

The Mind/Brain Question, Problem, Quandary, Conundrum—Conscious, subconscious, the intuitive mind, the rational mind, the analytical mind, intelligence, learning, creativity, free will, consciousness, the Universal Mind

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“The intuitive mind is a sacred gift, and the rational mind is a faithful servant.” Albert Einstein

“The intuitive mind is a sacred gift, the rational mind is a faithful servant, and the analytical mind is a skillful swordsman, and for the ladies a skillful swordswoman.” David Martin Degner

Abstract: The human brain is obviously some kind of computer. In this paper I propose a simple, novel, and admittedly speculative, model, or architecture, that illuminates how this mysterious computer works. I offer a scientific foundation for understanding the problem of consciousness. There are profound implications to understanding the operation of the physical brain that gives rise to the human mind in all its manifold phenomena. The “homunculus”, that I introduce and define in this paper, will become the most interesting functional part of the brain, having to do with the subconscious, free will, parallel processing, psychoanalysis, dreams, meditation, being, and self.

Model, physical analogy for the Mind/Brain—the IBM Selectric typewriter: the keyboard, the “golf ball”, and the page printed on.

The IBM Selectric typewriter was a highly successful model line of electric typewriters introduced by IBM on July 31st, 1961. Instead of the “basket” of individual typebars that swung up to strike the ribbon and page in a typical typewriter of the period, the Selectric had a “typing element”, frequently called a “typeball”, or more informally, a “golf ball”, that rotated and pivoted to the correct position before striking. The element could be easily changed so as to use different fonts in the same document typed on the same typewriter. The Selectric also replaced the traditional typewriter's horizontally moving carriage with a roller that turned to advance the paper but did not move horizontally, while the typeball and ribbon mechanism moved horizontally, i.e., from side to side. When using a typewriter, we are not aware of, it is in the subconscious, to operate the keyboard. We are aware of, it is in the conscious, what the “golf ball” types onto the paper—the line, string, stream, idea.



The John von Neuman (JVN) architecture is to look at one place, the central processing unit (CPU), and to have a memory list with addresses for instructions and data to move into and out of the CPU. This is also the basic Turing machine architecture with one head that looks at one entry on the tape at a time. Parallel computers are just a collection of JVN CPUs. I have seen it stated that the human mind is massively parallel, in fact, just the opposite is the case, the brain in its thinking mode is also a JVN CPU architecture machine.

The Mind/Brain question, problem, quandary, conundrum is divided into mental, dealing with thoughts and the mind, and physical, dealing with motor activity and motion of the human body. In this paper I am focusing on the mental so will not refer to the physical again.

The Mind/Brain architecture that is embedded in the connectome is composed of the cerebral cortex (gray matter), the hippocampus (gray matter), and the “wiring” in between, the white matter, myelin sheathed axons. The Mind/Brain architecture in terms of function is the JVN CPU, the homunculus and memory. The homunculus, that forms our thoughts, operates in the subconscious, is the keyboard, that precedes in time (of order fractions of a second) and gives rise to the conscious one-dimensional line, string, stream, idea. The line, string, stream, idea is analogous to the instructions and data that flow through the JVN CPU in a computer.

The entities a line, string, stream, idea is composed of are words, math, art, music, dance, audio, pictures, video, athletics, the senses, and the emotions. I call the line, string, stream, idea combinatoric space the set of all possible combinations of those entities, everything humans can think about, that includes all possible cogitation, all possible epistemic activity, and the totality of memories.

The “nexus”, the “center”, the “root”, the “golf ball”, the “Turing machine head”, the “JVN CPU” of the brain is I think the hippocampus. The JVN CPU has to be at the “nexus”, the “center”, the “root” of the brain physically to perform that function, which is why I believe the hippocampus is the JVN CPU through which the one-dimensional line, string, stream, idea flows and is where the “golf ball” “prints” the line, string, stream, idea into our conscious mind. As the JVN CPU of the brain the hippocampus interacts with the cortex through the subconscious, the homunculus in operation, to generate the conscious line, string, stream, idea, the one-dimensional stream of consciousness, the conscious output, what’s “printed” on the paper. “Printing” in the hippocampus is like the “golf ball” printing on the paper. What is “printed” in the hippocampus is what the conscious mind becomes aware of. What comes before “printing” is the assembly of the line, string, stream, idea that occurs in the subconscious by the homunculus. Then the hippocampus is the seat of mental consciousness—where our mind’s eye “sees”, where our mind’s ear “hears”, the JVN CPU through which the one-dimensional stream of consciousness flows.

