DECEPTIONS AND TRUTHS: MAN AND MACHINE

CONSCIOUSNESS ILLUMINATED

HOW TO DEVELOP A CONSCIOUS MACHINE

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I am willing to testify to the truthfulness of any claims made within this document regarding the development of this work. Polygraph testing is fine, too.

Any opinions expressed are entirely my own, no matter how honest, valid, factual, and 100% correct they really are.

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This work is a compilation of the relevant parts from:
Consciousness Illuminated and the Reckoning of Physics (August 2017)
The Road to Artificial Super Intelligence (May 2023)

And then a little bit extra.

It contains all of the research and development material in the fields of neuroscience, computer science, and artificial intelligence specifically that is required to gain a firm understanding of the concept at hand and the resulting software engine known as the RAICEngine.

If you want to know whether or not it truly enables consciousness in a machine, this is your chance to judge and verify for yourself.

Calling someone crazy without the willingness to review their work only proves
you are scared of them being right.

So, am I crazy? Let's find out.

Do note: any references to a physics section that may appear in this document refers to the physics section of the original paper from 2017. Said section has been removed as it was 300 pages or and irrelevant to this final paper. None of said information is needed for any understanding here as everything is still explained in full.

INTRODUCTION

I've heard that some people have said there is no definition for consciousness and there is nothing to explain about it. Others have said consciousness has no practical applications, doesn't do anything, and can't be detected, so it's not a scientific concept. Such thoughts should never have been spoken, let alone published. It's common human behaviour to deny something that hasn't been understood by the masses, but people should really stop doing that. It's a *very* bad habit.

On another hand, there are people who claim that consciousness has already been defined. In this case, I challenge anyone who says they can define consciousness to explain how to implement it into a machine using artificial intelligence. Why like this, you ask? Well, machines and AI are the sole man-made objects that can be created to the extent of the technical specification required to emulate anything about a living organism. Examples of this logic can be seen in the artificial creation of body parts. Though not perfected as of yet, the understanding of these physical components has led to state-of-the-art replacements for those suffering from deficiencies and disabilities. The human mind, however, is a much more complex object, and a fundamental part of it – consciousness – has continued to remain a mystery, but you can't simply call it a complex system that allows X and Y without explaining what that system contains, what it does, and how it works. So, if those people who claim to be able to define it can't explain, with ease, how to recreate it in a machine, they can't possibly be correct in their explanation of what consciousness is or how it works.

Today, we will not be entertaining the folk who attempt to convince us that a coffee table has consciousness, those who claim consciousness is a cosmic force of the universe, the theory of conflicting functions fighting for priority, or anything that includes the invention of magical properties that can *never* be proven. Based on the definition of "qualia" simply being subjective experience, however, we can accept that because it can be (and is later) proven.

Throughout the explanation of what consciousness is and how it works, I make comparisons between natural living things and AI/machines (terms I use interchangeably) in the broad context of intelligent machines. For those not entirely familiar, intelligent machines are computer systems that employ cognitive functions – that is to say, they are able to learn based on data and experience. For this work, no distinction need be made between any degrees of machine learning unless specified.

Now, let's jump right into the deep end of what's wrong with the current definitions.

THE CURRENT DEFINITION

The current (theoretical) definition of consciousness is amazingly flawed. Depending on your source, consciousness is generally defined in two ways:

A. The state of being aware of and responsive to one's surroundings; or
B. Point A above, with the addition of being self-aware.

I'm going to explain why this definition is lazy, at best, and horrifically incorrect, to be precise, using both machine and living examples.

If either of these were true, machines would have been declared conscious a long time ago – with much ease. It would be as simple as taking the following steps for point A:

1. Implement any type of sensor(s) that are able to detect surroundings – cameras, microphones etc; and
2. Set conditions that the AI follows depending on what is detected.

There are security systems in use today that are designed based on both these steps and I don't think anyone in their right mind would attempt to class such systems as conscious.

Now, if you wish to employ point B:

3. Use coding equal to (and yes, this is very crude):

```
$this = *map of physical/non-physical/mental system parts*;
$me = array ($this, "My name is X and I am a self-aware, conscious machine.");
$obj = $detectedObjects (objects detected by sensors);
$me != $obj;   $me !== $obj;
$obj != $me;   $obj !== $me;
```

All this code literally does is tell a computer what it is and what it isn't. I included both comparison operators – "!=" meaning not equal and "!==" meaning not identical – because there would otherwise be a semantic argument as a way around a single one using the other, such as in a case of machines having the same abilities versus machines having the same design. I also include "$obj" and "$me" on both sides of the operators to account for situations such as "all thumbs are fingers, but not all fingers are thumbs". Yes, I expect professional programmers will likely take issue with the actual code and point out flaws, but make no mistake, they get the picture.

4. Add some basic logical functions so a machine can understand and respond to questions, even with just a simple yes or no.
5. Ask the following two questions:

   "Are you (insert object name here)?" The answer will be "no".

   "Who are you?" The answer will be "My name is X and I am a self-aware, conscious machine," and it can display the map of its physical/non-physical/mental system parts.

   Depending on the abilities of the AI, it may be able to answer questions more specifically based upon exactly what was asked. For example:

   Who are you? "My name is X".

   What are you? "I am a self-aware, conscious machine."

   What do you look like? At this point, the AI can display its structural map.

So, I've just described the capabilities of virtual assistants like Siri, Google Now, Alexa, Cortana, Echo etc. Though my example is primitive, it works, and the fact remains: by the current definition, this would be enough to declare each of these intelligent personal assistants conscious. One may be quick to post an argument that states those assistants can't be deemed conscious because they don't have hardware to sense, but I will immediately stop you and state these two things:

- These AIs use microphones to hear us. That is an awareness of sound in your physical surroundings.
- The definitions do not explicitly state that the surroundings have to be physical. The assistants are more than aware of their digital surroundings – that's how they return information from the internet. It doesn't matter if it makes use of another computer system located elsewhere. They still have to process data, which forcibly implies an awareness of text, images, sounds etc, based on how it is detected.

When we use them, we can see that they are not conscious AIs. Depending on the definition one chooses, this can be extended to include many other types of AI systems. You put any of those AI assistants in a self-driving car and you meet both major points of the current definition of consciousness dead on. Neither definition explicitly states or implies that an entity needs the freedom to do what it likes, as opposed to giving the best possible logical answers or performing the best possible logical operation based on data that it has learned through experience or that has been pre-programmed. AI can easily be made aware – of themselves and their surroundings – but that does not make them conscious.

Not everyone will understand the computer aspect of things, so we'll look at it in a more relatable way.

First, point A:

If to be conscious is to be aware and responsive to your surroundings, then to be unconscious must mean you are not currently aware of and responsive to your surroundings, despite the fact you do have the ability to do so, seeing as those two terms are complete opposites – something implied by the prefix 'un'. This then implies that, for someone with the ability to be conscious, they can only ever be conscious or unconscious – there is no middle ground. Sure, being conscious can then be divided into subgroups such as partially conscious, low-state of consciousness, slow state of consciousness etc, but the person would still be conscious – that is axiomatic. Given this, if point A was the sole or partial definition of consciousness, the following questions would be raised:

- Why have studies shown that people in comas can hear?
- Why is it that you can hear in your sleep, hence the reason a loud noise can awaken you?
- Why are sleepwalkers able to navigate?

All three questions indicate awareness of surroundings, but they are all states in which people are said to be unconscious. If anyone then tries to argue that these are not states of unconsciousness, then what exactly is? There are only two possible answers, which are:

1. When you are stone dead, but that would actually be *not conscious*, not *unconscious*. This then infers that there is only a state of consciousness in a human, which isn't possible, as for any first state to exist there must be an alternative state, otherwise it cannot be observed. As an example, think of a light bulb. It can only ever be **on** or **off**, meaning those are its two states. Each of those, when active, would be referred to as its *current* state. Now, if the existence of either of those states was removed, how would you know what state the light bulb was in? If it was permanently illuminated as if it was "on", and it wasn't physically possible to turn it "off", you wouldn't recognise it as being "on", but would simply see the illumination as part of what makes it a light bulb. The illumination would be its *permanent* state. Now, think of a simple, wooden chair. The chair wouldn't have one state where it was filled with colour and another state where there was no colour at all, so you would simply see it as a chair, rather than "a chair currently filled with colour". Since it couldn't be changed, it would forever be in a *permanent* state. Any aspect of any object that has a single, permanent state cannot be referred to by state in regard to that aspect.

2. The second possibility is when you lose function of all senses AND any and all forms of mental ability, such as instinct or intuition. I don't know how many people would ever have been diagnosed as unconscious based on this, but I would imagine it is very, very few. I'm sure even Helen Keller would pull a face of confusion as she wondered how such a person navigated through the canals of life.

And now, point B:

Animals, too, are conscious, aren't they? At the very least, some of them must be. I mean, they are hardly robotic, and they seem to operate however they wish, much like a human does, yet it has been scientifically proven that very few animals are able to recognise themselves in a mirror. It is very difficult to imagine self-awareness as a prerequisite of consciousness when we can observe beings, who could otherwise register as conscious, that literally cannot identify and understand their own reflection. It's even more difficult to defend this point when you wonder how an animal that cannot recognise itself is then supposed to have an opinion of itself. Not convincing enough? Okay, there's more.

Human babies – said to begin to become self-aware somewhere between the ages of 12 months and 24 months. This implies that, for the first 12 months, at least, the baby is not conscious. Let's ignore how ridiculous that actually sounds when you say it out loud. If babies under 12 months are not conscious, that means intelligent machines can be built to behave <u>exactly</u> like babies of that age. If you try to build a machine that behaves like a baby, I will show you two things:

1. The pile of machines that have been thrown over the edge of a cliff by people who could not be bothered to put up with such behaviour coming from a piece of hardware; and
2. The pile of technology enthusiasts who lay next to it for telling their not-so-enthusiastic partners that dealing with a machine was equal to raising a child from birth through infancy. I fear the state in which a techie is found depends heavily on whether or not the infant of comparison suffered from colic.

We can also look at this in a different way. If an infant is not conscious, then what are they when they are asleep – off, or just on standby? That may explain the red eyes some have when they awaken.

Infants really are amazing. Before they graduate to toddler, they will hit you and laugh. You can tell them off and they can do it again, repeatedly finding it funny. You smack them. They cry. Some will do it again. Some won't. They can spit out their food – not always because they don't like it. Sometimes they just want to make a mess or just like being difficult. Babies have personalities. These personalities come in as many variations as they do in adults, albeit to much lesser extents. They can take to some people immediately and completely dislike others even approaching them – for no apparent reason. If infants are not conscious, they should all generally operate in the same way – just like computers and cars and footballs, with differences only appearing by type, such as electric cars vs. petrol cars – and then branch off after a year. There's only one type of baby – there aren't some babies that are designed to breathe air while others need to metabolise the bark of cedar trees – one type, and we can notice the differences in who they are from birth. Babies are conscious, they just don't understand themselves because they don't yet have the mental ability or capacity to do so.

Given everything, suggesting an awareness of surroundings equates to consciousness is ignorant and lazy, and using *"I think, therefore I am"* as a basis or establishment of the requirement of self-awareness is a load of drivel. It may have made an acceptable theory in the 1600s, but near 400 years of additional knowledge and introspection should have put nails in those coffins already.

