THINKING EXPLORED

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This is an interesting essay about thinking. It is written in simple words to understand easily. The logic used for exploring the thinking process is very elementary and hence it's an added advantage to all the readers.

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Lovingly dedicated to my 18 month old grandson, Niven Morse. My observation of how he skillfully gets assimilated to this world was the impetus for me to write this book.

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Sincere thanks to my good friends Bunchy Rahuman, Dr. Nihal Wijeysundera and my son Sajeev for supporting me.

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What is thinking?

This essay takes a stab at the difficult question of "What is thinking?" using simple logic construed in a methodical manner. As we read through, we will inquire deep into the subject of thinking, and develop a schematic model bringing clarity to our logic. Also, we will see whether the model we create, could stand for wider application of thinking scenarios. We will merge our model with the thinking concepts put forward by Nobel Prize winner Dr. Daniel Kahneman, to perceive further understanding of this profound question.

The brain is the primary organ essential for thinking. We got to know about this relatively recent. Aristotle (384 – 322 BC) believed that the heart, not the brain, was the center of emotions, intelligence and thought. At that time people thought the function of the brain was to cool the blood circulating in the body. The Egyptians who mummified bodies, preserved the heart and other internal organs for the next life, but scooped out the brain through the nostrils and discarded it. We got to know the functioning of the brain only in the 17th century. The knowledge of its functional capabilities and roles of its components, expanded in the recent past with the help of advanced neuroscience instrumentation. With the relinquishing of its secrets, now we know the enormous role the brain plays in thinking in addition to the major role it plays as our body's control center. Our adult brain is packed with information on our life experiences, knowledge, languages, emotions and other similar traits associated with thinking.

Where should we start to address the question of thinking?

When did we start thinking in our life? Can babies think? Did we learn to think? Is there a thinker in us? Can animals think? These are some slices of the big question. Perhaps the route to searching for an answer may become complex if we start with an adult brain. Hence we will start with an infant's brain where thinking originates for all of us.

Can babies think from day one?

May be the answer is "yes"… even when the child is in the mother's womb. Or perhaps the answer is "no".

To explore this question deeply, let's hypothetically assume the answer is "no". This is based on the assumption, the brain as a blank slate at birth, similar to a blank hard drive on a new computer. In here, I am really thinking of the old type of computers, which used to come without pre-installed programs. In the nineteen eighties when a PC is purchased, it had only the BIOS system in a DOS platform for the user to work-on. BIOS stand for **B**asic **I**nput **O**utput **S**ystem. BIOS, was the core facility that enabled, installing the programs like Windows, Microsoft Office programs, games, etc. Based on this analogy, I have to assume our brains are not completely blank at birth. Resembling BIOS system, the brain has an innate facility to install new programs and enhance those programs progressively as we grow. In addition to this assumption, I believe our brains have inborn abilities to perform certain physical actions. This is

proven by loud screams we do when we see the light of this world for the first time. Our inborn abilities are further supported by the fact, our immediate and instinctive knack to suck mom's milk without any prior training. The brain's inbuilt ability gives us the opportunity to develop all the brain programs we need for our life journey. However, unlike installing ready-made programs in computers, the babies have to develop and install their own programs on "Do it yourself" basis for their brains, by the brains. Development and installation of brain programs, advance with repeated test running and debugging actions. By nature, from the time of birth, our brains have an immense craving and an urgency to develop the necessary programs for figuring out things around us. As a result of this compulsion, the program development happens at an exponential rate. Scientists have found, the brain of a newborn expands at a phenomenal rate, adding a quarter of a million neurons every single minute. The brain at this stage consumes about 60% of the body energy, compared to 20-25% for an adult. This indicates the hunger it has for energy, for its growth. At this age, the learning process keeps pace with the growth of the brain.

As we know we don't start singing from day one, hence let's understand the probable programs we develop from day one. It is logical to assume the first programs that we develop as infants ought to be for the purpose of "recognizing" or "making sense" of the sensory signals that are streaming into our brains. These signals are the sounds, smells, pictures, tastes and body sensations that the infant gets through the ears, nose, eyes, mouth and body. As we know, the developments of "recognizing programs" on all these five streams, start in a very small way and gradually become stronger and stronger as time passes by.

Does an infant know how to think?

Probably the answer is "yes", as thinking is part of our cognitive development process. At first, babies wouldn't know how to think, but their innate BIOS system will accommodate the development of "Do it yourself - thinking" processors. Thinking processes will start in a small way and develop concurrently with the recognizing programs. Take the example of an infant who sees its mother and father most of the time. Gradually the infant will recognize those two persons as its closest acquaintances. Out of those two, the baby will realize mom has breast milk. That knowledge is probably a result of thinking. I am not sure whether the neuroscientists will agree with me on this idea; but please assume so. The thinking and the 'sensory signal recognizing programs' are obviously interlinked and complement each other. The thinking process is what people call the mind. It is a process; it is not an entity. It is a verb than a noun. It is the actual experiencing of the execution of the programs along the process flow architecture that we will be exploring in this essay. The mind process takes place in the brain, and nowhere else in the body. If the brain gets injured, then some of the thinking abilities get lost. If we take drugs, the brain chemistry will change and such changes could lead the brains to process information weirdly. If the brain is deprived of sleep, it affects our thinking. The sugar level in the blood impairs thinking. Our hormonal levels, change our moods. Deprived of oxygen for over 10 minutes, thinking totally stops and the brain goes dead. Interestingly, according to researches, some people go to heaven and come back when the brain is deprived of oxygen.

From day one, the infants get a barrage of information through the five sensory faculties. This information will keep crashing into the tiny brain when the child is awake. For example, the eyes bring in all images that are captured in the visual range. The captured pictures are embedded with details such as near, far, up, down, east, west, moving, still, red, blue, bright, dim, etc., but the baby wouldn't know any of it. In the case of sound, it is all kinds of noises in the surrounding fed through the ears. All these signals do not make sense to an infant as these are novel, strange, mixed, messy, complex and chaotic for the tiny brain. The baby's brain has two choices to make; either to have all this information as a muddle and live with it, or to develop a method to bring clarity to understand the sensory information. Unless the brain has a severe birth defect, the natural route the brain set to follow, is to develop a method of making sense of what it's receiving. The manner the brain brings clarity to what it's seeing is, by concentrating on one thing at a time. Therefore, the baby's first route to understand vision starts with paying attention to one object at a time; separating (the object) from the clutter of all other images that are entering the eye.

The continuous improvements the baby makes to the "picture, recognizing program", slowly but surely makes sense of the pictures. After a few months, the task of recognizing a particular person or an object, will become relatively easy. The process will gradually speed up and ultimately will become automatic or instantaneous**.** For example, a few weeks old baby may take a few seconds to recognize its mom, but a few more weeks later it would a done in a fraction of a second. However, for this to happen, it is imperative to have a past picture of mom already in baby's memory. Without a past picture in the memory, there is no way of checking the latest picture captured. If we agree with above, then we also will have to agree that the mom recognizing process has to have an information access network system to access memory. We have to assume that the recognizing programs and access network systems develops in parallel, from day one. According to neuroscientists, the cell networks go through an enormous progression of connections, disconnections and re-connections in the cell circuitries during the first few years of our lives. The scientific literature explaining what parts of the brain responsible what functions, is plentiful. But, this essay doesn't cover, such details, as its main intention is to explore the brain's working fundamentals in a 50,000 foot level, rather than covering allied anatomical intricacies.