A key part of consciousness is the access to the totality of an individual’s memories. Memories are always centered on I, me, the first-person singular, and only I have access to my memories. This is key to both the experience of consciousness and the definition of self. The line, string, stream, idea combinatoric space includes the totality of memories and all subsets thereof.

The main modes/activities¹ of consciousness, what consciousness is primarily concerned with, are:

1. Thinking
2. Talking
3. Writing
4. Computing
5. Reading
6. Watching
7. Listening

Thinking is singular and is common and foundational to all six of the other modes/activities of consciousness. I am defining computing as numerical thinking. Thinking, talking, writing, and computing are out of the mind, into conscious existence, into the external world. In thinking, talking, writing, and computing the subconscious, through the homunculus, precedes the conscious line, string, stream, idea. Reading, watching, and listening are into the mind, out of the external world. In reading, watching, and listening the line, string, stream, idea from the external environment is the conscious input that is then translated simultaneously into its meaning that forms the conscious mental stream. In this paper I will be primarily addressing thinking, talking, writing, and computing, the out of the mind modes/activities of consciousness that utilize the subconscious and involve free will and creativity.

¹ Leaving out human’s default mode/activity—vegging!

The senses and the thalamus (gray matter) need to be integrated into this brain architecture and the main modes/activities of consciousness—the eyes reading, the ears listening, the throat and tongue talking, and the hand writing—the input/output functions. The thalamus is also at the “nexus”, the “center”, the “root” of the brain physically and is wired into both the hippocampus and cortex by axons, the white matter.

The cortex is where addressable memory, that becomes represented in the conscious line, string, stream, idea, resides. The subconscious homunculus, the keyboard, that gives rise to the stream, that comes before the stream in time, the cause whose effect is the stream, must interact with both the hippocampus and the cortex, so I think includes both the hippocampus and the cortex, and the connecting white matter, the myelin sheathed axons. There is a “subconscious/conscious cycle” between the hippocampus and the cortex via the “in between” wiring. The cortex is where learning takes place, learning becoming both consciously addressable and subconsciously capable of giving rise to the line, string, stream, idea, sometimes without our knowing it, and sometimes at our direction through our free will, the homunculus in action. Then learning is the creation of memory in the cortex, that memory has an address, a location in the cortex, and is addressable, both consciously and subconsciously, through a hippocampus/white matter link to that cortex location.

That we think in terms of words or symbols seems intuitively obvious and is an easy conclusion to arrive at, but in forming the line, string, stream, idea the subconscious uses the ideas words or symbols represent, not the actual words or symbols. What happens in the subconscious is the part of thinking that we are not aware of. The line, string, stream, idea that is read into the conscious mind, what we are aware of, what we “see” in the mind’s eye, what we “hear” in the mind’s ear, are the ideas encoded symbolically as words or symbols. When we type on a typewriter or read a book the words are manifestly physically represented on paper or a screen but in our mind, in our conscious eye, it is the ideas they represent that forms the mental stream of consciousness. In a computer words and symbols are represented as the actual words and symbols, ultimately encoded as binary strings, but the computer has no understanding of the ideas the words and symbols represent. In numerical thinking, computation, it is the actual numbers that are used in our conscious mind’s eye, which is why manipulating numbers seems slow and cumbersome—we have to do most arithmetic like multiplication and division with fidelity for each digit albeit incorporating the finite memorized multiplication tables we learned in elementary school. This is why only limited computations can be done in the mind without pencil and paper—try to compute the $\sqrt{2}$ in your head. In a computer numbers are represented as the actual numbers, as binary strings, but the computer has no understanding of the ideas the numbers represent, and of course computers have zillions of times the capacity to do arithmetic computations as compared to a human mind.