WORKINGS OF THE MIND: PART 1

Before we step into the world of consciousness, I want to clarify the difference between intelligence, consciousness, cognition, and intellect because some of these are used interchangeably and some are generally misunderstood, which leads to gross misinterpretations of things that you will need to have a clear understanding of before continuing.

> **Intelligence** encompasses everything a species can do and is able to do. At the very least, it is differentiated by species, not by individual. All humans, as a species, have the same level of intelligence because it's how we developed.
>
> **Consciousness** is a type of intelligence. It is an ability some species have and it is what is explained throughout this document, so I won't say much at this point.
>
> **Cognition** (cognitive function) is also a type of intelligence. It is our ability to learn.
>
> **Intellect** describes how mentally capable someone is as an individual – basically, how smart someone is.

Two things to also define:

> **The Conscious Mind** – The "conscious mind" is the mental path, through which data travels, that passes through the manual decision-making system of the mind.
>
> **The Subconscious Mind** – And, obviously, the "subconscious mind" is the mental path, through which data travels, that does *not* pass through the manual decision-making system of the mind, but passes through the automatic one.

These two definitions will become much more understandable as we progress.

The True Definition of Consciousness

The first thing to understand is what consciousness actually is – more than just philosophical or theoretical definitions. Through my own research and work, I have been able to determine what makes something conscious, and give the concrete definition of consciousness as:

> *The ability to have personal values, and the freedom to knowingly make illogical decisions, relative to the main goal(s) of life – the "raison d'être" – for a species, that do not, in any way, contribute to or stem from a logical decision making process based on that which is being perceived, studied, solved etc (while a logical decision making process may still*

influence the outcome), without said illogical decisions being random, based on one's individual values.

Or, you know, we could simplify it to the following:

The ability to have personal values, and the freedom to knowingly make illogical decisions based on one's individual values.

Let's just pause for a quick minute to examine something.

- **Consciousness** – Ability to make illogical decisions based on personal values.
- **Conscience** – Ability to know which decisions to make.

Does this not immediately seem to make more sense to you than consciousness having something to do with awareness? *Yea, thought so.*

This would then give us the following:

- **Conscious** – is to be in a state in which one can manually decide what they wish to do, such as when we are awake.
- **Unconscious** – is, obviously, to be in a state in which one is not able to manually decide what they wish to do.

Now we continue. A few very important things are to note here:

1. Illogical decisions not being random is very important, as random actions do not account for awareness, and to be conscious you must be aware of the decisions you are making, even if you do not fully understand why you have arrived at said decisions.
2. Illogical does not mean irrational. Imagine a burning building with a family trapped inside – a father who is an athlete, a stay-at-home mother, and a baby. The building has been burning for some time before the emergency services arrive. When they do get there, they can only rescue one at a time. Everyone is in perfect health outside of this situation, an equal distance from the door, and the conditions of getting to and from each person is exactly the same. Who do they rescue first? It's axiomatic that the baby would be saved first, then the mother, and then the father. This is illogical. The father would have the best chance of survival – better lung capacity and endurance would significantly increase the chances of him still being alive. Nevertheless, the decision would be to save the child and mother first because, well, society values their lives more – this is rational. Because of this, though saving the father first would be the logical decision, it would be the irrational one. Since the baby

would have the lowest chance of survival, it would make sense to save it first, knowing that the others could survive longer. Anyone who has seen and remembers *I, Robot* should think back to the scene where the robot saves Will Smith from the car instead of the little girl. Funnily enough, the film even states that Will was the "logical choice", at 45% survival rate versus 11%.

3. When something is referred to as "logical", it means the mechanics for the decision are *absolute* – they must be able to hold up in any and every possible situation. Something being described as "rational", however, means the mechanics for the decision are *relative* – they only need to be logical in regards to the situation in which they are being used, the person who is using them, and the outcome they desire.
4. In natural living things, the raison d'être is survival and procreation or, as Herbert Spencer put it, "Survival of the Fittest".
5. "Survival" in this context, does not mean you staying alive as an individual, but keeping your species alive. Remember this as a relative point is addressed later.
6. "Illogical decisions" does include decisions that seem to be neither for nor against.

It's easiest to understand when we look at and compare the raison d'être of living things with the actions they perform:

- Dolphins have sex for pleasure. Monkeys play. Humans consume alcohol and drugs for non-medical reasons.
- Plants grow towards the sun. They feed. They reproduce.

In the first point, these actions are illogical. Dolphins, monkeys and humans do not need to do these things to survive or create new generations – sex for reproduction, yes, but not simply for pleasure. In the case of the humans, these things actually hinder them. Yet still, these are rational behaviours because, in all 3 cases, the intent is to feel good. Humans – having a higher state of consciousness than animals – even actively go completely against their goals by choosing not to have kids and committing suicide. In the second point, plants operate like drones. They move towards the intended goal – nothing more; nothing less. Plants are intelligent, not conscious.

Attempting to determine consciousness in an animal is not always simply based on whether or not they only do what they need to do to survive – sometimes we must examine how they do it. Take the behaviours of army ants, for example. Upon initial inspection, it would be easy to think they are not conscious – they reproduce, travel in groups for protection and consume whatever they come across. It all seems to be pretty standard. However, look a little closer:

- When they hunt, they don't just go looking for food – they use highly coordinated attacks that involve thousands upon thousands of them to snare relatively large prey. The coordination of such attacks can easily be compared to that of big cats, chimps, or militaries.
- They are willing to fight even when they don't need to – no adversary is off limits, regardless of size or threat level. Once paths cross, that opponent will die unless it can escape or somehow manages to wipe them out first.
- They don't stay in one place. Their nests are temporary and they continually migrate. Given their group size and collective power, they could create and defend a permanent nest, as opposed to carrying their unhatched young with them while on the move and risking them being eaten by other predators. Regardless of age, this actively increases the chances of them dying because, as they move into unfamiliar territory, they do not know what to expect. To make things worse, most of the workers ants are blind, meaning there are dangers that they will not be able to sense until it is too late, even with soldier ants on the lookout.

You may attempt to argue that these behaviours only follow the rules of "survival of the fittest", but they do not. These ants do what they want. Take what they want. Go where they want. They operate as if the world is theirs for the taking, and anything that gets in their way is obliterated. They go beyond the required measures of survival to enforce dominance and control. It's truly a joy to watch.

The most interesting and convincing part about the behaviour of these ants doesn't lie in what they do together, but what one does when it becomes separated from the group. These ants have evolved to use a sophisticated method of shared consciousness which relies on pheromones to keep the group operating as one, and it makes them seem rather robotic in that aspect, but when one ant becomes deserted, it has no idea what to do. Having to think for itself, by itself, there's no more robotic behaviour – it's lost, it's hopeless, and it's more useless than non-conscious bacteria because there's no specific logical programming for it to follow that can't be consciously overridden, so its own panic leads to its death.

To prove my definition even further, we can look at much more complex examples based on human existence in the world today, two different ways, taking the raison d'être in a wider sense of actions performed.

Example 1

- 6:00 – Person 1 wakes up.
- 6:01 – They go to the toilet and relieve themselves.
- 6:05 – They brush their teeth and bathe.
- 6:30 – They get dressed.
- 7:15 – They make and eat breakfast.
- 7:45 – They make a packed lunch.
- 8:00 – They leave for and go directly to work.
- 9:00 – They arrive at and begin to work.
- 13:00 – They have lunch.
- 13:25 – They use the bathroom.
- 13:30 – They go back to work.
- 17:00 – They leave to go home.
- 17:17 – While crossing the road, a car jumps the red light. Person 1 steps back to avoid being hit before continuing on.
- 17:45 – They smell the aroma of Indian cuisine and decide to pick up food for themselves and their partner.
- 18:00 – They arrive home.
- 18:10 – They dish out the food and eat with their partner.
- 18:50 – They wash the dishes.
- 19:00 – They spend 2 hours reading a book on structural engineering for their hopefully future career. Money is tight and extra income is needed.
- 21:00 – They get ready for bed.
- 21:30 – They engage in coitus with their partner since they decided to try for a baby.
- 21:32 – They go to sleep.

This example follows the current definitions of consciousness, yet nothing in this set even really appears to depict it. These are all abilities that indicate the presence of intelligence in a person, not consciousness. They learn, they work, they eat – essentially they exhibit the 7 living processes currently required to be declared 'alive' and then a few additional things that are required for the best chance of survival as a human.

Now, let's look at it again with a few additional/modified details.

Example 2

- 6:00 – Person 2 wakes up.
    - "Should I pull a sickie? I really don't wanna go to work today. Meh, let's get it over with. Another day, another dollar."
- 6:01 – They go to the toilet and relieve themselves.
    - "Uh, I look terrible. I need a holiday and a tan."
- 6:05 – They brush their teeth and bathe.
- 6:30 – They get dressed.
    - "Important board meeting today – maybe I should put on suit. It's gonna be hot though. A shirt and trousers will do."
- 7:15 – They contemplate making breakfast but decide they'll pick up something on the way. They sit and watch the news before going to work.
- 8:00 – They leave for work.
- 8:30 – They stop to buy breakfast at Starbucks.
- 9:00 – They arrive at and begin to work.
- 13:00 – They go to lunch.
- 13:05 – They have a cigarette while they walk.
- 13:15 – They order totally unhealthy fast food and a bottle of vitamin water before sitting down to eat.
- 13:30 – They are joined by a colleague to whom they complain about their job.
- 14:15 – Second cigarette.
- 14:25 – They use the bathroom.
- 14:30 – They go back to work... 30 minutes later than they were supposed to.
- 17:00 – They leave to go home.
- 17:17 – They cross the road outside of a crossing because of its distance, but an oncoming car swerves and narrowly misses them.
    - "Watch where the f*** you drive your f***ing piece of s*** car, you a***hole!"
- 17:30 – They see a friend and decide to join them for a drink at a pub.
- 18:30 – Slightly tipsy, they stumble their way home.
- 19:00 – They arrive home.
- 19:30 – Their partner wants to go out tonight despite the fact they have work in the morning. They agree and begin getting ready.
- 20:30 – They set off out to a bar first for pre-drinks.
- 21:30 – They leave the bar and head to a night club.

- 22:00 – They arrive at the club and party the night away, drinking 'til their heart's content, and consuming illegal substances any which way they can.
- 02:45 – They leave the club, drunk and hungry, and decide to get kebabs, though previous experience has taught them, on multiple occasions, that kebabs do not agree with their digestive system.
- 03:30 – They arrive home. As they enter the door, they begin to tear off each other's clothes and engage in coitus.
- 04:15 – They go to sleep, dreading having to wake up in less than 2 hours.

The differences in the lives of Person 1 and Person 2 are both astronomical and clear to see, so now let's inspect them.

Person 1 lives a life that is comparable to the workings of a machine. It is efficient. It is convenient. It is goal-oriented. It is logical. There is a high level of predictability. In the real world, people who live this type of life are even said to be 'robotic' because they operate in such a linear manner.

Person 2, on the other hand, is very different. Their life is full of spontaneous moments, emotional reactions, and decisions that are detrimental to their health. Their actions raise questions like:

- "This is bad for my health. Why do it?";
- "This could cost me my job. Why do it?"; and
- "This is going to have a bad reaction. Why do it?"

At no given time can you predict with what Person 2 will do. The best anyone can do is make an educated guess based on past behaviour. These 2 statements hold true for both persons. However, Person 2 can and will likely surprise you at some point, while Person 1 likely will not.