To recap what was discussed to this point; the program of "recognizing mom" is an example of an executable program developed by the baby. It is of course a subprogram of the wide version of picture/object recognition program. Seeing mom, instantly activates the "mom recognizing program." As part of information processing, it will instantly access mom's picture data in the memory to compare and confirmation. If it is mom, the baby gets to know it's mom. Then, as part of the process the mom's latest picture gets updated in the memory for future use. As time passes by, some of the old data in the memory gets erased and some retained. The "mom recognizing program" will become accurate, reliable and fast, every time it's executed. The program-architecture of the wide version of "people and object identification" program comprised of different subroutines to recognize different people and different objects. The same logic holds for the "recognizing programs" for sounds, smell, tastes and body sensations.

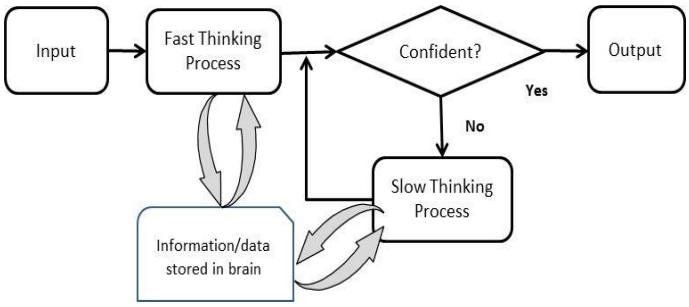
As we all know, from day one we develop a lot of programs required to do physical tasks. Over time, these programs become instinctive, thus enabling us to walk, run, talk and do similar routine tasks, easily. The degree of program development, corresponds with the baby's physical growth.

At this juncture, I would like to introduce Dr. Daniel Kahneman's great idea of thinking, detailed in his stimulating book titled "Thinking, Fast and Slow". Nobel Prize winner Dr. Daniel Kahneman, categorizes thinking into two modes. He calls them - System 1 and System 2. System 1 is "Thinking fast." System 2 is "Thinking slow." Thinking fast, is what happens, more or less in an **automatic** mode in many situations in our life. Ex. The solution to 2 + 2; answering the question "what is your name?" looking at the direction of a sudden flash light, understanding the facial expression of another person. The events such as recognizing mom, actions like walking, talking, etc., that we do without any intentional concentration are thinking fast related processes. Dr. Kahneman didn't use the word automatic, but I did. Thinking slow is where a deliberate attempt is made in thinking. Ex. The working the solution of 57 x 93; trying to guess where the closest town to the south of New York; answering to a question paper. Thinking slow happens in ambiguous situations which presents a dilemma. Thinking slow is analyzing all the things we can do in a situation and intentionally selecting an appropriate decision or action. We will discuss this further.

If we revisit the development of a baby's thinking process, all the "recognizing programs" established for sounds, smells, taste, pictures and body sensations, starts as basic "slow thinking" programs. But the repeated execution of these programs, make them fast – automatic executing programs.

Thinking model in a diagrammatic form

Given below is the model of thinking we discussed.



This diagram is explained below:

Inputs are what is captured by the five sensors. All these inputs are channeled through the fast thinking process. Fast thinking process access the stored information/data in the **memory** to check the past-information connected with the inputs. This step is indicated by the large arrows. It is part of the data processing procedure. The fast thinking process, process the inputs. Then its result goes through a "Confidence" check stage to assess whether the answer or the result derived is Okay. I have named this logic box as "Confident?" However, I think a better word should be found to replace this word to represent "Confidence/gut/ intuitive feel." An answer having a sufficient degree of "Confidence" will represent as the final output. (The judgment on this "Confidence" or "Gut feel" is a personal feature that's

distinctive to each person. The confidence level depends on different thinking situations; and hence it can be subjective).

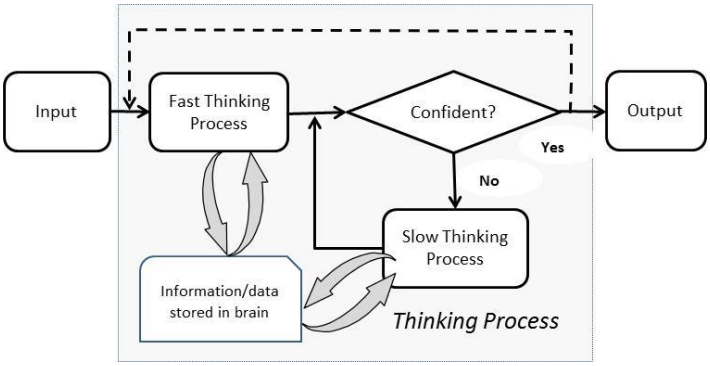
However, if the "Confident/ gut/ intuitive feel" doesn't present the answer or the result as the final output, then the question (with the answer) gets directed to the **slow thinking process**. The slow thinking process, then accesses and obtain relevant reference information from the stored memory once again. But the referencing at this instant happens more meticulously than the previous time. The slow thinking process gives more **intentional attention** to the issue. The result thus derived**,** then goes back to the confident block for judgement and to present it as the final output. The **intentional attention** is a distinctive characteristic of the slow thinking process. The fast thinking process lacks this characteristic. Dr. Daniel Kahneman attributes the fast thinking to brain's hasty behavior. In day to day life, we mostly use the fast thinking process. This is why even a large percentage of intelligent people answer the following question wrongly. "A bat and a ball is $110. The bat is $100 dollars more than the ball. What is the price of the ball? The answer is on the last page for you to check how you fared.

Let us put our schematic model into the test with the baby–mom example. Consider the case where baby recognizes the mom at first glance. In this case, the "input" is mom's presence that makes an upside down shadow picture on the baby's retina. As soon as this was captured, the program developed to recognize mom, is instantaneously activated in the fast thinking process. Then through comparison of the shadow in the retina, with the information stored in the memory, mom is immediately recognized. The result is certain and the confidence level is high to confirm that is "mom". So the output attests, it's mom. This happens quickly. The slow thinking process was dormant during this process.

Consider another example where mom was wearing a different dress. In this case, just like before, the fast thinking process result still reaches the confident checking point. But in this occasion, the decision has a doubt. Because of the doubt, the "confidence checking" diverts the issue to the attention of slow thinking process. The slow thinking process performs a thorough analysis. This time the verification check attests that the person seen, in fact is baby's mom. Therefore that becomes the final output.

We have to understand, in both the above cases, it is not only the "sight, recognizing program" that runs to recognize mom, but also all the other sensory recognizing programs that were running parallel in the background of the brain. All these programs are interconnected and run as a cohesive team. The stored memories of mom's past voices, data on the rhythm she walks and other connected traits that would have been subjected to in-depth scrutiny of the slow thinking process, to assist in recognizing mom correctly.

To make the model more logical, I believe we need to add a feedback link from the output, to the input. This provides the mechanism to reaffirm the validity of the output. The dotted line depicted in the diagram below is the feedback link from the output point to the entrance point of the fast thinking process.



