and our standing in the greater scheme of things, and where we’re going, all look soon to suffer dramatic change.”

Mind as Machinery – our brain consists of 10 billion cells, each with one thousand connections, resulting in approximately 1 trillion connections. The neo-cortex, the more recent of our three parts of the brain, is made up of some 10-20 billion nerve cells containing even more connections through our entire body and guides the vast complexity of intelligent life via processes that are essentially computational. However, unlike how a computer works, running off a pre-written program, our brain learns by itself, from experience and embeds the lessons from experience by reconfiguring its own hardware. Of course, one goal of science is to create computers who are self-adaptive or “intelligent” like our brain.

Satinover teaches us an important lesson: “Truly successful people, the most successful, have a very checkered track record, peppered with what they consider very serious “losses.” Success for them is defined not by any external, objective standard unvarying from one person to the next, but rather by that level of accomplishment the individuals themselves experienced as unequivocally satisfying (and that often happens to, but need not, coincide with what others consider successful, too).” As Satinover also reminds us, “If you can’t fail, you can’t succeed.”

Satinover shares the history of developments in artificial intelligence as well as related sciences. This alone is an incredible education. The most powerful understanding for me centers around how the brain works. To summarize it in terms I can relate to, it’s like a big pyramid. At the top of the pyramid is the program that runs the brain, generated by our DNA. At the bottom of the pyramid are not foundational blocks but rather antennas. Sensory apparatus that help us to obtain feedback from our environment and adapt to it...on its own.

For years scientists believed that DNA controlled every aspect of human development and that our experience and memories further shaped our development. What the scientists have discovered is that the “sensors” at the bottom of the pyramid act autonomously. They can do their own thing without receiving direction. Scientists are rapidly discovering the intelligence at all levels of existence, arguably down to the quantum soup of waves and particles. It is nowhere, yet everywhere.

Learning – Did you know the human brain as a whole expends a remarkable 25% of our energy intake while consisting of only 2% of our living body tissue mass? Satinover explains that our brain, an enormously powerful processor, works best when fearless of failure, undaunted by repetition, not deduced by educational facts and shortcuts. He provided a quote physicist Richard Feynman gave to his sister Joan when trying to understand a college astronomy text: “You start at the beginning and get as far as you can get before you are lost. Then you start at the beginning again. And you keep working through until you can understand the whole book.” Satinover adds to this advice when you butt your head up against the same wall, ask yourself, “What am I missing?” In a sense, it’s natural to take two steps forward and one back, sort things out and then take two steps forward again.

“In brief, you certainly can teach an old dog new tricks, but it is more difficult to do so, depending on what his old tricks are, and whether he is a dog willing to pick himself up and start all over again, again and again, or not.” According to Satinover, the chief stumbling blocks are laziness, the quest for novelty, desire for instant gratification, and especially the avoidance of failure. “The solution to the old-dog problem is practical and pedestrian: repetition, perseverance, courage, willingness to start all over again.”

What makes for genius is the ability to see similarity where others see none. It’s not so much about pure ability, but the desire to play around. As Aristotle stated, “But the greatest thing by far is to be the master of metaphor. It is the one thing that cannot be learned from others; and it is also a sign of genius, since a good metaphor implies an intuitive perception of the similarity between dissimilars.” As an example, I encourage HR executives to see how programs used to market to customers and clients can be turned inward for use with the workforce. See the similars in the dissimilars.

Nature’s Way – natural intelligence is thus “guess, measure, adjust the answer, feed it back again.” Randomness generates changed outcomes which generate new memorized applications. It may appear to be chaos...but only because we don’t understand the rules.

“In a well-structured creative process, whether individual or group, the best initial state is one of relatively high temperature: lots of opportunity to generate ideas, crazy or otherwise without constraint; one notion stimulating others without critique of any sort – brainstorming – a state that favors the creation of new ideas (the fresh perception of similarity among dissimilars), both good and bad...which then follows a period of cooling when the initial ideas are consolidated and pruned, but with a light hand. Individual ideas that remain are expanded on in minibrainstorm sessions. This is then followed by even more cooling, and so on. When an individual brainstorming in a group can’t cool down at the right time, the group will cause her to chill.”