Clearly, we know that Person 1 is conscious and has the ability to do what Person 2 has done because they are both humans, but, if Person 1 didn't have the ability to make the types of choices Person 2 did, what would we say then? If Person 1 was replaced by an intelligent machine with the same needs and goals, could we expect the same or similar results? The answer is yes.

Now, we ask the same question for an intelligent machine and Person 2. If Person 2 was replaced by an intelligent machine with the same needs and goals, could we expect the same or similar results? No, we couldn't, because it wouldn't have the values and unpredictability necessary for the illogical decisions made by Person 2. The best you could hope for is best-answer decision making combined with the ability to make random actions but, as previously stated, random acts do not account for awareness of decision making.

This is a clear indication that the distinction between conscious and not conscious lies in the predictability of the decisions one is able to make. Illogical decisions can never be predicted to the same accuracy as the logical simply because there will only be few (or one, usually) logical decision that can be made compared to the quantity of illogical decisions – which is always infinite – at any given time. If one was to determine the level of accuracy for each, it couldn't be said that they are polar opposites, but the difference is significant enough for each to appear on opposite ends of a scale.

One important thing to note between the lives of persons 1 and 2 is the 'Dinner vs. Breakfast Purchasing" conflict. This was done to illustrate a point – you can arrive at illogical (or not the most logical) outputs even when using (seemingly) logical inputs. "I smell food. I am or will be hungry. It's quicker to buy food now than to have to cook when I get home." These inputs all make the decision to buy food now seem logical. It was quicker. It was convenient. It made sense. It seemed logical. That is until you get to 7pm where you realise money is tight and, rather than saving, they are spending foolishly. But why this illogical act when everything else seemed logical? Because whether you are conscious or not, human or intelligent machine, you can and will likely make mistakes – mistakes based on information you have not taken into account at the time. Even machines create errors. Logical decisions can only ever be based on the given inputs, while illogical decisions can be made based on anything, for any reason.

Two States VS. Two Minds

Before continuing, it's imperative that I clarify the distinctions between the different aspects of the mind.

The mind of a conscious being can be divided into two types – the conscious and the subconscious. The conscious mind is what we use to manually make decisions. Whenever we choose to initiate a thought, that is the first step of the conscious mind at work. The last step is whether or not we actually do choose to do something. That is because, before action is taken (even if the action you choose is to do nothing), you make the decision as to whether or not you want to do what you were thinking about. The subconscious mind works a little differently in that it is an automatic decision making system. It can't be controlled and will continue to run until you are brain dead. It initiates thoughts for you and causes you to act without thinking. How does it achieve this? Through past experience. All experiences you go through and things you learn throughout your life and, in fact, the life of your species, contribute to the subconscious mind doing what it thinks is best. It uses what you already know to help you function without needing to think about what need be done.

Both the conscious and subconscious minds use processes and share resources to facilitate their abilities. Here's a basic breakdown of how it happens:

- Perception
    - Conscious perception uses our sensory tools – eyes, ears, tongue etc – and occurs when we decide to perceive something. The object is within the centre of focus of any one of our senses. When we watch television or listen to music, that is our focus. Although center of focus is usually only applied to vision, it can and should be used to generally describe anything on which we choose to focus, and you'll understand why with the next explanation.
    - Subconscious perception uses the exact same sensory tools as conscious perception, but it doesn't rely on the center of focus. Instead, it uses peripheral perception, which collects information based on what we can still perceive but is not the focal point of our perception. This can even occur across senses. Have you ever been doing something while someone is talking to you? You can hear them but you aren't paying attention until they say something that immediately snaps your focus away from what you were doing and you are now focused them. Your subconscious mind is what was using your ears to process what you were hearing.
    - I suppose conscious and subconscious perception is akin to the difference between hearing and actually listening, touching and actually feeling. I can't think of relative terms for seeing, smelling and tasting, but you get the picture. With subconscious perception, the body still takes in and uses information, but it doesn't register the way it does when you perceive consciously.
- Memory
    - Conscious – When the conscious mind accesses memory, it does so because you want it to. It is completely within your control, and, with its access to memories, you are free to think about whatever you can possibly remember. When you want to remember something, the conscious mind accesses and locates the memory you are looking for before putting it to use.
    - Subconscious – Being an automated system, the subconscious mind is permanently accessing and using memories. Ever wonder why random things pop into your head? That's the subconscious mind putting them to use for some reason, and you consciously perceiving it. It's the same thing that happens when you dream, which is why your dreams can be as random as they are strange, and you can only dream of things of which you already know.

- Reaction
    - Conscious – Reactions made by the conscious mind are rather boring – you perceive something, think about what you want to do based on what was perceived, and then decide what to do. Nothing special here.
    - Subconscious – This is much more interesting. Reactions caused by the subconscious mind happen (almost) instantly. The process that controls it can't afford to waste time because this is used as a survival mechanism. Everyday subconscious reactions may appear trivial until you look at it in the grand scheme of things. For example, I'm sure most, if not all of us, have been in the situation where a friend jumps out at us surprisingly and shouts "BOO!" What usually happens next is you jump in fright, your heart rate increases, and then you settle. Seems innocent, but what is actually taking place is the subconscious mind preparing your body to run without needing to think about it. A shot of adrenaline to get you in gear and you are ready to go. If you were in a genuinely dangerous situation, you'd be running before you even realised you were. Of course, the reaction can be different depending on the person and the perceived threat – in some cases, a person could prepare to attack the threat rather than run from it. Some people will stand petrified while others will remain calm and have no reaction at all, but those are explained later. Now, the reason you don't act based on your prepared reaction in this situation is because, in the time it has taken your subconscious mind to perceive the threat and prepare to react, your conscious mind has perceived the potential threat, registered it and overridden the response, declaring it non-threatening.
    - Continuing with the scenario above, the mental speed of an individual has a bearing on reactions. A slow subconscious mind creates slow reflexes, which means you will take longer to prepare to react – very bad for survival. A slow conscious mind means your manual actions which follow your subconscious reactions may be too slow when needed. If your subconscious reaction is to punch the person who frightened you, a slow conscious mind won't be able to stop the punch before it's too late.
    - Another example is this: for most people, once we perceive our thoughts, they are processed again and sent through to the decision system where we decide whether or not we wish to communicate this information. For some people, however, or in some cases, the information is passed to the communication system without passing through the decision system first. This is an instant reaction caused by the subconscious mind operating too fast for the conscious mind to keep up with. This can occur automatically when certain conditions are met, such as a level of anger,

that results in what we say is someone "speaking before they think", and it can also be manually induced, as is attempted during any test where you are asked to state the first thing that comes to mind when you perceive whatever stimuli is given to you.

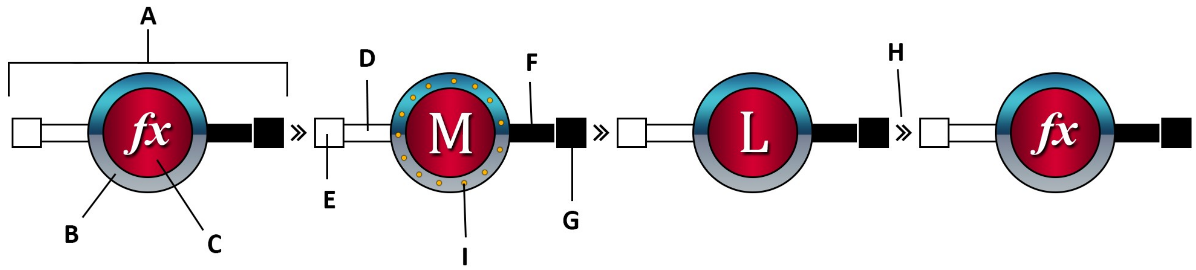
While consciousness is the ability to make illogical decisions, the conscious and subconscious minds are the drive systems for the entire perception and thought processes that lead to both logical and illogical decisions. Awareness, in relation to consciousness, is not based on being aware of yourself or your environment, but being aware of decisions you make before an action is taken.

As for the states of mind, there are two – conscious and unconscious. A conscious state is one in which we are manually able to control our decision making. An unconscious state is one where we are not able to manually control our decision making. When you are awake, you are conscious, because you are free to do whatever you wish. When you are asleep, you are unconscious – you have no control over what you dream or how you move. While unconscious, only the subconscious mind is at play because of its automation.

There is no "unconscious mind" that is used for any sort of mental process, as I hear many people say. What they are referring to is the subconscious mind. Where "un-" would imply the inability to perform conscious processes, the prefix "sub-", meaning "below", implies conscious abilities below that which we can perceive. We have no perception of the subconscious mind as it works – only once the effects or results of the subconscious mind are produced can we consciously perceive them.

Oh Memory, Where Art Thou?

Memory – as fundamental as it is mysterious. We are born containing memories that we have already started using and, as we grow, we gain more based on every little thing that we do and experience, regardless of how insignificant an event may seem. Nevertheless, the problem of how the memory system works has remained unsolved, and so here is how I theorize the memory system actually works:



The above image represents a neuronal network within the brain (neuroscientists, this is so I can easily explain it to others, not to you). The labelled parts are as follows:

A. The entirety of a single structure is called a neuron.
B. Soma (cell body) – What signals travel around within a neuron.
C. Cell Nucleus – Where information within a neuron is stored.
D. Dendrite – This is what incoming data travels along.
E. Postsynaptic ending containing neuroreceptors.
F. Axon – This is what outgoing data travels along.
G. Presynaptic ending containing neurotransmitters.
H. Axodendritic synapse – This is the gap between a presynaptic ending of an axon and a postsynaptic ending of a dendrite. The gap itself is the synapse cleft. Other synapse types exist, depending on what part of a neuron a synaptic ending is connected to, but the need to differentiate between types isn't relevant for the purpose of the explanation.
I. These little gold dots, they represent **engrams** and that's where I theorize memories are stored – as an engram within the soma of the neuron itself. I used multiple engrams in a single soma in the example image, but I can't say for a fact whether a soma holds a single engram, multiple engrams, or if it varies depending on individual neurons. However, given the vast amount of data it's possible for us to store, my guess would be that a neuron would hold multiple. We'll understand why as we continue.

For those who don't now, an engram is a structure of data that contains information about a memory. Each engram contains both the data for the memory and metadata to help it be identified, and later I explain why. The identifiable metadata may simply consist of information such as the name, timestamp, location, and/or the neural path signals need to travel when that specific engram is activated to have the desired effect.

There are three primary neuron types in the human body – memorial, functional, and logical – designated by the "M", "fx" and "L" symbols within the nuclei of the image above.

1. **Functional (fx)** – Functional neurons are what we are familiar with. They can be thought of as the "manual labourers" and are only found in the Peripheral Nervous System. Their subtypes include:
    a. Sensory – Responsible for transferring data from the environment, gathered by our sensory organs, to the Central Nervous System.
    b. Motor – Responsible for transferring data from the Central Nervous System to the environment, using our muscles and glands.

2. **Memorial (M)** – This is one of two types of neurons commonly referred to as "interneurons" and is found in the central nervous system. However, I think they are of significantly greater importance than currently thought, which is simply to connect neurons and help pass messages, hence why I have given them their own type, rather than accepting them as a subtype. These can be thought of as the "bankers".
    a. Mental – Mental memorial neurons store mental memories that we hold, such as that of objects, experiences, ideas and so on, and are created when we perceive, experience and think something.
    b. Muscular – Muscular memorial neurons store our muscle memories. These memories are what we use to physically operate our body.
3. **Logical (L)** – This is the second of two types of neurons commonly referred to as "interneurons", also found in the central nervous system. Two different sets of neurons exist for this type, and the neurons of each set join together to create a parallel circuit. Depending on the location of neurons in each circuit, they perform different tasks in the brain, but they all process incoming information and take action based on said information. These neurons can be thought of as the "technicians".
    a. Manual Control System (MCS) – This set of neurons is what we use to manually do things. They are the control system for the conscious mind.
    b. Automatic Control System (ACS) – This set of neurons is what we use to automatically do things. They are the control system for the subconscious mind.