This feedback link, keeps the looping action run across the process. The feedback looping is, always an integral part of our thinking process. When the baby recognizes mom at first glance, the output, i.e. identifying mom as mom, is fed back as an input to the fast thinking process, and it goes through the fast thinking process again and again, in a cyclic mode (looping) in the fast thinking circuitry. This eases the operation of the thinking circuit by not concentrating on mom's picture continuously or accessing the memory over and over again as the answer is already known. The cyclic running creates the consciousness or the feel of mom's presence, in the baby's thinking system.

In the second example where the baby had a doubt about mom, the slow thinking process came into action. The slow thinking is really the process that clears the doubt. As soon as the baby got to know it was mom, the baby is back in the fast thinking process, with the loopback signal creating the comfort feel that "it's mom". Immediately after resolving the issue, the slow thinking process ceases to operate and becomes dormant. Whether there is new input fed to the system or not, "consciousness of mom's presence" remains in the background of the baby's brain as far as mom is in the vicinity.

If you consider an example of replacing baby's mom with an unknown woman, then the resultant output through the fast thinking process will be something like "she is not mom". The looping back circuitry provides the baby, the consciousness or the feel of that person is not its mom. No involvement of the slow thinking process was required.

Leaping Further into Thinking Process:

Up to now we discussed the recognizing programs where the inputs are fed through the five senses in our body. Can our model be used to explain what makes baby demand things around?

Let's analyze this.

We inherit genes from our ancestors lived over millions of years through the human evolution process. The process of evolution dictates progressive transmission of changes in our genes. Hence we should invariably inherit some information cascaded down from our ancestors. As regards the genes, we need to understand the living cells in our bodies are as new as a few seconds and old as millions of years. This is simply because there are no births of cells. The cell re-generation occurs by cell division. Because of the division of cells the new cells are always associated with the old cells. We are part of the process of cell

division. All our present cells in the body have residual components derived from the very first human cell ever existed. These have been passed on to us by our parents in the form of single cells. These single cells invariably had been carrying rudimentary characteristics linked to our primitive ancestry. Thinking along the fundamental of the evolutionary process, the process of cell division has the perfect mechanism of propagating the favorable experience and behaviors that are useful for the human survival, through the genes.

The innate behavior which is commonly explained as instinct is what we have inherited this way. No proper scientific explanation for "instincts" exists to date. A few good examples of instincts are: 1. An infant's ability to suck mother's milk just after birth; 2. The ability and knowledge of a baby kangaroo, which is less than an inch long and totally blind at the time of birth, climbing to its mother's pouch immediately after birth for milk; 3. The Baby turtles' choice to dash towards the sea instead of running towards the land side, just after hatching from the eggs; 4. Birds' abilities to build complex nests exactly as their parents could, without going through any training. Beside instincts of similar nature, I tend to presume we also inherit qualities such as anger, fear and other emotional traits which are essential for survival. Babies understand pain from day one. These specific characteristics are possibly associated with our evolutionary process and inheriting from the group behaviors of our ancestors. It is a known fact that in extreme crisis situations, there are inbuilt brain programs that can even make us instantly unconscious and leave us in a survival mode until dangers are clear. We fear snakes and spiders. All these facts make us to conclude that at birth, our brains are already having a compact program package to start our lives with. Therefore, the instincts may be a mix bag of programs as well as some inherited data etched in us that are linked back to millions of years.

We know babies tell that they are hungry by crying. Did any thinking happened to make a baby cry or can it be related to instincts? If we refer back to our model, I would say it was due to an input signal spawned from the baby's stomach. When the baby is hungry the stomach sends a signal to the brain. It is not an external signal, but an input created internally (body sensation). Does any fast or slow thinking take place when this input hits the brain to produce the output of crying? According to the model, I think the signal was processed through the fast thinking process and the output of crying took place because the past information from memory whispered to the process that crying would be helpful in getting someone's attention. The looping process keeps the baby crying until the baby gets the opportunity of having milk. As soon as that opportunity is fulfilled, the fast thinking process takes the baby into the auto-mode of drinking milk.

In this particular instant, was there any requester for milk? It does not appear to be one, because the stomach was the generator of the input signal. The stomach is an organ of our body. Can the stomach be considered as a commander or requester as it's a body part of a person? If it's yes, is this another commander in the body? What is the function of the brain in commanding? Several questions of this nature pop into our minds, but we will leave these interesting questions behind for the time being.

Throughout the baby's growth, the sensory organs will look for new information to explore and experiment with whatever the baby comes across. The analysis of information on exploration and experimenting by the baby, happens through all the recognizing programs that will occur individually and

collectively. For example, when a baby grabs a toy (say firstly attracted by its color), he or she will then likely to touch the toy to feel its texture and also put it in the mouth to taste it. This is how babies explore. The new data gathered will get stored in the brain. If there is a particular smell coming from the toy, that will also be registered in the brain along with any sounds it can produce when it is shaken or pressing a particular button on it. The tiny brains will do all these things for everything they come across to understand the things in the physical world. During this continuous step by step self educating process, the brain will develop a characteristic called the individuality. As a result of the creation of this individuality, the baby (really the "**brain**" if you think deeply) will have preferences in life matters. They will want sweet things to taste rather than tasteless, bitter or sour things. They will like to have the soothing sounds to hear than disturbing sounds; to have familiar people around them rather than strangers; will like to enjoy a comfortable room temperature than unusually hot or cold temperatures. All these preferences come from the past experience stored in the brain as a result of its exposure and exploration of the five sensory inputs. Therefore, when a baby grows, we need to assume the past data in the memory has a direct influence on babies' decisions making.

In support the above, consider a case where a baby sees one of its old toys. In this case the input signal is "seeing the toy". This signal will be processed through the fast thinking process. During the process it will refer to the memory and understands it is a toy seen before. The loop back process makes the consciousness of the presence of the toy. As the thinking process runs repeatedly as a loop. The repetition will allow more information to retrieve from the memory with details such as what the toy can do, the texture of it, the sounds it can make etc. Depending on this information, a choice will be made by the baby, either to grab it or to ignore it (final thought). The "physical action" succeeding the final thought will be either to grab and play with it or not to have it.

Similar to above, we can write many examples of baby's demanding situations, and using our model we can explain the probable action baby may take for each of those examples. From the logical analysis of the above examples, it appears that the demands are always associated with inputs that are sourced externally or internally.

Can all the demands be input related? We will address this question as we proceed.

What happens in the thinking process, when there are no inputs? Are there situations of this nature?

Yes… when a baby is asleep. Can the fast thinking and slow thinking systems become dormant at sleep as there are no external inputs?

Let's analyze this situation using our model. One possible scenario is, the thinking process treating the input condition as having absolutely "no inputs"; hence this is a state of total "shut off" of all inputs. The thinking process will not run in this scenario and hence the process circuit is inactive. This is a situation of having sound sleep without any mental activities. The second scenario is the thinking process treating the "no inputs" status as an input. This is similar to treating "0", in binary language logics. In the binary system, even "0" is an input state. In this case the "no inputs" signal will run through the process, still

without any data. However, in this scenario, because the thinking process is now running, the circuits will be **active**. I believe in sleep, the brain runs one of these scenarios. Scenario one, is how we fall asleep. Under this scenario since the thinking circuit is not active we there is no feel of consciousness. After we fall asleep the second scenario can run. But, as to what triggers the second scenario to seem interesting and will be discussed. What could happen when the thinking process is **active** with "no inputs"?