Thinking in “words” (the ideas they represent) is the foundation of verbal intelligence. Numerical thinking is the foundation of quantitative intelligence. Spatial thinking is the foundation of analytical intelligence.

The individual entities a line, string, stream, idea is composed of are on average of similar energy, like each word in a line printed on the paper in a typewriter uses on average a similar amount of ink. The “choice” of entities composing different lines, strings, streams, ideas, the “formation” of different lines, strings, streams, ideas, that “improvisation” is free will and seemingly paradoxically goes on in the subconscious. It is not paradoxical if you think about the mysterious nature of free will and thought formation with this correct architecture—it is explanatory of precisely that mystery. The energy cost of choosing between different entities to use in a line, string, stream, idea is probably very small compared to the energy of the line, string, stream, idea itself—that is what the “choice”, the “formation”, the “improvisation” that is free will means in terms of thermodynamics. The homunculus is literally (connectome) and figuratively (function) the “puppeteer” of the line, string, stream, idea. Free will works through the homunculus to form the line, string, stream, idea. Free will, executed through the homunculus, uses the intuitive, the rational and the analytical mind, the verbal, the quantitative, and the analytical skills, observing reason and logic, cause and effect in the environment, i.e., the surrounding space accessible to one’s senses, over the entire time of wakeful existence. Free will is at the foundation of creativity.

The search of the cortex by the homunculus, the selection of the entities a line, string, stream, idea is composed of by the homunculus, appears to be done by parallel processing, meaning more than one place, even many places, of the cortex are being searched simultaneously, and all that searching goes on in the subconscious. Free will can also be a conscious decision, directing the retrieval of a memory stored in the cortex. Free will exerts itself in what we choose to learn that then becomes part of the homunculus's purview. The memory of something new is initiated by free will and born through the homunculus, printed into the conscious—a new poem, a new equation, the design of something new.

Not the whole brain requires sleep. The hippocampus is where the “work”, in the physics definition of work, i.e. energy, of linking the line, string, stream, idea takes place, and that's a small portion of the brain, that does a lot of work per neuron, the neurons run out of stored chemical energy, require significant time to recharge, ergo we sleep, recharging the “chemical battery” for those neurons.

Dreams are always centered on I, me, the first-person singular. It seems obvious and maybe trivial, but I have never seen that aspect of dreams explicitly stated. Dreams are read into the conscious mind in the hippocampus, like the line, string, stream, idea, but the major difference is that the homunculus and free will are turned off when we are sleeping. This accounts for the bizarre nature of dreams, that violate the laws of physics, and are an Alice in Wonderland kind of experience.

Meditation is “fiddling” with the homunculus and free will. In meditation the free will is used in an attempt to turn off the homunculus. Some people ascribe highly therapeutic effects to doing that, although they do not know what they are in fact doing physically, and other people find meditation to be pointless mental masturbation.

Consciousness—mental illness like depression, anxiety, psychosis is a contrast to the euthymic normal consciousness and show “what” consciousness is for normal states—just the operation of the IBM Selectric, with its subconscious homunculus, its “golf ball” and the conscious output, the line, string, stream, idea. When a person is thinking, when a person is concentrating, when a person is focused, sensory input ceases to be consciously received—that is an important aspect of the JVN CPU architecture. Feelings, emotions come into play parallel to the conscious modes/activities, i.e. parallel to or associated with or invoked along with the JVN CPU operation. For instance, we can cry reading a book or watching a movie. Contrast sensations, like pain or orgasm, we remember but do not invoke or relive.

Most profound: Learning, consider the full line, string, stream, idea combinatoric space and the subconscious. Conscious strenuous effort goes into learning, and once that learning is stored in the cortex, it can be used in the subconscious, by the homunculus, to give rise to, to cause the conscious line, string, stream, idea—that is the exemplar, the paragon of free will.

The math line, string, stream, idea combinatoric space is the most complex and interesting of the possible combinatoric spaces associated with the modes/activities of consciousness because math is the “language” of the physical universe, and our minds/brains are part of the physical universe. Is the line, string, stream, idea combinatoric space infinite? Can we think of anything without any limit? Is our free will unbounded? I believe the answers are Yes, Yes, and Yes—the Universal Mind!

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