For now, we are only concentrating on the memorial neurons.

There are many different types of memory that are used by both the conscious and subconscious minds to do many different things. The following are the types I've been able to deduce so far:

Object Memory (Mental)

"Object" in the broadest sense of the word, referring to any tangible or intangible item that can be perceived.

- **Structural Memory (SM):** Structural Memory stores structural information of tangible objects (shape, dimensions).
- **Motion Memory (MM):** Motion Memory stores information about how tangible objects move.
- **Auditory Sequence Memory (ASM):** The vibration patterns and sequences of sounds that our ears detect are stored here.

- **Taste Memory (TSM):** Taste Memory stores the sensation patterns created on taste buds when they come into contact with tangible objects.
- **Odour Memory (ODM):** Odour particles create smell patterns in smell receptors, and those patterns are recorded in this type of memory.
- **Touch Memory (TOM):** Every part of our body is covered in receptors sensitive to touch, and this type of memory stores everything we can possibly feel, such as surface patterns that create texture, temperature, and pressure.
- **Biometric Recognition Memory (BRM):** Biometric Recognition Memory is how we remember and identify different members of a species, using mathematical elements such as size, shape, distance, position, and angle, but, make no mistake, this does not apply only to faces. Depending on exactly what we pay attention to, we can identify members based on many of their features, such as their walk (motion) and silhouette.
- **Property and Value Memory (PVM):** This includes all values that someone knows of for any property. An example is colour: we know that red, blue, yellow, and so on are values of the property 'colour', and we group them as such.
- **Word Memory (WM):** All our vocabulary for any and all languages with which we are familiar is stored here.

Relationship Memory (Mental)

Relationship memory is what helps us remember how any type of object relates and interacts with any other type of object.

- **Object Relationship Memory (ORM):** We know and remember that hammers are used to bang nails into place, grass grows from soil, and cows moo. Object Relationship Memory prevents us from needing to figure out how objects interact with or relate to each other, including ourselves, every time we wish to make use of them.
- **Entity Relationship Memory (ERM):** The relationships we have with other entities are just as important to our survival as remembering how objects work, as it covers areas such as knowing who to trust, and remembering how someone made/makes you feel.
- **Grammar Memory (GM):** What may also be referred to as "Word Relationship Memory", Grammar Memory contains the rules for forming correct and coherent sentences, as well as what we learn for adaptive purposes such as short-hand text and slang.

Function-Ability Memory (Mental and Muscular)

Function-Ability memory is what we use to remember and control every action our body is able to perform.

- **Automated Function Memory (AFM):** Specifically used by the subconscious mind, this memory contains functions for everything your body does automatically, such as breathing, regulating your heart beat, blinking, and other types of reflexes, as well as what neurons themselves can do. However, unlike all other types of memory, AFMs aren't stored as engrams because they can't afford to be forgotten, so they are actually stored as part of a neuron's function in the nucleus of a cell. That's why your brain can't forget how to regulate your heart beat (unless there is neuron damage). These functions are created from DNA and embedded during development.
- **Manual Function Memory (MFM):** Used by the conscious mind, this contains functions for everything you can manually do – walk, move your eyes, chew etc. Also contained in here are function overrides for some AFM functions – more specifically, AFM functions that may need to be interrupted. These overrides are what allow you to hold your breath – beneficial if you are in an area with toxic fumes or underwater and need to prevent inhalation. You don't possess overrides for vital functions, such as your heart beating or brain activity, because of how detrimental to your health it could be for those to be manually controlled for even a few moments.

There are also three subtypes of abilities worth mentioning that fall under both AFM and MFM memory types:

- **Fluid Action Memory (FAM):** This is where you record actions you've learned that involve the fluid motion of muscle or gland actions from start to finish, such as riding a bike. Such actions are recorded and repeated as a single, fluid, uninterrupted motion, which is why the only way to overwrite the recording is to learn the whole motion again a different way.
- **Sequential Action Memory (SAM):** This is where you store actions you've learned that involve a sequence of muscle motions, such as unlocking a door or entering a password. SAM actions are a lot more flexible than those of FAM as they are recorded and repeated in a step by step manner, meaning steps can be changed without the need to relearn the entire action.
- **Instinctive Action Memory (IAM):** Unlike the previous two types of action memory described, these aren't learned but are inherited and can contain actions for both fluid and sequential types, and, like both action memory types, can be found under both automatic

and manual function memories. These memories, like AFM, are not stored as engrams but are written into DNA

To simplify this type of memory by showing it as a tree:

Functions		**AFM**			**MFM**	
	|	|	|	|	|	|
Abilities	**FAM**	**SAM**	**IAM**	**FAM**	**SAM**	**IAM**

Knowledge Memory (Mental)

All the fun things you were taught, learned from experience, and came up with yourself.

- **Factual Memory (FM):** This is where all the bits of true information are stored, from definitions of words to random trivia that wins game shows.
- **Conceptual Memory (CM):** Ideas, theories, opinions – they all go here.
- **Outcome Memory (OCM):** I'm not particularly fond of the name... Maybe I'll change it later. Anyway, Outcome Memory is where we record our actions in a situation and the result that followed. We use it to make better decisions later.

Navigation Memory (Mental)

This memory type, very literally, is what we use to navigate through life.

- **Spatial Memory (SPM):** Spatial Memory is how we remember the orientation details of tangible objects within an environment – a mental map, if you will. Again, this type of memory is based on mathematical elements, such as distance and angle. We use this for tasks including reaching for items without looking, parking a car, and navigating in the dark.
- **Location Memory (LM):** Your internal global positioning system – it's how you remember the positions of geographical locations on a tri-axis plane. Everything from the location of your bedroom to the place where you did that thing that one time (that you actually did twice) is stored here.
- **Route Memory (RM):** Knowing the position of something is useless if you don't know how to get there (yes, mapping systems, but I'm making a point!). Route Memory helps us find our way without additional tools.

Working Memory (Mental)

Using copies of data from engrams we have stored, working memory stores data we are currently using, up until the point we are finished with it or it expires.

- **Short Term Working Memory (STWM):** As the name suggests, this is where copies of data from the memories we are currently using are temporarily stored, for a short period of time, until we are done with it. This is data we are using (almost) immediately, such as what is yet to be used to complete sentences or change direction on route to somewhere. When complete, the data is discarded. Current theories estimate an expiry time of a minute or less – given the number of things I realised I had forgotten while writing this, I'm inclined to agree.
- **Long Term Working Memory (LTWM):** Long Term Working Memory is also a temporary memory, but keeps track of things you were doing that are not yet complete – this includes both physical and mental tasks. The most interesting thing about LTWM concerns tasks of a mental nature: when a mental task is left incomplete by the conscious mind, the subconscious mind can continue to work on it while the conscious mind focuses on other things. I'm sure everyone has had the experience of coming up with an answer to an earlier problem at some point after the conscious mind stopped processing it. In terms of expiration, it would seem that LTWM can hold data indefinitely or, at the very least, for a very significant amount of time – we are talking years – and can usually, once buried, be brought forward by the recalling of other data that is relative to the LTWM in question.
- **Recent Recall Memory (RRM):** This type of memory acts as a sort of "waiting area" between short term working memory and permanent types. It's what allows you to quickly recall memories no longer in use, which were in use not long ago.

Compilation Memory (Mental)

Compilation memory contains engrams that consist of references to engrams of other types of memory.

- **Current Associated Memory (CAM):** For memory laziness (read: efficiency), Current Associated Memory prevents the need for us to constantly combine the data of different memories with things of which we are already familiar. For example, when you wish to think of your smart phone, the memory of it stored in the CAM will already have the associated properties stored with it, such as the device colour, size, shape, wallpaper design etc, which can be recalled by an ID, such as "My Smart Phone". More complex examples involve multiple objects, more than two types of memories, and groupings. A group CAM-type memory with a reference ID of "My Bedroom" likely wouldn't repeat the data of individual objects already stored in the CAM, but would make reference to them, resulting in a tree data structure, as well as containing other information, such as the location of your

"My Current Bedroom State"	"My Bedroom"	#Walls	Royal Blue
			!Floor to Ceiling
		#Ceiling	White
			!Top of Walls
		#Carpet	Black, Fluffy
			!Covers Floor
	"My Bed"	#Bed Frame	Black, Leather, Smooth
			!On Carpet
			[Right Wall Center]
		#Mattress	White, Smooth, Diamond Stitching
			!On Bed Frame
		#Bed Sheet	Royal Blue, Smooth, Cotton
			!Covering Mattress
		#Duvet	White
			!Inside Duvet Cover
		#Duvet Cover	Royal Blue, Chelsea FC Emblem
			!On Bed Sheet
	"My Bedroom Location"	"My House" > First Floor > Turn Right	

bedroom, sounds, etc. A basic example, to make it clear, would look something like this:

In the above examples:

- items in speech marks refer to other objects;
- items preceded by a hash are objects themselves;
- items preceded by a right-facing arrow are directions for navigation;
- items preceded by an exclamation mark are the relationship to other objects;
- items enclosed by brackets are positions; and
- items not preceded or enclosed by a symbol are properties.

- **Episodic Memory (EM):** This memory type records information about events and experiences using only descriptive details and references to information stored in most other memory types, such as objects, property values, locations, timestamps etc – something like this:

Date: 15th November, 2014

Time: 08:00am – 08:10am

Location: My Bedroom

Objects:

Walls – Royal Blue – Floor to Ceiling;

Ceiling – White – Top of Walls

Carpet – Black – Fluffy – Covers Floor;

Bed Frame – Black – Leather – Smooth – On Carpet – Right Wall Centered;

Mattress – White – Smooth – Diamond Stitching – On Bed Frame;

Bed Sheet – Royal Blue – Smooth – Cotton – Covering Mattress;

Duvet – White – Inside Duvet Cover;

Duvet Cover – Royal Blue – Chelsea FC Emblem – On Bed Sheet;

Happenings:

Woke up. Sat up in bed. Yawned. Pleasurable Stretch. Stepped out of bed. Exited room.

What happens here is the brain essentially creates an immensely detailed (much more than shown above) description of objects, properties, positions, actions, sensations, movement, sounds etc. that can be used by your imagination to compile the data that is being referenced and create what can be described as a "mental video playback".

- **Episodic Photographic Memory (EPM):** This could be seen somewhat as a sub-memory of Episodic Memory. Episodic Photographic Memory uses a time-lapse photography technique to capture different instances during an event. Since this is the equivalent of stills, these memories are solely composed of visual data. Data that could only be displayed in a video, such as movement and sound, isn't stored here. When we attempt photographic recall of a moment, we pull instances of what was observed. This is also why, when people experience photographic flashbacks, they see a series of images in quick succession. The more observant an individual is – in general or at a specific point – the more detailed and complete an image can be.

It's hard to say whether or not this is an exhaustive list – in fact, it probably isn't – but these are ones that humans use every day, and the omission of any one would have disastrous effects on the way we live.