In this situation, the feedback loop plays a major role in the thinking circuitry as it runs on a non-stop mode. The circuitry creates a dynamic condition of running all the recognizing programs in the brain without each sensory stream (five) having any inputs. Because of the dynamism in the active cell circuitry, it has a high potential of picking residual data from the memory that is urging to pop-up. A random data pick from the memory getting into the thinking circuit, can easily direct the thinking process to various routes and produce perplexing outputs. If you are not clear on this point, the following explanation may bring some clarity. As depicted in the model, the fast or slow thinking processes are **designed** to approach the stored information in the memory. Generally the purpose of accessing the memory is to seek data that are related to the inputs that's been fed (or the specific "processing content" in the circuit). However, when there are no inputs, the mere function of the thinking process **accessing** the memory has a high potential of picking random data from the memory. This can be due to, some form of a "neurological stimulation" due to the thinking process accessing the memory. Irrespective of the strength of the random signals popping out, once picked, it can get into the processing circuitry as internal inputs. (Without any of the above explanations, another possibility for the second scenario to run may be from a signal stemming internally. Ex. A nerve caused by the sleeping position). However, once these inputs get into the circuit, the thinking system will generate outputs, one after another. Just like a positive feedback system in a typical engineering control model, any random information coming from the memories can keep the thinking process generating outputs. Those outputs, in turn, fed-back as inputs, can keep the thinking circuitry running non-stop. In every looping cycle, when the memory is accessed, it can provide different reference information relating to the latest content running in the process at each instant. Depending on the nature and complexity of the information that is running in the system, the fast thinking as well as the slow thinking processes will partake in the thinking cycles.

I believe the above explains the core mechanism of dreams. The same principle is applicable for dreams in both babies and adults. As you can understand, for dreams to take place, the inputs need to come from the memory. Since the thinking circuit becomes active in dreams, we have the feel of consciousness. At the time of dreams there can be the external sensory inputs (ex. TV 'on' with the sound), but these inputs are completely shut off and none of these inputs will be subjected to any form of processing.

We know by experience, dreams create emotional feelings. This is possible because, the sources of emotional programs reside in our memories and these get involved with the dreams. In most instances, the outputs we create in dreams end as mental entities such as thoughts and emotional feelings. We forget most dreams very quickly. However, some data from dreams get stored in the memory. At times the outputs from dreams get delivered as physical actions; sleep walking is a good example.

Let's analyze the dream situation further. When we are awake, the inputs mainly come from external sources. But, if we explore these inputs by going deep into details, the input sources linked to the thinking system are logically not external. Because, the inputs are really the "reactions" made by our sensory organs. The input from an eye to the brain, is the "shadow picture in the retina" and not the external physical object, though there is a fringe connection to external objects. Input from the ear is the vibration in the eardrum caused by the sound source but not the source. In dream situations, the inputs are not even the reactions made by the sensory organs, as the information really come from the memory. The data in the memory have no absolute "one to one" or "fringe connection" to the external source. Why did I say that? There is a reason. Let's examine an object that we see in a dream. Let's agree that the particular object came from the memory. Then we may argue that particular object is connected with past data received through the sensory inputs from the real world. Is this assumption always correct? No! As we discussed, we need to understand the dreams we create generates a lot of new information and some of this information are weird due to the unrealistic nature of the dreams. Then parts of the information coming from dreams gets stored in the memory; because the storing of information is an innate characteristic of our thinking process. Hence, we cannot say for certain, that all the information we have in the memories are 100% connected to the sources in the real world. Good examples of unrealistic events and data coming from dreams are actions like flying at tremendous speeds, floating, rising from death and doing similar superhuman deeds. One of the reasons why we meet with various new people in our dreams, (perhaps even never exist in the real world) is because the inputs that source the dreams are both realistic and unrealistic information stored in the memory.

To explore the data in the memory in a different way, consider a friend that you have not seen for 20 years. This means the picture information you have in your memory is over 20 years old. When you picture the friend, what you really have in your thinking process is the over 20 year old data; hence it's not the real representation of that person, at the present time. In regards to this example, this logic is true for both dream situations and wakeful situations, as the data comes from the same memory. Therefore, we have to agree that in our normal life, we make decisions based on realistic and non-realistic information from our memories. This is a fact and logically true, but it is too perplexing for one to accept this fact operates in us in our normal wakeful situations. In dream situations, sometimes we meet with accidents and lay in pools of blood, fall from the sky and fly through the trees with near misses. Though these are not real situations, this information remains in our memories. That is why we can write and talk about them. This is why we can write novels using our imaginations. That is why we have imaginations and could build further on our own imaginations. The memories are a supporter of our imaginations. When we awake, I think our thinking process has some mechanism to sort out what are real and what are non-real; I'll say up to a greater degree. The reliability of separating these two streams of data for real life depends on one's cognitive ability.

Our basic thinking model gives clues as to how some of these facts can be explained; especially to understand how we generate weird dreams. This reasoning makes us understand that the information we have in our memory are past information from the real world as well as synthetic information from our own dreams without having any connection to the real world. In dream situations, our memories can produce inputs of sounds, smell, visual, tastes and body sensations without any direct links to the real

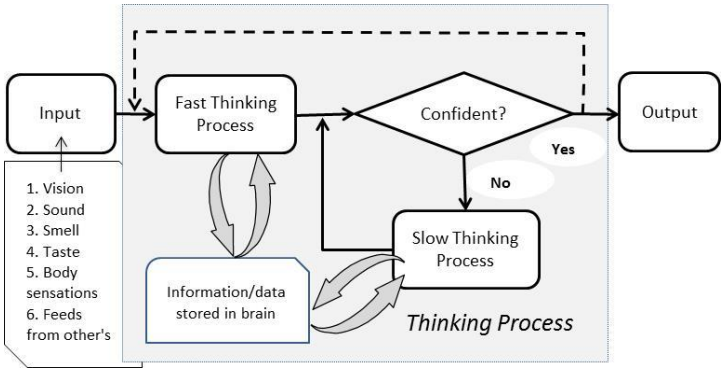
world or to the five sensory organs. The dream state generally do not sustain for long. The dream states have certain operating conditions and limitations that makes us switch back to wakeful states when the five sensory signals experience high levels of external inputs (ex. A loud noise, someone shaking your body, someone switch on the light in the room, etc.) or severe mental strains caused by the dreams.

Why is thinking process so complicated to understand?

We know our thinking system is much more complicated than what was explained so far. Why is thinking process so complicated to understand?

The following reasons will give us some idea about what makes it so complex. From all what we had learnt until now on the development of the baby's thinking process, we assumed the understanding of the physical world is associated with perceiving the sensory information received as sounds, smells, pictures, tastes and body sensations. **This assumption is completely wrong, because in reality there is one more important stream of inputs that we have ignored totally.** The input we ignored is the input stream of "various feeds provided by others." A few examples of inputs from this stream are, the earth is like a sphere; the idea of heaven; method of finding square root of twenty nine; Santa comes from the North Pole; 2 +2 = 4. Though I have used the words "feeds provided by others" some of these inputs can be our own mental thoughts fed through the feedback system.

The following diagram depicts all six streams of inputs into our model.



What happens to baby's thinking process when they receive the 6th category of inputs?