Energy – Nature is designed to work at its lowest energy state. The brain just so happens to be the most powerful optimization device ever discovered in the known universe. It is expert at optimizing its resources.

Proteins gather in microtubules which form cells which generate neural-networks which form the brain. Microtubules and the proteins they envelope are extremely “plastic” and able to instantly adapt to the demands of the brain as a whole. In a sense, the energy in our brain is organized upwards from its quantum state through neurons and proteins and microtubules and cells, each amplifying their impact upward, all performed in parallel, and from what scientists can tell, without a governing structure. DNA doesn’t do it all. It’s creates the program or foundation which allows it to do it.

The importance of proteins cannot be exaggerated. “If DNA is the blueprint of life and RNA the architect, proteins are at once preassembled construction materials, the factories that do the preassembling, the general contractor, the foreman, the subcontractors, the craftsmen and the craftsmen’s tools. They deliver raw materials to the factories and crews to the construction site. They need no elevations or building permits. They need no project schedules, dispatchers or quota masses. Everything is built according to code, on time, without

supervision. Their budgets undercut everyone. The amount of waste is staggering small. They care and protect the architect and see to it that he reproduces himself and therefore their own replacements.” Of course, all proteins are made up of 22 amino acids. To this moment, we can’t understand how proteins and amino acid molecules are able to work so quickly and optimize energy so efficiently. The answer according Satinover is that these proteins take advantage of quantum physics to do things that would otherwise be impossible.

Remember, energy is chaotic, constantly trying to move to a lower level. The quantum effect is a two-way street. Not only does it help to amplify up through “tunneling,” Satinover also believes that it can work in reverse, our mind in a sense can force energy to tunnel down. We can literally create our physiology with our psychology. (Try this experiment sometime: Pretend you are floating all of your cells and atoms upward. Do that for a few minutes and you will start feeling light-headed and lighter. Then pretend you’re relying on the force of gravity to pull your energy downward. Feel the cells and the neurons weighing heavily in your body and in a few minutes, you’ll feel like you weigh a few tons). It is important to understand that in organizations, this quantum amplification may take place as well. Actions of the rank and file, performed at the customer level on a daily basis, amplify up through an organization. Likewise, a leadership’s energy is able to amplify in the opposite direction.

Quantum Ripples – for me this was perhaps the most interesting part of the book. Integrating science with philosophy and spirituality. Satinover tackles such notions as God, free will, consciousness, morality, religion, future and society. Just the list alone sounds heavy enough. Physicists, Einstein included, love certainty. Roughly half of them don’t believe in “God”. Renegades such as David Bohm, Neals Bohr and Stephen Hawkins think in more “holistic terms”. They allow for the belief there may be a higher Spirit, Creator or Divinity guiding circumstances. They are open to the thought that our attention and intention can shape our future. They believe, as do many others, there is something unique about the human being that will never be copied. Arguably because we were created by an intelligence far more vast than our own. Of course, a Buddhist would take this one step further, claiming that since we are the intelligence, there is no possibility of separation. All is One.

“A genuine truth arrogantly asserted – that is, without so much as a guess as the likelihood of its being false – is a most pernicious kind of falsehood, far worse than a mere mistake, because it alienates people from it.” Amen.

Satinover argues that whether you call it divine intervention, or natural intelligence, “there is something going on” that is timeless and omnipresent. Satinover tells us that the answer to the question, “Why did I do this and not?” may remain forever unknowable.

Quantum Outcomes – Once the math is done, what makes us decide to choose or not remains ultimately a mystery. (I think Malcom Gladwell was talking about some of these challenges in his recent book Blink). There are certainly plenty of justifications but none of them provide ultimate scientific explanation. Satinover explains that one of the greatest difficulties is finding the mechanics of intention. Of consciousness. Is consciousness something that is simply part of the mechanical progression of the universe or is it divine intervention? Could they be one in the same? Satinover doubts “we will ever be able to show that consciousness is a logically necessary accompaniment to an material process, however complex.” So if consciousness is not in fact mechanical, did it at least arise from the mechanical? Or does it come from someplace else?

Scientists are trying are to build computers with a conscious. What makes us unique is that we have the ability to think about how we think. So far, we haven’t been able to design a computer program that can do that. Yet, Satinover talks of an Orwellian future of 30 years from now, when artificial intelligence runs our lives. At work and at home.