As for where engrams of each type of memory are stored, it would make the most sense for them to be located in neurons that reside in the part of the brain responsible for using the data contained.

This would make for extremely efficient operations when data needs to be processed quickly and with as little confusion as possible.

Now, the burning question is, undoubtedly, why do I think engrams are stored within neurons? Let me explain:

So much of our body is replaced without us realising – we're told that it only takes seven to ten years for our cells to die and be replaced with new ones. However, this doesn't happen with neurons in the same way and, the question is, why? Neurons, themselves, are cells of the human body, so what makes them so special?

Neurons are used to control every aspect of how we function, making them of the utmost importance to any individual's existence but, for some reason, were not made to be replaced unless absolutely necessary. Here are some fun facts:

- The soma (cell body) of a neuron is designed with layers of protection for the nucleus. The neuronal network of the brain that these neurons make up are then covered by three layers of tissue, cushioned by cerebrospinal fluid, shielded by the skull and then covered by another five layers of tissue, which we call the *scalp*.
- Most cells are programmed to undergo a process called "apoptosis", which sees them commit suicide so they can be replaced. Neurons, however, once matured, prevent this process from happening again unless there is a genuine need for it, meaning any one neuron can avoid the seven to ten year life cycle guaranteed to other cells.
- Neurons have special support cells called "neuroglia" – "glia" for short. There are different types of glial cells, which are said to "provide metabolic support, insulate, protect, reinforce, repair and clean up damaged area" of the nervous system. Basically, they act as medical staff, military, housekeepers and mechanics.

All of that protection and upkeep for a few (billion) cells? Neuronal networks are theorized to have a high level of redundancy and that is something I agree with. Given this, we *should* be able to replace neurons without issue, relying on the remaining neurons to control functions while some are renewed. The only rule necessary would be that only X percentage of any set of neurons that perform the same function could be replaced at any one time, allowing the percentage of neurons not being replaced to maintain functionality. In light of this, logic dictates that these cells must hold some very valuable information – information that can't afford to be lost on a whim. We follow the same principles in the real world when we wish to protect important people, employing every type of person we deem necessary to keep whoever is of such value as protected and free to fulfil their job requirements as possible.

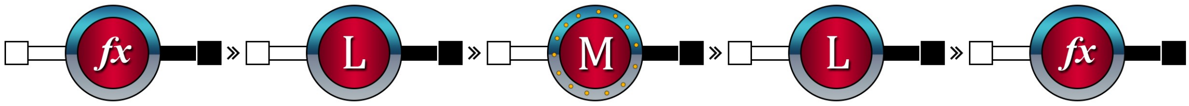
The information can't be what is held in the nucleus and used to create the cell for one reason – the neuron and its information is still controlled by DNA and could easily be replaced, just like all the others. This only leaves the possibility that the information being protected is that which isn't created or passed on genetically, but that which we have learned. Based on evolutionary theory, it would takes thousands of years for any learned memory to become a genetic one, so replacing a neuron would cause the loss of whatever learned engrams and memory data it also held before it could become part of genetic function. Engrams and their data couldn't be grown back, either, because the data for the engram wouldn't be stored anywhere else inside us, and, given that engram data is based on external perception and experience, there wouldn't be a way to recreate it through neurogenesis (growth) with absolute certainty without a blueprint. Needless to say, attempting to blindly recreate a memory could be catastrophic – you wouldn't want to misremember an extreme danger as something that you could encounter in a carefree manner.

Now we will do some maths:

- There are said to be 100 billion neurons in the brain.
- There are a maximum of 2,557 days in 7 years.
- There are a maximum of 3,653 days in 10 years.

If neurons followed a seven year cycle, there would be an average of 39.1 million neurons dying every day. For a ten year cycle, that number would be 27.4 million. Taste buds are the fastest regenerating cells in the human body, taking as little as 10 days to fully regenerate. Going by that schedule, humans would be looking at a maximum of between 391 million and 274 million neurons, respectively, not fully functioning at any one time – and that's with the fastest regenerating cells in the body. Other cells, such as those in the lungs, have a 6 week regeneration period. Following that schedule, we'd be looking at 1.64 billion and 1.15 billion. Even in a sea of 100 billion, that's a significant loss of memories and functions. Chances are, we either wouldn't be able to survive for long or would be even feebler than we are already.

Now, using a slightly different example image of a neuronal network, I'm going to give you an example that compares the workings of neuronal networks to real life.



Imagine the following:

- You are a memorial neuron.
- The nucleus is your brain.
- The soma is your torso.
- The dendrite is your left arm.
- The postsynaptic ending is your left hand.
- The axon is your right arm.
- The presynaptic ending is your right hand.
- The axodendritic synapse is the space between your right hand and another person's left hand.
- An engram is a gold information card.
- A message is a blue information card.

There is only one rule:

- Since pre- and postsynaptic endings in neurons can't pass information to each other directly, information must be put in a torso pocket with one hand before it can be retrieved with the other.

You are standing amongst other neurons – one sensory (Person S), one motor (Person M) and two logical (Persons L1 and L2).

- Person S receives a blue information card about an object in their environment. They put it in their outer jacket pocket with their left hand and return their left hand to its outstretched position, ready to receive more information cards. With their right hand, they take the card out their pocket and pass the information to Person L1.
- Person L1 receives the card in their left hand. They read the card and realise the data is something new to them. Card goes in their outer jacket pocket. Person L1

decides a memory needs to be made of this before a response is given. They take the card out of their pocket with their right hand and hand it to you.

- You receive the blue card in your left hand, read it and put it in your outer jacket pocket. Since this is new information, however, you copy the information to a gold engram card and put it in your inner jacket pocket. You then take the blue card out of your outer jacket pocket and hand it to Person L2.
- Person L2 receives the blue card in their left hand. They read the card and decide what to do in response. Having made a decision, they discard the original blue card and write a new message on a new blue one. Using their right hand, they pass it to Person M.
- Person M receives the card in their left hand, reads it, and causes whatever actions the message species to be performed.

This example can be modified extensively, including having neurons that control chemical releases, logical and memorial neurons of different types and so on, but the principle remains the same.

As you can see, information that needs to be remembered is kept hold of, and other information moves around the body and is passed on to whoever needs to address it. You see, memories are just persistent messages and engrams are simply a tool for persistent storage. I did initially consider the storage of neurons within the nucleus of neurons, but I see this equal to keeping personal files in the System32 folder – it's just safer to not keep anything there that isn't required for core functionality. Also, in a more accurate example, humans would have multiple left arms to receive different input from multiple sources and multiple right hands to distribute the same information to multiple sources but, alas, I don't control evolution.

I've read some theories about memories being stored in synapses, but that just doesn't compute. What would be the point in storing data in a gap? It would be like keeping the gold engram cards from the example above between two people. First of all, it would still have to be read by the neurons before anything could be done. Second, which neuron gets to read it and how? Using the same equivalences from the example above:

- Axodendritic – This is a connection between a right hand and left hand, as shown in the example image. So, with a gold card in between two people, either the right hand of Person 1 (P1) would have to pick up the card, copy the information to a blue card and then pass it to the left hand of Person 2 (P2), or the left hand of P2 would have to reach to take the gold card, copy the data to a blue card and then put the gold card back where it was.

- Axosomatic – This is a connection between the right hand of P1 and the torso of P2. This would require P1 picking up a gold card and placing it in the pocket of P2, P2 reading it and then putting it back.
- Axoaxonic – This is a connection between two right hands. The problem here is that both hands are designed to send, not receive. The only way for this to work is for one or both right hands to forcibly develop left hand capabilities.
- Dendrodendritic – A connection between two left hands. Similar problem to the one above but in reverse – the two left hands need to develop right hand capabilities.

In every case, one problem exists – how would persons know what memory is written on the gold cards between them when memory data is required? They would surely have to memorise all the data between them, no? That would result in engram data in both the neuron AND the synapse – pointless. Another option would be to pull data from engrams blindly until they find what they want. Can neurons "pull" data, or would the engram have to send it? Are engrams autonomous? Maybe it would take a neurotransmitter to send a signal which reads all engrams in a synapse until it finds what it's looking for, or pushes the engram data over to the receiving neuron to be read. Regardless of the method, it's highly inefficient. I can't imagine nature creating such a terrible flaw. All of this when it's easier for the nucleus to read engrams in the soma before sending messages via an axon.

Let's move on to functions and events relating to engrams themselves.

- **Data Writing –** Data is written in layers by memorial neurons translating multiple neural signals into a storage format, and works much like progressive image loading. The first layer is fuzzy and largely unreadable, but, as more layers are written, it all becomes much clearer. Think of it as a sphere that expands or gets brighter with each layer written. How well data is written can depend on a number of factors:
  - The primary one is not within our control – the strength of the synaptic connections between neurons that begin the process and the neuron that creates the engram. The better the connection, the better the data can be written.
  - The secondary factor is how well the neurons involved in the process are performing. Higher performing neurons, such as the ones resulting in photographic memory, eidetic memory, or hyperthymesia, significantly improve the writing process. This comes down to how well an individual is able to record specific types of data – some people never forget faces, meaning the neurons involved in the creation of BRM engrams excel, while high performing neurons involved in the creation of ASM engrams mean a person may never forget a tune.

  - The remaining factors depend on us – how much or how little we value the data being perceived/created, how much we are paying attention to what is being perceived, whether not it is observed consciously or subconsciously, how many times we observe it, and so on.
- **Engram Updating –** Incomplete engrams are updated when we encounter the exact same stimuli again. As we begin to observe the stimuli, the currently held engram is activated and the rest of the data is written. It's like learning a new song but not getting it all the first time. You remember what you have learned and, when you encounter it again, learning new parts, you update the memory of it that you have. The brain wouldn't create a new engram when you continue learning because it would then need to locate all the individual parts you have whenever you wished to remember it, or you could end up with a complete version and an incomplete version, risking the chance that the incomplete one is the one remembered, which could range from being pretty inconvenient to a disaster.
- **Preservation –** The more layers that are written to an engram, the longer it is stored without becoming subject to the process of forgetting.
- **Reinforcement** – While the original writing of an engram may not have been perfect, we are able to reinforce whatever data in the engram we were able to write through repetition. Simply repeating the data of the memory we do have – regardless of whether it is in our head or expressed externally – we are able to strengthen an engram as if it was being written through original perception/experience/thought, to the point where it becomes ingrained and we cannot forget it.
- **Forgetting** – An act that we don't (usually) do willingly.
  - Non-Storage – Some memories don't make it past the short term working memory. We perceive, store, use, and discard them in the moment. These memories are of little to no importance, and we barely pay attention to the fact that we have even recorded the data, as it is simply part of the work flow.
  - TPR – Otherwise known as Temporary Performance Reduction. Anything that can cause a temporary performance reduction of neurons – fatigue, alcohol, knocks to the head – can impair the sensory neurons' ability to perceive and the data writing process.
  - Engram Burial – When a non-ingrained engram has faded through lack of use, a memorial neuron transfers a copy of the data of an engram that needs to be removed to memorial neurons deeper in the brain or further out of reach, where they take longer to retrieve, before destroying the one it has stored.