This is where the language comes into the picture. During the development of recognizing programs, the baby didn't require any assistance from anybody. The baby learnt actions such as crying to demand for things, crawl and grab toys without anyone's teachings. Researches say, at this tiny age, they even recognize the facial expressions of others to assess other's moods without anyone teaching such skills. All the program developments to this point were 100% on a DIY basis.

As you know, the brain development does not end there. At the second phase of development, babies gradually learn how to talk. Different to DIY program development, in the second phase of development,

babies have to learn various skills from others. The babies will not learn to talk or learn a sign language, if not taught. The babies gradually learn the sound of the words as taught by others. These get stored in the memory. If the teacher shows a cat when teaching the word dog that is what the baby will learn. Similar to the recognizing programs, the baby will develop an executable language program to use the words. The talking program will be advanced to levels of learning sentences and understanding the meanings. The moms, dads or anybody else who teaches the baby will use simple words and simple sentences; not Shakespearian phrases. Also, the teachers will correct the babies by providing instant feedbacks. Once the baby reaches some standard, the resultant skill will be the ability to talk. At some stage of this process the baby will understand its own name and will start calling the mother "mom" and the father "dad". The words that the baby uses will be the words taught by the others. Sometimes babies make their own words with their own meanings. But their own words will get dropped when they realize that those are not the words used by others. As time passes by, the babies will gradually correct any words leant wrongly. For an example, they will ensure the word dog is used for a dog and not for a cat. As the babies grow, they will learn a lot of other things such as stories, songs, mannerisms, religious & superstitious ideas, various educational subjects, sports and other physical skills. The influence of learning these comes from the parents, teachers, friends, and the media as well as from the society they live in. What goes to baby memories are generally the one to one copy of what's being taught. Like the vaccinations that the babies get as infants, unfortunately the developing brains are forced-fed with ideas of the parents and the others. They have no choice in these matters at this age. A famous astrophysicist Carl Sagan quoted some of his serious thoughts on this as "*Every kid starts out as a natural-born scientist, and then we beat it out of them. A few, trickle through the system with their wonder and enthusiasm for science intact.*"

What are the general highlights with the 6th stream of input?

There are a few points that can be highlighted, having significant impact on ones' life, because of the 6th steam.

- The memory now has words, meanings of the words and various ideas given by others. (Ex. Words: Mom, dad, tree, beach; Meanings related to same words are: Mother, father, object, place; Ideas: moon is cold, the sun is hot, Santa Clause, angels, ghosts, after life, 2 +2 = 4).
- The output thoughts can be delivered in words: verbal, written, conventional gestures and body reactions.
- After listening to a person, others can understand the inner nature of that person to a certain degree and make judgments of the person's opinions.
- The memory will get stored with vivid ideas taught by others, from reading books, media, etc.
- In dream states, the vivid ideas mentioned above that are in the memory, can spring into the dreaming process to generate complex dreams with numerous new ideas and things. The fresh ideas thus generated can get stored back in the memory.
- Waking up from dreams can happen when a grave mental disturbance occurs in a dream.

- Any new idea that comes as an input from someone else, will get subjected to evaluation, analysis and judgment. Then it can get totally rejected or accepted depending on the mood, mere preference or the opposition to the idea based on past information in the memory.
- Some ideas learnt can become deep rooted and can get hard wired rigidly in the brain. Those ideas would be defended very tenaciously (ex. Religious and ideas of superstitious nature) akin to the action of a virus guard protecting the software in the computers.
- Some words can create imaginary pictures and ideas in your brain; you have never seen or don't even exist in the real world (Ex. Dragon, Unicorn, Dionysus, and icy Planet Dadida in a solar system named Vaadi).
- When reading a letter from someone known to you, the background in the head gives a feeling that, that person is reading those words for you.

By the age of 4 to 5 yrs, the development stage of the brain forms the core foundation for the individuality in the adult's life. Let's examine the thinking process at this stage.

Long time ago, I can remember, my 5 year old son asking my wife "mom, why did you say you don't have money to buy all the stuff we want? Isn't it simple to go to the ATM, put the card and get all the money we want? I have seen others doing this and I cannot understand why you say you don't have money!" Also, on another occasion, one night, I was in the house and my son came running towards me from outside, highly excited, and said "Dad, dad, come out soon. Look at the moon. It's broken." These are good examples to illustrate the level of learning at a tender age and to spot the missing elements they yet have to learn. These limitations gradually diminish as children become teens and then move on to adulthood.

I recently saw a YouTube video where the mother gives the child a meal made of octopus meat. The child asked what that was and then refused to eat it after realizing the killing of a living being has been involved in the meal. This particular example shows, this child has got into a stage of reasoning. He didn't agree with the concept of killing due to his own reasoning or due to an idea planted in him by the others that he agreed with.

We can see from the above examples, the programs of perception get developed through the child's interaction and assimilation with the world. As children grow, they can be objective about their own subjective existence. The human brains are genetically geared to look for the fulfillment of pleasurable urges demanded by our cravings. These are the cravings that are created by the six streams of inputs from day one that we have engraved in our brains. As the hungry stomach crave for food, all these sensory receptacles crave for feeds that can bring happiness, pleasure and fulfillment of sensual desires. You may wonder why the sixth stream was included with the other five sensory stimulants that source cravings. Of course, it is one of the core cravings that dictate our lives, if you explore deeply. The cravings created by the sixth stream, is the reason why we want others to think the way we think; we want the others to agree with our ideas; and others to approve what we do. This is why we join a particular club, affiliate with a particular political party, read similar type of books, adopt a particular belief system and do many other boundless things we like. In supporting this fact, scientists have found

that we become friendly with people who have similar ideas. There are people who will be willing to sacrifice their life to safeguard their ideas professed by the doctrine they follow. So, the 6th stream is a paramount desire that cannot be ignored and just like the other five sensory pleasures, we like to enjoy the pleasures associated with the 6th stream of inputs.

The journey of childhood to adult is full of activities involving acquiring knowledge, gaining experience and a lot of decision making. We develop various skill sets. Some people become experts in certain fields in education, arts, science, philosophy, sports, etc. Some people are born talented and gifted to acquire such skills quickly. Some people get those skills with their sheer persistence. All these are part of the characteristics of the mix of people that forms the societies, we live in.

Dream state and Wakeful state:

Sleep is a very important thing for the health of the brain. This is the period, the brain does all the housekeeping work: refreshing the data, delete what is not required, put things in order, do the necessary remodeling and attending to similar maintenance work. When we are sleeping we our basically in two modes. One mode is deep sleep where we do not feel any mental consciousness. The other is the dream mode. Where we experience the consciousness. We touched on the concept on how the dreams are formed. We know in dream situations the inputs come from the memory.

In wakeful state, all 6 streams of external inputs play a domineering role in the thinking process. But this is not the case all the time. Sometimes, the internal inputs take over the domineering role of the thinking process from the external inputs, without giving them any leeway. We regularly experience such situations where the external input gets completely ignored and we get carried away by something cooking in our head. How can this happen?