Satinover asserts that a “new cognitive elite” has just begun its ascent to dominance. As an example, MIT now produces the largest portion of entrepreneurs and the largest number of new businesses per capita per graduating

class. He warns us that if this new elite is ever overthrown, it's more likely to be from one of their own creations than any subordinate brethren. To guard against our own destruction, we're advised that "as we reach for the sky, if we do not at the same time, root ourselves in the wisdom that gave birth to our culture, we will destroy ourselves."

Conclusion – All of this thinking can really get you to thinking! I know that no matter how much I study, the more I learn, the more I realize I don't know. Fact is, I don't know if there is something unique about humans that can't be copied. I don't know if there is a before-life or an after-life. I have no proof of any of this. I have not experienced no mystical moments that would cause me to believe otherwise.

What I am left with is Faith. As Lou Reed sang, "you need a busload of faith to get by." I can choose to believe that I live in a world where there is a Holy Spirit and that my ancestors are somehow floating around me, or I can choose to believe in a mechanical world and claim that all of this stuff is nonsense. No matter how much science, the choice of faith remains.

So that's where I am today. Sure there is some DNA and environmental programming going on, but I still have choice and the ability to react to my environment. I am not a machine. I can choose to believe in whatever I want to. What a concept. I can choose to believe that how I conduct myself has more to do with how I chose to define this journey than it does with any punishment I may receive in the afterlife. The only heaven or hell I know for sure is the one that I deal with here and now.

We are so amazing! The very ability to write or read this article is in itself a true miracle. Paradoxically, we are so insignificant! In terms of mortality we are simply flashes in the pan. The rock out my back door has been around a lot longer than I have been, and will be there long after I am gone. And yet, that rock is just a pebble in time.

I choose to focus on the miracle side of a conversation. I am insignificant only if I confuse the scope of my relevant universe. Most of the universe that *really matters* to any of us is generally within 10 feet of where we are standing. That person right in front of me. At that moment. If I choose to treat that person with caring, love and grace it is because those terms appeal to me. The scientific basis for choice is something I am sure someone could tell me.

Thich Nhat Hanh reminds us it takes no effort to enjoy the blue sky. We simply have to be present in order to do so. I believe the same applies to relationships. In order to treat each other with honor, dignity and respect, all we have to do is be present. Thich Nhat Hanh says that if we want peace, we have to be peace. Of course, if we want to be present we have to be presence itself. (Hint: If we can't be present with ourselves, there's no way we can be present with another person.)

The more present we are, the more able we are to take advantage of our innate intelligence. We will not just be better persons; we will enrich our body and soul. Unfortunately, we are *running so hard* that it can be difficult to take advantage of this intelligence. In a sense, when we are running really hard, we are acting like machines. No time to be present. No time to think. No time to feel. No time to share. Just do it!

I realize the above is somewhat disjointed. But after all, I did say they were only "musings." They are simply what I have been thinking about as a result of reading a fantastic book. It's the thinking this book got me doing.

This was the fifth book on Quantum Physics that I've read over the last year or so, and the last one I intend to read for a while. In part because I've gotten out of this area what I need to get out of it – an understanding of what we generically know and don't know when it comes to physics, human development and just as importantly, how the brain works. I will continue to pick up a Scientific American now and then at the airport to see what cutting-edge discoveries loom. Perhaps more than anything, these books have opened me up to a

deeper understanding of how complex and amazing we are as individuals and the universe in which we live. The awareness I have gained from this level of understanding has not diminished my spiritual beliefs, it has deepened them. I am not a big fan of traditional religion. While it serves its purpose, in its fundamentalist form, it seems to cause more trouble world-wide than any potential benefit.

I believe Jesus, Buddha, Krishna and Muhammed were great teachers, not religious leaders. Whether these teachers were placed on the planet as a simple result of our quantum mechanical soup or if they were placed by divine intervention makes no difference to me. What does make a difference is that I fundamentally agree with and believe most of what they teach. I believe when they spoke of God they weren't referring to some old man in the sky. They were speaking of the miracle that is. The miracle that every one of us is.

You can purchase the book by [clicking here](#).