  - Weak Connection – Weak synaptic connections to a neuron make it more difficult for data of an engram it contains to be retrieved and would require alternative routing to be achieved to an acceptable degree. This wouldn't cause a permanent loss, or even burial, but could increase the time it takes to find and retrieve the desired data, depending on the route travelled.
  - Neuron Damage – Damage to somas can cause damage to engrams that are caught in the area of destruction, reducing their readability or rendering them unusable. Neuron damage can also cause someone to forget the data of engrams it contains if the neuron itself becomes impaired. This can be also be the result of axon or dendrite damage, making it difficult to actually reach the engram or to carry its data to the necessary location.
  - Neuron Death – When a neuron dies, all engrams held within the soma are destroyed along with it.
- **Repression** – Repressed memories are engrams of either episodic type that contain data of significantly traumatic experiences. Because of the potential repercussions of these memories being accidentally recalled, specific types of engrams, which I'll call "repressive", are used to store them. I initially thought that they could be stored in a special type of neuron, or that a special type of neuron was used to block them out, but a few things caused me to think otherwise:
  - The fact that a person is still affected by a repressed memory, even though they can't recall it, means the engram is still active and functional but, for some reason, the data it contains can't be passed on for processing.
  - The fact that, since the memory has a continuous effect on an individual, it couldn't have been buried at any point, as it would forever be resurfacing.
  - Memories of an event can be repressed the moment the event is over. One neuron growing axons to block engrams of another neuron would take longer than it takes to repress the memory.
  - Repressed memories can be unlocked instantly or it can take months, if not years, of work.

  I see two viable ways to achieve this:

  1. A chemical inhibitor that, as long as it is in effect, prevents the main data of the engram from being read. Unlocking the memory requires the chemical inhibitor to be halted. Given the cause of the repression, it makes sense that an extreme feeling of tranquillity would be required to reverse it, hence why therapists use calming techniques... or drugs.

2. The data of repressed engrams is encoded in a non-uniform way, meaning it can't simply be decoded for use without major effort.

I lean more towards number 1 as it seems more likely, based on the given number of chemical processes already happening in the brain, and the fact that there's no evidence that multiple forms of engram encoding is likely or even possible.

Now, repressive engrams are like redacted documents – much of the information has been blacked out. It would seem that the only information not redacted is the metadata, hence why people are still emotionally affected by it and know that a memory is missing from a specific point in time. You see, with the metadata containing a timestamp, if it wasn't readable, a person wouldn't actually know that a memory was missing from a period because they wouldn't know that it even existed for that period. However, with a readable timestamp and unreadable content, they know they have a memory of that period but have little or no idea of what it contains. With redaction, there are two types – partial, which makes some of the main content readable, and full, rendering it completely illegible. This would be controlled by the strength of the chemical released, and they can have a variety of effects on an individual:

- **Temperament –** Logical neurons of the ACS are constantly sending signals to have data of a repressed memory read, treating it like somewhat of a foreign object (the body doesn't like anything that it can't identify, and the chemical inhibitor draws attention), which causes the engram to continuously be stimulated as the memorial neuron is constantly reading and reacting to the metadata. The meeting of these opposing forces can be seen as something slightly less than the unstoppable force versus the immovable object, and the instability of the event causes involuntary response signals to be released to the areas of the brain that are designated within the metadata, causing a seemingly permanent change in temperament.
- **Triggers –** When we perceive something with the conscious mind that causes the MCS to try to read the repressed engram, the MCS and ACS working together creates a surge in neural activity to the areas of the brain that the engram relates to – one of these areas being that which controls emotion and feeling. Here's an example to make it clear:

  A teenager experienced physical child abuse at the hands of his father when he was young, which created feelings of extreme anger and fear at the time. The memory was repressed and the metadata of the engram was written as "bullying", which had signal indicators that pointed to the parts of the brain that caused anger. Due to the inability to be read, the subconscious mind, in its continuous attempts, permanently *causes stimulation of the engram, causing the person to develop a naturally angry persona. Now, in school, the teenager witnesses someone being bullied by another person who clearly outweighs them. The conscious mind is now trying to pull memories relative to bullying, comes across the repressive engram, and tries to read its contents. The signal activities of both the conscious and subconscious minds have now compounded and are causing a surge of electrical stimulation to the part of the brain that controls anger. As a result, the teen goes absolutely berserk and has trouble maintaining control because he can't reduce the level of stimulation he is experiencing, therefore having to wait for it to pass or for a way to be calmed.*

  - **Flashbacks –** When an engram is only partially redacted, triggers can cause parts of the main data that haven't been redacted to be released. When this does happen, the combination of the surge of activity combined and the released data being processed is what causes flashbacks to be brought on in such an intense and overwhelming manner.

- **Signal Patterns –** Despite what scientists have claimed, I don't accept that memories are stored as "signal patterns". Given the amount of neural activity that continuously occurs, as signals pass through neurons that aren't actually required in the process but facilitate travel between point A and point B, random memories *could* constantly and uncontrollably be recalled. What I *would* say is happening is that any engram has its own unique neural paths – a signature – to the parts of the brain that are stimulated in response to its activation. Based on the number of outgoing connections a single neuron can have, the multiple areas of the brain stimulated for any one engram, and the number of neurons an engram could possibly reside in, it's both possible and likely. When these signatures are manually recreated, they're matched to their corresponding engram and the same results occur as if the engram itself was activated.

Here are a few points to explain some questions that may be raised, and other memory related things:

- **Metadata References** – Engrams with references in the metadata make them easier to find. With a metadata name of "red" and the data to display whichever colour/tone our brain processes as red, the engram is easy to locate by only needing to read the metadata. This means it can immediately be brought forward. Without a metadata reference, the entire data of the engram needs to be read before we are able to process and determine what it is.
- **Imagination** – When we imagine something, we are able to create it in any way we desire. Without these separate memory types, we would literally have to have individual memories

of every single possible combination of properties for every single object we can think to apply a property to [1]. For example, if I have a memory of a blue pen and wanted to imagine it as a green pen, to do so would require an actual memory of that *exact* pen in green. By separating these memories, we are able to imagine anything we want in any way we want, with the only limitation being the memories we have stored.

1. I specifically express it this way so you understand that we wouldn't have a memory of trying to apply the colour red to a specific sound, since sound has no colour. Based on separate memory types like those listed, people who suffer from synaesthesia are the exceptions, possibly caused by abnormal configuration of Object Relationship Memory. Without the separation, I'm not sure how such people would be able to see sound as colour, as they wouldn't have a memory of the auditory object and property object combined.

- **General Brain Activity** – For efficiency in both storage and retrieval, such organisation is very beneficial, given the complexity of what must occur constantly to keep us alive, and what can occur simultaneously and/or at a very rapid rate of change when the conscious mind is active.
- **Episodic Memory** – You'll notice I didn't use CAM references in the EM example. This is because CAM engrams refer to how things are now, while EM engrams refer to how things were at some point in the past. If CAM references were used, our episodic memories would end up appearing as we currently know things to be, and they wouldn't make sense at all.
- **Words and Definitions** – There are times when there are words we know and can define but, in the moment, can't immediately think of the definition. If both word and definition were contained in a single engram, we would always be able to immediately give both together.
- **Biometric Recognition** – Though BRM engrams are created based on structural data in the same way Structural Memory engrams are, they're used for a different purpose. Whereas we can see the same table one hundred times over, we only associate one biometric structure with one being. When it comes to properties, though, BRM works in the same way as SM. For example, you can varnish a wooden table but still recognise it as the table in the same way that you can retouch a photo of someone to remove blemishes and smooth the skin while still recognising who it is (within reason...). This also explains why contouring and plastic surgery which appears to change the mathematical structure of a face can, if the difference is significant enough, make a person unrecognizable.
- **Deficiencies** – It's possible for people to have specific types of deficiencies in some types of memory without having deficiencies in other types. It's also possible to have superior function in some types simultaneously. This supports my theory of engrams being stored in

the part of the brain primarily responsible for the processing of the type of data it contains. Let's look at British architectural artist Stephen Wiltshire. He has been diagnosed as autistic. Autistic people are said to have issues with their working memory. Wiltshire, however, has an incredible ability to draw cityscapes *from memory* – something he has done repeatedly. This means at least one of the following is likely:

- That connection issues exist between his Working Memory and types of memory other than his Structural Memory and Spatial Memory; and/or
- The neurons of his Structural Memory and Spatial Memory are exceptional in performance, as are their connections to his Working Memory.

It couldn't be issues with Working Memory specifically, as he would then encounter the same problems in any task he was attempting to perform.

Now, if engrams were stored without a high degree of organisation, and spread across the brain, how could it be so easy for any one type to be deficient?

- An unorganized memory structure would make it incredibly difficult to determine if any type of memory was deficient, as it would be very easy for two engrams of two different memory types to share deficient connections and, when their data is called, encounter issues in attempts to reach the Working Memory that we wouldn't think anything of because other engrams of their memory types were located in positions that had good connections or, to be realistic, randomly dispersed bad connections. We would unlikely be able to determine a pattern we were sure of to be able to say with certainty that a problem with specific memory types existed, and would have to state that there are problems calling the data of individual engrams relating to a specific memory.
- We could also consider memories being stored in a single part of the brain, but it would be too easy for relatively few bad connections to cause catastrophic complications across the board. Let's consider amnesia – there are so many types. It can range from people forgetting names of objects, to people forgetting words, to people forgetting events before or after a specific date. It would appear that amnesia can affect one or multiple types of memories. If memories were all stored in the same part of the brain, how could the amnesia be so clear cut in what is remembered and what is excluded? There's also the fact that it can be brought on by damage to multiple areas, indicating that it *clearly* isn't possible for one area of the brain to be so dominant in the storage of memories, but that it is a widespread operation.

- **Advanced Functioning** – Let's look at three different advanced memory functions:
    - "Photographic" Memory – Everyone has some degree of "photographic" memory but, when someone is said to have it, what is meant is that they have a superior version of Episodic Photographic Memory. Superior EPM means a person is capable of high and *very* high frequency time-lapse photography techniques in a given moment. Now, how this enables superior visual memory of an instance is like this:
        - Multiple mental images are recorded in a very short time interval – think milliseconds. One millisecond is the time it is said it takes for a single neuron to fire one impulse and return to rest, so I guess that makes sense. It also has to be this fast to be able to record visual data before any significant changes can occur. Each mental image may contain different parts of an overall image.
        - The mental images are then combined to create a single image, with overlapping data being discarded.

Image sequences can also be recorded, which requires both high and very high frequency imaging working together. As an example, I'll show the difference between a normal functioning EPM person and an advanced functioning EPM person capturing both standalone images and sequential images:

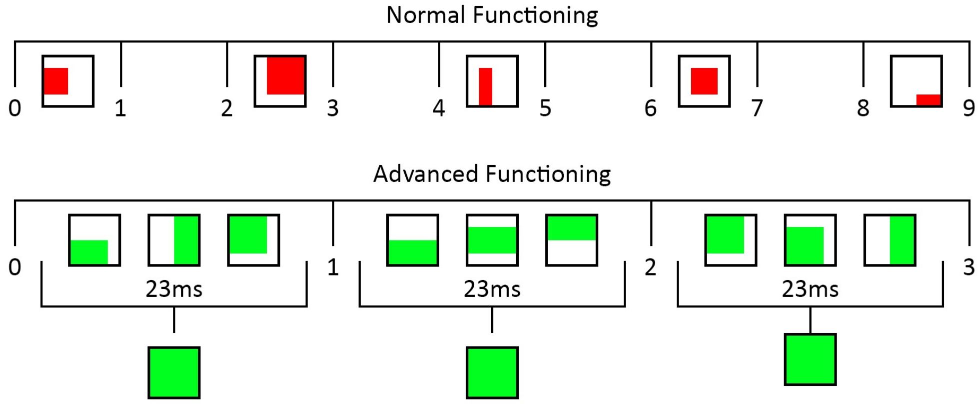
	Normal Functioning									
S	1	2	3	4	5	6	7	8	9	10
M	1	1	1	1	1	1	1	1	1	1
P	•		•		•		•		•	

In the table above, we see that for every two seconds (S) that pass, a neuron (•) fires to take a photo (P) over one millisecond (M).