One possibility is, the feedback signal from an output thought (at a given instant) could be very intense to warrant the inputs to be ignored in the thinking process. The other possibility is the a domineering input that overpowers the external inputs, stemming from the memory itself. I am of the opinion, the memory harbors issues of various nature, in addition to carrying information and data. These can be; unresolved issues, burning issues, sad issues, anger issues, happy issues (emotional issues) or any other type of unresolved residual issues. At the beginning of this essay we discussed about the fast thinking process diverting the question to the slow thinking process in situations in doubt. But we did not discuss what happens when the slow thinking process cannot resolve the problems. I think such situations become unresolved issues. These types of issues that lingers in the memory, either could creep-in as inputs when the external inputs do become dormant (at times) **or** on its own strength. Therefore, those inputs coming from the memory can take over the thinking process without making any leeway to the external inputs. In here, I am not trying to commingle this idea with a typical thinking scenario that we discussed before, but trying to emphasize on an additional scenario where the input could solely come from the memory without any influence from the external inputs or from a feedback from a previous thought. These types of inputs can trouble you very much and even keep you up at night. For example, say you had a loss in the family. As soon as this was heard by you, your thinking process goes through the normal processing

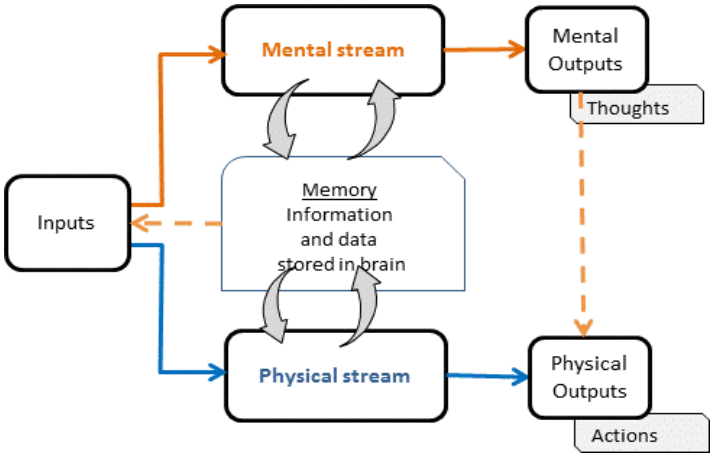
routes and then as a result you go through the usual emotional routines. But, this type of shocking news does not go away from the memory easily. Even after a few weeks or months, this issue can suddenly surface out from your memory without any influence from any of the new inputs you receive. Therefore, we need to understand the additional role the memory play in generating internal inputs, when we have issues. As to how the input receiver gives preference to inputs in selecting the inputs for processing, including the ones coming from the memory, should be considered as an integral function that has been incorporated in the input receiving programs we developed.

Given below is another example:

Assume you are a smoker who like to kick the habit. Every time you hear about the dangers of smoking, you think about it; but the thinking process related to addiction that is running in your system is more domineering than the reasoning you make to quit smoking. Hence, this is an issue you have in the memory. Say, one night when you had a quiet moment where all your external inputs are dormant, this issue shoots from the memory. Then, through your repeated slow thinking process, you arrive at a decision to quit smoking, and you quit the habit immediately.

Categorization of thinking streams:

While Dr. Daniel Kahneman provides a good concept for us to understand the thinking process as fast and slow thinking, it's my view, that all the brain activities that create outputs can be broadly categorized into two key streams. One stream produces "physical functions" and the second stream produces "thoughts." Similar to our very first diagram, the physical stream will have three stages. A stage to take in **"inputs"**, followed by a stage to **"process"** the inputs and a stage to "**produce physical functions"**. The second stream will have similar first two stages, but the third stage **"produces the mental outputs"** that we define as our thoughts.



Let us understand the stream associated with our physical functions.

Think about a baseball pitched at you, for you to hit. Your inputs associated with facing the ball will be several. These could include the speed of the ball, flight of the ball, pitcher's action, sounds coming from

the spectators and many other similar input feeds. All these signals will be picked by your sensory organs and be automatically directed to your brain's physical activity processing stream. The brain will process the inputs through the thousands of sub-programs and produce an appropriate output. In this case, the expected output is hitting the ball to score a run. Your output parameters would be many. Some of the output parameters are the things like adjusting your body posture, judgment of where to hit in the field and judgment of striking height of the ball. The final output of hitting the ball, is a combination of all that. As exemplified earlier, a lot of tiny brain programs developed through training and practice have to run concurrently to create this desired output.

This example gives us the sequence of events that take place in the "physical activity operating system." This system takes in "many inputs", "process many inputs" at the same time taking into considering of various parameters required for the output, and produces "a specific output." Otherwise, hitting the baseball properly wouldn't be possible. Driving a car is another good example. When you drive a car, so many inputs are continuously fed to your brain. The traffic condition, distance to other vehicles, notice of erratic drivers around you, the condition of the road and the color of the traffic lights are some of these inputs. Your brain processes all this information through the thinking process and make you drive safe. Once you get used to driving, all this becomes almost an automatic process. This happens through the fast thinking process, we learnt. During most parts of the journey, you don't think about any of the inputs intentionally (i.e. Slow thinking process). Therefore, this is a good example to validate the brain's concurrent multiple inputs handling ability or multitasking capability. The data processing happening in the background, is similar to many computer programs running in the background of your computer when you are working on a specific computer application. In most cases, if the particular skill has been developed in the past, with repeated training and practices, then the multi-functional brain processing phenomenon become true and functional on an automatic mode. This is how we learn to play golf, gymnastics, playing a guitar and many other skills… with the focus of looking for relaxed and smoothness in doing things.

Will the multitasking ability to be true for the mental stream of thinking?

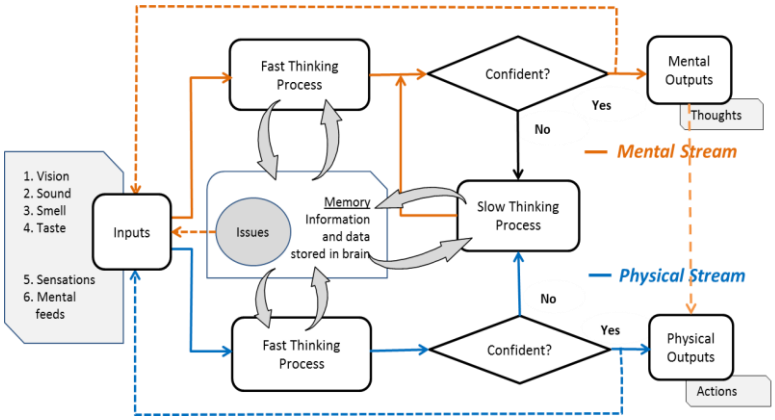
No. The human brain, with all its amazing capabilities, simply cannot concentrate on more than one thing at a time. This is an established fact by the researches of brain science.

Let's evaluate how the mental stream operates. Similar to the physical activity process, it has an input stage, a process stage and an output stage. But in this particular process, the input processing stage is very different to that of the physical stream. The core difference is that the processing stage can handle only **one distinct input** at a time. It isn't capable of processing multiple inputs concurrently. Hence, it takes a single input, then process this input and produce a single output (a thought). It may happen at high speed without us being aware of the rate of processing. The 'single input processing' is the unique feature of the mental stream of the thinking process. If you like to check this, think about the ring exchange event in a friend's wedding, you attended. Now think about the same event at your wedding. Try to hold both thoughts at the same time. Can you? You may alternate back and forth, but you cannot think of both events at the same time.

Our slow thinking process doesn't multitask. It produces only one thought at a time. The thinking processes that produce the thoughts can be of various types. Examples of the process types are: manipulating of information, forming concepts, problem solving, reasoning and making decisions. The "the outputs" defined as thoughts can be ideas, images, sounds, emotional feelings, ideas of new concepts, decisions, results of calculations made, preferences, etc. When a particular input is getting processed, we automatically shut down the doors to all the other inputs. That is why we cannot understand the contents of two people talking at the same. Our listening process, can flick from one person to the other, but the processing will still happen in a very restricted fashion by attending to one input at a time. It is impossible to absorb two mental inputs at the same time. According to scientific studies, the mental stream of thinking process is limited to a meager rate of producing 42 thoughts per minute, the most. Whether the mental stream of thinking process needs a language is debated. But, without a language, cognition required in the thinking processes will be slow and sluggish. Language helps people to teach others about history, past experience, concepts and ideas. Without language any of these are hard and sometimes impossible.

In our day to day life events, for most inputs, we will have spontaneous outputs (thoughts). A major % of thoughts are generated hastily through the fast thinking process. The thoughts produced this way are like "mental reactions". Mental reactions can be very different to the thoughts that are produced through an intentionally concentrated slow thinking process. For example, if someone scolds you, you may react by shouting back. In our general day to day life situations, the result of an output gets further evaluated. The further evaluations happen through the looping process and also on how the recipient reacts or reciprocates to our output. In the latter case, the recipient's reaction becomes our new input. Sometimes your output of "shouting back", may become an input through the feedback link, making way for you to produce a different output. For example, in your second round analysis, you may realize the narrow mindedness of your previous output; and this time you may process it in a different way; and make a new output like "Oh! I made a mistake by shouting back at him. In fact, that person doesn't deserve to get scolded. I was wrong and I must apologize." Or sometimes, fueled by your past records in the memory, the output may become worse than the first one.

After going through all what we learned to this point, I have given below an updated depiction of our model to understand the thinking process further.



This schematic diagram illustrates how the physical stream and mental stream running as two separate streams as explained. We need to understand that all the programs we developed from day one are stacked behind the principal blocks in this diagram that are responsible for the functions of inputs (capturing/choosing), fast and slow thinking processes (processing), confident (decision making/intuitive feel) and outputs (thoughts and physical actions). As you can see, the slow thinking process plays a common role for both streams and the memory is shared by both streams, too. When the thoughts need to be delivered as verbal, written or physical actions, that happens through the physical action block indicated by the dotted line drawn from the mental outputs to the physical outputs.

Let's understand the above diagram properly with an example. Take the example of you driving your car to your office in the morning. Since it is a physical activity, according to my definition, all the inputs are processed through the physical stream. Say in the morning you have been reminded to go to the office when you got up (as to how this was prompted is explained later). So the programs running in your brain already know where you are scheduled to go. The input is generated within the brain to prompt you to go to office, among other things as you are trained to do in the morning. This leads you to go to the car within a predetermined time frame. Once you are in the car, your fast thinking process will summon the slow thinking process a few times, like in the instances of reversing the car from the garage and maneuvering it to the main road. Once you are on the main road all the factors like the awareness of the other vehicles, where you have to be on the road, traffic light signals, etc., will be fed as inputs and your journey will be almost automatic as you proceed driving towards your office. All those good things happen through the fast thinking process, with the affirmation that you are doing well and safe, fed by the continuous feedback system. If you switch the radio "on" and start listening to the talk-show, and if you understand what is going on in the talk–show, then that means you have your concentration on it. The concentration happens through the slow thinking process. Without the slow thinking process, you will not understand the content of the talk show. You may have a few off-concentrations moments, depends on what you come across on the drive. The act of driving happens through the physical stream (blue line) using the fast thinking process with the blue dotted line feedback system. Slow thinking process has nothing to do when you are driving, as driving happens almost on an automatic mode. The concentration on the talk-show happens through the slow thinking process (orange lines) with the feedback loop facilitating the interlinking of the content of the talk-show from a moment to moment to sustain the continuity. Listening to the radio takes the sound of the radio as an input, through the mental stream and processed through the slow thinking process. Understanding the content of the talk-show is the output of the mental process stream. If we shake our head to the tune of the music coming from the radio, then our output thoughts from the mental stream is passed on to the physical action block as shown in the diagram. The physical action block has the necessary programs to shake the head to a tune we want. The driving and shaking of the head can occur at the same time. But the continuity of shaking head is taken over by the physical stream to facilitate listening to the radio intently.

Consider a variation to this example. Say, while you are driving smoothly, all of a sudden a police officer

signals you to stop. It is a visual signal. Immediately, through the fast thinking process, you know you have to stop. The feedback on the stop decision, when reaches the decision making block through the fast thinking process, it diverts the signal to the slow thinking process. The slow thinking process, will facilitate you to take the vehicle to a shoulder lane and stop it in a proper manner. If your radio was “on” at the time the police officer signaled you to stop, then from the moment you engaged the slow thinking process to stop the car, you lose the concentration on the talk-show. You will not know anything that went on the talk-show during that time, because the slow thinking can process only one signal at a time; and at that instant it was used in stopping the car correctly.

Yet, take another example where while you are driving, your windscreen shatters accidently into pieces. You will react immediately to protect your eyes with your hands or move your head in another direction. In this instant, the reactions are mainly instinctive and hence as to what extent the fast thinking process played a role in this action can be debated. The instincts, mainly connect with the physical stream, hence I am biased to say it took place in the physical stream.

I believe our model facilitate to construct logic behind most examples similar to above and hence pay a way to explain the majority of thinking related accounts. However, you may wonder who or what made the decision in the morning for you to go to the office. I think all the micro programs (that we developed from day one) pertaining to our life affairs run all the time in the background of our brains or run on a schedule, established by the brain processes. “Go to office” is one of those programs that run in the system, with details as to what time of the day it should run to make you aware of the daily event that you should prepare for. These programs could even include details as to what to wear, what to take with you to the office and what time you have to be there. Also, similar to what we discussed with the child–mom program where mom’s picture was getting updated every time it ran, the “Go to office” program may designed to get constantly updated to keep it current and effective.

This 2nd stream of input processing brings the word “Mind” into the picture. The word "mind" is very extensively used by everybody. What is mind?

It’s not an entity. It’s just a word we casually use to describe "data processing” in the brain that we discussed. The mind is a verb, not a noun. While the brain is an integral part of the body, the “mind” is the processing going-on in the “thought producing” processing programs or the thinking process that we discussed throughout in this essay. Because the mind is a “process”, we always feel young, even when we become old. This is true as long as our the thinking process can run in a healthy brain. The processes aren’t subject to aging like the physical body (ex. Doing a complicated calculation in an old version of the Microsoft EXCEL program. Excel is the program. It can do the calculation whether it is old or new. The mere computations that goes on in the program is the processing. The process that produces answers. So, we feel young in our minds most time, because the processes don’t age. However, as we grow old, some parts of the brain can malfunction or become weak. Hence, our thinking process is vulnerable to deterioration even if we do not wish to have such conditions at any age. Patients with Alzheimer’s disease prove the consequences of brain cell deteriorations.If we ask ourselves to assess the condition of the cognition process we will always give positive remarks as the assessment of the processor is done by the process itself. Unfortunate when our processing abilities do go bad we have no way of knowing it.

Someone else has to make that observation.

Can hypnosis be explained using our model?