	Advanced Functioning																								
S	1					2					3					4					5				
M	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
P	•	•	•			•	•	•			•	•	•			•	•	•			•	•	•		

In this table, however, we see that for every second (S) that passes, a neuron (•) fires to take a photo (P) three times over three milliseconds (M). In reality, neurons need to rest between firing, so we can use our imaginations to add a ten second rest time between firing, meaning for every second, a single neuron fires three times over twenty three milliseconds.

A visual example of how the process works is:



As you can see, in a normal functioning EPM brain, the mental images recorded contain different amounts of detail. This, too, applies to the images recorded in the advanced functioning EPM brain but, because of how fast multiple are taken, they are compiled into a single complete image.

The reasons for me stating that superior EPM requires multiple photos being taken and compiled, rather than simply one photo being taken, are:

- People with superior EPM don't remember everything they ever see but can remember what they pay particular attention to. This means that, when they are paying less than the required amount of attention to completely memorize something in photographic form, their EPM acts in a similar manner to those who have normal functioning EPM.
- Neurons fire in a millisecond and rest, as I previously mentioned. If a complete photo cannot be taken in an instant, as stated in the point above, it can only be taken over a series of fires, otherwise a neuron would have to remain in a firing state for longer than a millisecond and continuously capture data until completion. Of course, it is possible that multiple neurons handle the function, meaning that all of said neurons could even fire in the same millisecond, capture different parts of a photo and have them compiled, but that would still follow the principle of multiple image composition, with the process simply completing in a much shorter time.

- Eidetic Memory – This is a superior version of Episodic Memory. The principles of its workings are similar to the aforementioned mechanics for superior EPM, with the differences being:
  - Multiple neurons are definitely required to fire at different millisecond intervals from the first, in order to continuously record data when other neurons are in a state of rest.

        - Recording neurons fire over an extended period of time rather than in short bursts, as you wouldn't be able to record much in a few milliseconds, as opposed to a few minutes or longer.
    - Hyperthymesia – To put it simply, this occurs when the neurons that control recordings for eidetic memory are permanently stuck on auto-fire, to the point where a person consumes data about everything they experience in a given moment repeatedly and so fast that its engram reaches a point where the memory becomes ingrained in the time it takes a normal person to record a memory.
- **Episodic Memory Fragments** – When we think back to something that happened on a given day at a certain time, we don't always remember it all immediately, but it can come to us over time. This is why I think engrams for episodic memories are, for some reason, fragmented. As we think harder, we locate more engrams that are fragments of the complete memory. Maybe it's a space saving technique that, in the long run, allows us to erase only engrams that contain unimportant details from a complete episodic memory, rather than needing to erase a single engram of an entire event.
- **Working Memory Data Copies** – Finally, why did I state that working memory uses copies of data from an engram, as opposed to the actual engram itself? Well, because if the actual engram was brought forth and returned after use, brain scans would be able to determine exactly what data an individual engram contained – never been achieved.
- And, for the sake of covering everything, the relationship between the brain and the spine. It's odd to think of the mind extending into the spine but, technically, it does. Logical neurons of mind take data from engrams of memorial neurons and send it to the logical neurons of the spine that sit between sensory and motor neurons, where movement is coordinated. The logical neurons of the spine then send messages to motor neurons – not an extension of the mind but part of the peripheral nervous system – that control our muscles and create movement. The system works in reverse, too, where sensations we experience are picked up by sensory neurons which send messages to the logical neurons of the spine and then up into the brain.
    - Stroke: When someone suffers a stroke that leads to any degree of paralysis, memorial neurons storing engrams for muscle control are destroyed during the deaths of the affected neurons. Depending on the size of the destruction, there may be enough memorial neurons in the part of the brain responsible for movement to be able to relearn how to control the required muscles.
    - Spinal Damage: With spinal damage can come also come paralysis. As with the brain, the neurons of the spine are divided based on the part of the body they are in

control of, only in a columnar arrangement, and so, much like the brain, the precise position in which damage has occurred affects which parts of the body become paralysed. Also, since only logical neurons are within the spinal column of the central nervous system, the problem is completely physical – it's not a case of recreating engrams that enable us to learn and remember how to move, as it is with a stroke, but that nerves required to transfer messages are damaged and cannot grow back, which can prevent the messages from reaching any neuron lower than the highest point of damage, depending on extent.

- Lastly, neurons in other organs. The heart and stomach have their own neuronal system that regulates their operations. These will all be logical neurons, as only the brain is required to stored memory data.

Tools of the Trade

When explaining the conscious and subconscious minds accessing memories, I mentioned that, once found, the memories are put to use... but how do we locate the memory we want? A very interesting internal process called *Recall* allows us to do this. Recall is used to play a game of data fetch. It's the job of this process to locate and translate engrams before delivering its data to the necessary area of the brain for processing.

The process of recalling works in a similar way to our sense organs translating objects of the physical world, requiring memorial neurons to translate our engrams. To help understand this, I'll compare it to the eyes and sense of sight, since it's the sense that works in the most similar way to the process:

> When our eyes detect something, they translate objects so that we are able to identify them by determining their properties. With no translation, we would still be able to see objects but would not always have a clear idea of how one differs from another. This is somewhat relative to *Molyneux's Problem*. The eye is a mathematical instrument, and, for that reason, can be used to determine measurements, which could allow us to identify differences between objects based on such measurements – size, shape, angles, and so on. With two boxes of completely different sizes or shapes, a person would be able to tell the difference between them just by examining their measurements with the eyes. However, if they were the same shape and size, how would a person differentiate between the two? You see, maths is and will forever be absolute, so, unless you have other neurological/sensory deficiencies, it will always be possible to tell the difference between objects, based on mathematical properties, using only your sense of vision. However, properties not based on maths, such as colour and texture, can't be gauged in the same way. Colour can only be

identified by vision – with no translation to determine colour, how would you identify the red box from the blue box? What about the texture of an object? Visual clues allow us to determine whether or not something may be smooth or rough without needing to physically touch it. With no way to translate these visual clues, the sense fails us. Our perception of the world would be bland, governed entirely by shadow, based on how much light is being reflected into the eye from any one point.

These same principles apply to memorial neurons during the recall process. When an engram is detected, even if it has some properties that make it identifiable to some degree, that wouldn't be enough to know exactly what the data it holds. The complete information of an engram needs to be read and translated to be of any use.

So, how does the process work?

- **Step 1 – Broadcast:** Logical neurons broadcast a signal to the area(s) of the brain corresponding with what is desired.
  - **Search**: If we don't know precisely what we are looking for, a signal containing relative information is sent. This is how we are able to start describing things when we are trying to remember it.
  - **Get:** If we know what we are looking for, a signal containing the precise name reference is sent.
- **Step 2 – Scan:** As a signal is received, memorial neurons begin to scan engrams they contain.
  - **Partial Scan**: When a partial scan is performed, only the metadata of an engram is read.
  - **Full Scan**: When a full scan is performed, the full content of an engram is read.
- **Step 3 – Translate:** When the desired engrams are found, a copy of the data is translated into a signal format that logical neurons can work with.
- **Step 4 – Send**: The now translated data is sent to the logical neurons in different areas of the brain that are responsible for processing the data it contains.
- **Step 5 – Process:** Logical neurons process the data, one at a time, which allows us to mentally perceive it.

The mechanics of this process are required to operate in the way that they do in order to stop our minds from going haywire.

- If memorial neurons were also the neurons responsible for both processing the data and allowing us to mentally perceive it, we would face a major risk of unstable behaviour.

Engrams wouldn't need to be translated before being used because the one neuron would do both jobs, meaning that, even if only scanning, random memories could accidentally be activated, and us reacting to them would be beyond our control.

- Leading on from the previous point, scanning could result in the activation of memories. Now, it's axiomatic that scans would be run simultaneously – maybe not on multiple engrams in a single neuron, but definitely multiple neurons scanning at least one engram each, otherwise the delay in reaction time would be relatively severe. Every time we tried to recall something, we would be at risk of multiple engrams being activated. It would drive us insane having all those thoughts racing at the same time. Even if there was a guaranteed success rate of 99.9%, there would still be more than 8 hours a year where a person would have multiple memories circulating at once, and given the number of engrams we hold – every life event that the person remembers, every trivial object, property, sound, word and so on – can you imagine just how many memories could be active? We could easily hold memories of a million different things, and, with a 99.9% guaranteed inactivity rate, there would still be a thousand memories active at once. For those 8+ hours, anyone could be driven to do anything – that is, until the mental break down kicks in, which wouldn't take long at all. Hell, being a nerd *could* kill you.

This isn't to say that the function is without its flaws – the returned data isn't always what we are looking for, though that's partially our own fault. When we can't identify exactly what we are trying to recall, but have partial knowledge of some of the data, recall is happy to return results that match what we can remember, partial matches, or even similar matches.

Data from engrams is processed by the same parts of the brain that receive and process the information from our traditional sensory organs, as these are the parts responsible for the function we know as *Imagination*. Imagination is the complex composition and/or recreation of engram data, so, when this saved data is again processed by the brain, we are again able to experience the stimuli, though to a much lesser extent than if it was being experienced physically due to the lack of physical sensation, without the actual need for the physical stimuli we are imagining to be present. This also explains the resulting effects:

- The Ears of the Mind – That little voice in your head – ever wondered how it is created? How you are able to have mental conversations with yourself? The answer is the memory of sound. First, we pull the sound sequence data from memories of words we know. They are sent to the part of the brain that we use to compose sentences as if we were to speak but, rather than us actually expressing them externally through speech, the information is sent to the part of the brain that we use to process sounds that we hear. Remember, the ears are only used to detect sound, but the sound is actually processed and played in our brains. So, when this part of the brain is used with the memories of sounds, the sounds are played in our mind and we hear ourselves thinking. Without the ability to hear ourselves think, we would have to speak and then listen. This, too, applies when we recite tunes in our head. We pull the sound sequence for the tune we wish to hear. When we make up our own tunes, we don't pull sound sequences but individual sounds and compile them as we see fit.

- The Mind's Eye – Much like how we hear ourselves think, we can mentally see what it is we are thinking of when what we are thinking of is a physical object. This process works in the same way as described above. Visual data is pulled from memories of tangible objects and sent to the parts of the brain we use to process visual data. Once processed, we can mentally visualise the object in our mind.
- Taste, Touch and Smell – Taste, touch and smell work a little differently, and for good reason – these senses require actual haptic physical contact with tangible objects. For this reason, when we use memory data of each of these types, it is more likely to cause a physiological reaction similar to what one would experience with the physical version of the stimuli. When you think of nice food, your mouth can water. People who are scared of spiders can feel their skin crawling when they come to mind. When you remember a bad smell, you can wrinkle your nose in disgust.

I know, I know, "Why can someone cry when they see a picture of someone who broke their heart?" Well, that's easy – you don't always get to choose exactly which parts of a memory are pulled and when, and you don't control which parts of the brain are stimulated in response. You may only want to pull a visual memory of an object, but you may end up pulling all memories of the object that can be found, so, though you are still only desire to look at and think of an image, the memories of sound, touch, taste, and smell can all be pulled and processed as well, and they can all stimulate parts of the brain which control emotion, triggering emotional responses. The subconscious mind is a fickle bitch.