How a person can be hypnotized, is a difficult phenomenon to explain. In hypnotism, the person who gets hypnotized strictly and obediently follows the hypnotist's instructions once that person enters into a different thinking plain called hypnotic trance state. At the end of each hypnotizing session, the hypnotist's command the person under hypnosis, to come back to a wakeful state from the trance state. That is part of the obeying process that the person undergoing hypnosis, is obligated to follow. In hypnotism, the trance state is explained as a state of consciousness that is similar to a "carried away" state. We experience carried away states when our brains delve deeply into high processing of one event, such as watching an interesting movie or a drama. In such situations we feel that we are part of the movie or the drama. Our inner mechanisms do not have any influence to make us aware that we have transitioned from a normal state to a carried away state. The external inputs are ignored when we are in a carried away state.

How can we correlate the above phenomenon to our model of thinking? To start with the hypnotic trance state can be compared to the dream state to some extent. In the dream state, none of the external sensory signals play a role, and the input signals are generated internally. In the hypnosis process, the sole input to the thinking process seems to be restricted to the commands given by the hypnotist; and the outputs delivery is in the form of talking, body action and emotional reactions. The commands given by the hypnotist include the command to switch back to the wakeful state from the trance state. It appears to me, the thinking process that is applicable to the hypnosis (in our model) is the fast thinking process without the involvement of slow thinking at all. This means the "confident" sector is redundant when the hypnosis is taking place. I am also inclined to view, that the feedback link in the mental stream of thinking is taken out of the system when that person is in the hypnotic trance state. I will leave it at that, for you to ponder what else could be derived from the model to explain hypnosis.

Does the brain run all the programs the way we like them to run?

The answer is no. Whether it is the physical stream or mental stream, despite the marvelous things that the brain can perform, the brain programs deviates a lot from our expectations.

I am sure you will be able to read the following with some effort.

"Aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae. The rset can be a total mses and you can sitll raed it wouthit a porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe."

Can a computer do this as easy as you did. Probably not! But, in spite of these capabilities the brain programs do not meet our expected simple norms.

If our physical and mental programs can run as we wish them to run, we shouldn't have any problems in

playing golf perfectly or remembering many facts that we like to remember. We should have not fought with the neighbors over their leaves falling onto our property as we really don't like, fighting with our neighbors. I shouldn't have forgotten about attending the office meeting at 10.00am yesterday and my sister's birthday last year. If we are run by a conscious mind, how does the magician's trick us? Brain researchers say that we are run by a dumb mind (thinking fast) and the magicians use this weakness to trick us. What does all this say to us? Are we different from our brain, that runs the way it wants to run?

Is there a thinker of the thoughts?

Our thinking processes wonder around when it is free or indulge in idle fancies at a time, build castles in the sky and debate internally to make decisions. That is the nature as to how the programs have been designed and developed. Did someone design the programs? No. Then who did? Can we use the words "I" if there is such a person as the pioneer who developed the programs?

The programs came into existence in a small way and become stronger with time, on their own. The memory has been renewed continuously in the development process as part of the thinking process to provide current and best information. The programs and data are not permanent and continually subjecting to change in every fraction of a second. Is there a commander that can be identified behind all these events?

The dream and wakeful situations we discussed earlier, raises an issue as to where the thinker resides, in these two situations. If the thinker resides in the brain, why it couldn't alert us that we were experiencing a dream? If the thinker was outside the brain, then why it didn't still indicate us that we were dreaming. Where could be the thinker when we are in deep sleep and fully anesthetized for surgery? Is the concept of the thinker or the soul a delusion?

The programs that we created from day one, are running the whole live show for us. There is no thinker of the thinking, but the thinking takes place. J. Krishnamurthy once made the following paradoxical citing in a discussion.

Krishnamurthy said "We're saying that thought creates the thinker; the thinker separates himself from thought, then the thinker tries to control thought. But the thought is the thinker." Also he has said; the thinker is the past, because the information in the memory gives the impression of a thinker. Information in the memory is all past information. Even, if you take the present moment, the moment you produce a thought, since that thought is already produced, it is past and not present.

Other than the brain's responsibility to keep our body function (temperature, blood pressure and all that), it appears that it is the 'thinking process and the programs' that run the rest of the live show. It is not run by a thinker or a controller of thoughts, but by the programs we developed (the software). If I ever need to relate "self" to something, my best guess would be to define it as the cluster of cohesive network programs we developed from day one. The day we disappear from this world, the programs will rot with the rest of the body. The definition of self is more related to the programs than the thoughts it generates. Your thoughts and the behavior are a product of the programs. There is no possibility of something identical to your programs getting re-created as those programs cannot be cloned.

The social behavior pattern of bees and ants may help us understand the insight of the pseudo "controller" aspect better, as I see a lot of similarities. In each bee colony there is a queen. The queen's main function is to lay eggs. Other than the queen, there are drones and workers. Drones are to assist reproductions and they are killed by the workers once their service is obtained. All workers have different tasks to perform at various stages of their life. The amazing fact is that the bees are not commanded by anybody, not even by the queen. Each bee is like a pre-programmed robot. They function in a network of communication systems without a commander that dictates the functioning of the colony. For example, if there is a threat to the colony or to a single bee by an intruder, the alarm system is set to go off by means of releasing a particular chemical from their bodies. According to the studies, each bee knows what to do in all situations. If the situation is to fight with intruders, then an assigned army of bees will fight (no assigner). If the first squadron of the army is losing the battle another set will join them. But strangely there is not a single commanding officer to summon the second set of bees or to give commands at any stage of the battle. This behavioral pattern without a commander centered organization that prevails and runs the functioning of the bee colonies is a wonder of nature. These behavioral patterns do exist with ants and other insects as well. Though I cannot equate a brain-cell, to a bee as the bees are made of millions of cells, this leaderless operational phenomenon has a direct correlation to our complex array of brain cell organization described in this essay. Probably the inbuilt consciousness of our cells in all parts of the body and the decision making networks of cells in our brain, may be operating in a similar manner to support all our life organization. If this phenomenon is applicable to us, then there is no single commander that we can consider as the "thinker", "self", "soul" or "I".

Is "self" an illusion?

We may be very reluctant to accept this phenomenon as it ousts the concept of self that obviously seems not right, and leads to a mind boggling problem. We, human beings, consider ourselves as individuals. We have organized ourselves to presume that all of us are individual entities. Could all of us be multiple entities or single entities or zero entities in the context of the mental fabric? Should the current scientific discoveries be the eye openers for us to re-think of our "self" concept; especially not as individuals or controllers of our mind-body system? The general tendency of our psyche is to reject these ideas and lock us into ego-based modules that we are attuned to adore over time. This tendency is the natural default pathway of our psyche, to keep our ego in peace and harmony. Our ego system doesn't wish to resort to conflicts and doesn't prefer to change our thinking process or cause any self inflicted mental wounds as the life goes on. As Dr. Daniel Kahneman has pointed out, the hasty, fast thinking is the dominant running mode of our thinking system. Slow thinking does not have a due place it deserves to be in our lives.

I presume my stab at explaining about thinking and ending up the essay by questioning the existence of a soul, draw your kind attention. It will be interesting to explore further into this subject, with an open mind.

Good luck! Thanks for reading.

Answer to the question: Ball $5 Bat $105

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The world we have created is a product of our thinking; it cannot be changed without changing our thinking. ~ Albert Einstein

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