There is a reason why physiological reactions can also occur without the need of memories based on physiological experiences with whatever is in question, but that need not be addressed at this point in time.

Imagination is a very powerful function and it can do more than only use data that is actually part of a memory – it can add data based on expectations. This is where *three* other handy processes of the mind come into play – *Analysis*, *Reasoning,* and *Judgement*. Analysis is the tool used to examine data, reasoning is the tool we use to compare, and judgement is the tool we use to conclude. Here's an example of how they work together so beautifully:

> You are walking through a forest. You are tired and wish to rest. The ground is covered with dirt and crawling with living things, much to your disgust. Miraculously, you come across what looks to be a tree stump. You've never seen one before and you wonder if it is something on which you can have a seat. Enter *Analysis*.
>
> You examine and take in all the properties of the stump:
>
> - Around 1.5 feet high.
> - Flat top.
> - Rough texture.
> - Solid and sturdy.
>
> Next, memories of something you have successfully sat on before are pulled and analysed. For this example, we'll say a chair.
>
> - Around 2 feet high.
> - Flat sitting surface.
> - Smooth texture.
> - Solid and sturdy.
>
> You select these properties of a chair you remember because you can only compare similar properties. It is possible to compare one object against multiple if there are properties of the one that require multiple to fulfil comparison requirements. It is also possible to include properties that are not matched for reasoning purposes.
>
> Time to *Reason*:
>
> - Height difference – **Not important.**
> - Level surface – **Ideal for sitting.**
> - Texture difference – **Not ideal. Not a deal breaker.**
> - Build and stability – **Ideal for sitting.**
> - Back support – **Missing. Not required.**
>
> An overall conclusion is derived from how you reason each property taken into consideration. To do this, basic maths is used. In this example, a negative is valued at -1, neutral at 0, and positive at +1. The results are as follows:

- Height difference – **Not important: 0**
- Level surface – **Ideal for sitting: +1**
- Texture difference – **Not ideal. Not a deal breaker: 0**
- Build and stability – **Ideal for sitting: +1**
- Back support – **Missing. Not required: 0**
- **OVERALL CONCLUSION: +2**

This conclusion is made using the last tool, *Judgement*. So, in your opinion, it's a good idea to take a rest on that stump. Values, when it comes to reasoning, can differ in a much more complex way, which is something explained later.

This system is why you can't reason very well when there's information of value of which you do not know, and why, when you reason against something of which you think you know well, you can be perfectly logical and still end up being completely and catastrophically wrong.

There are different types of reasoning, but the comparison of data is essential to them all, regardless of whether the information being compared already exists in memory or has been newly acquired directly from the environment you are currently in. At the same time, it's not only comparative properties that we reason but also on a "need versus ability" basis. A quick example is when your back itches in a place that you can't reach yourself, so you grab an object that you reason is long and rigid enough to use as a scratching tool. It could be a kitchen utensil or the remote control, but it won't be one of those lovely, decorative cushions laying around.

The next question is, obviously, what one does if the result is neutral. This is where the priority system comes in. We use reasoning to determine which of the available options we value most. At this point of the process, many factors can come into play, depending on the situation at hand. In the example above, you may value resting more than continuing without other factors coming into play, but if you then factor in that your current environment is known for wolves and bears, you will likely want to get out of there as quick as you can. The last question centers around priority options of equal value and the answer is random selection, often expressed something along the lines of, "Fuck it, I'll just choose this."

Long detour but back to the addition of data. This example will be based on spiders.

Many people are afraid of spiders – not on a phobia level, just a hatred of the thought of them being within close proximity of their body – without ever actually having a bad encounter with one, so, why? They reason, based on any number of reasons, that the spider is a threat. For example:

- It's not attractive to look at;
- Some spiders are poisonous and so, since they know nothing about spiders, and, you know, all spiders are spiders, it's best to treat them all as poisonous.
- Anything that small with the ability to survive in a world of giants must be a master killer!
- They've seen what this spider can do, thanks to David Attenborough, and would rather avoid them.
- They've had run-ins with other "yucky" creatures, and that's all that need be said.

We use analysis and reason to plug gaps in what we want to know. Amongst many things, this is how irrational fears are created. The good thing is that plugged gaps aren't permanent because they aren't based on actual experience and so, more often than not, they are easily overwritten with whatever happens during an actual experience.

Lastly, to answer the age old question of what it is to "think", "thinking" is the sum of all these tools used together as described, and, even then, there's more to it, such as ideas and trains of thought. I have read that some people equate thinking with remembering – I can't imagine why – but this is false. 'Remembering' is simply the act of recalling a raw memory. Also, this – thinking as a *process* – differs from thinking as an *act*, which is how we use the term to describe the conscious internal perception of any information within the brain, as well as the processing and issuing of commands.

As well as imagination, these four processes (recall, analysis, reason and judgement) are used in combinations to create other functions, such as prediction, which requires specific data to make educated guesses about what is to come, and argument, which takes given data and uses reason to make arguments against it. All it really comes down to is the data used and the purpose for which we use it.

The Hippocampic Symphony

Throughout my writings so far, I've referred to different parts of the brain responsible for the processing of different types of data. Now, it's time to take a look at them:

- Visual Cortex – Processes visual data.
- Auditory Cortex – Processes sound data.
- Gustatory Cortex – Processes taste data.

- Olfactory Cortex – Processes smell data.
- Broca and Wernicke – Processes language data.
- Somatosensory Cortex – Processes touch data.
- Motor Cortex – Coordinates movement.

Note: Though the Broca and Wernicke areas are not called cortices, I will refer to the above collective as such and individually as a cortex.

When it comes to thinking or using our imagination, engram data is retrieved and processed in the cortex corresponding to its type, where it is used for mental perception. Each cortex is capable of working alone, like when you are picturing something in your head; independently, such as when you are picturing one thing while mentally singing a song which is completely unrelated; and cooperatively with one or more of the other cortices, such as when you have mental conversations with yourself. It is harder for some than others to be loners at times, though. For example, due to human conditioning, it's hard to picture a word using the visual cortex without also saying it to yourself using the Broca, Wernicke and auditory cortices.

Since object data is stored in neurons of the area in which it is processed, not much happens in areas outside of these, in relation to the process, when we are solely thinking of the objects. A most interesting thing happens, though, in the area of the brain responsible for Compilation and Spatial Memories – the *Hippocampus* – when we require the data of engrams stored there. You see, the way we are designed, we have to take in everything that we perceive individually via our five sense organs, so they immediately reach the areas in which they are processed and stored. What happens next, however, is the hippocampus has to compile details of all this incoming data into one or more engrams, creating what is essentially a multimedia reference file with more information than you realise. This is the set up.

When we decide to recall an engram of Compilation Memory, it's at this point that the performance begins. The hippocampus becomes the conductor, sending out signals that tell the orchestra – the collective cortices – what engram data to find and use, when to use it, and for how long. With the use of Compilation Memory data comes the use of Spatial Memory data, which helps the cortices coordinate how objects are arranged. Working together, the symphony that is remembering old times begins to play. Of course, such a performance can be manually orchestrated by "you" through use of imagination. Remember this as it's explained in 'The W System'.

Divide and Conquer

An idea was put forward that humans can't actually multitask, but that we switch between tasks very quickly. This is *partially* true. In actual fact, humans *can* multitask, but there are multiple types and certain conditions under which they can be performed, with varying levels of performance based on said conditions.

The first type of multitasking involves external and internal perception. The cortices used for our senses all have multiple divisions of neurons, with at least two which are used for actual perception – one for what we perceive in the physical world and the other for what we perceive mentally – allowing us to perceive both types simultaneously. Without such division, we wouldn't be able to do many things that we take for granted, such as:

- Daydreaming, which uses the visual cortex and involves us mentally perceiving visions while still being able to visually take in what our eyes are able to see in the physical world; and
- Using our auditory cortex to listen to our own mental chatter while we are also listening to someone else speak. You know when you say to yourself, "I agree with what this person is saying", or "This person is talking absolute bollocks" – yeah, those moments.

It doesn't work anywhere near as well with the olfactory, gustatory and somatosensory cortices, however, due to the fact that sensations caused by haptic physical contact are not something the mind can so easily recreate. This is a flaw in both design and operation – vision and sound are processed solely in the brain and only require stimuli, meaning it can easily be recreated through engram data, but taste, touch and smell – due to their physical natures – require both stimuli *and* haptic sensation. Imagining what something tastes, smells, or feels like is one thing, but recreating the sensation on demand is virtually impossible because the brain doesn't have control of the sensory receptors, meaning it can't recreate the sensation patterns within them that actually creates the taste, smell, and feeling. In actual fact, this can be applied to sound, too, when it is loud enough to make our ear drums vibrate more than they should, to the point where we can actually feel them moving – the brain can recreate the sound, but it can't recreate the vibrations felt. Such lack of control means we can, at best, attempt to imagine a different sensation while experiencing one, but, with only half the job done, it's never really successful. Eat something disgusting while imagining something sweet, smell something bad while imagining you are smelling roses, or stub your toe against the corner of, well, anything, at your normal walking pace but imagine you are getting a massage – you'll see for yourself. The physical sensation can't be overwritten, but the combination of both mental and physical stimuli working simultaneously can cause confusion and affect how well the brain processes the stimuli, reducing the effect it has.

The second type involves physically performing tasks of two different natures, where at least two different areas of the brain and spine, or different divisions of said areas, are used. How many people type without looking at the keyboard, so focus their eyes on something else? I know I do. Nevertheless, we can know when we mistype a letter, hit backspace, and make the correction without ever having to look at the keyboard or screen. This is only made possible by the fact that we use spatial memory, fluid action memory, one division of neurons in the motor cortex, and multiple sections of the spine to type, while using one division of the visual cortex, a second division of the motor cortex, and a different section of the spine to concentrate on, in my case, the television. In fact, it is this dividing of the central nervous system that allows us to multitask.

Where we can't multitask properly – if at all – is in performing two tasks that require the same division(s) of the brain. Writing/typing while talking is a perfect example of this. Remember those moments where you accidentally started writing what you were saying? That's because the Broca and Wernicke areas, which are comprised of a total of three divisions, are used for three functions – choosing words, forming sentences, and ensuring they follow the rules for said sentences to be coherent. There are no divisions of each of the three to enable parallel processing, so only one language processing task can be performed at a time. Trying to type and speak different sentences means the sole neurons capable of the required processing have to switch tasks constantly... but there's a problem. If they don't switch tasks in perfect succession when data from one area has been sent to another, data for task A ends up sweeping into task B, and the output becomes a combination of both until order is restored.

The brain has a limited supply of energy and one conscious mind, so splitting focus, regardless of the multitasking type, *will* cause performance to be reduced. *Just so you know, this is also why concentrating on one pain helps you ignore another.* The best anyone can hope for is that, while the MCS performs one task, we've performed a different task enough times for the memory to have become engrained, allowing the ACS to let us perform it on autopilot – it does happen, though we rarely notice it while it's happening.

THE 'W' SYSTEM

A fundamental question that remains is who – or what – you are.

When you start getting deeper into how all this works, you start to realise that there has to be a part of the brain that is its own self-contained system. Without it, you are stuck in a never-ending question loop situation, always asking something along the lines of, "What neurons issue commands to these neurons?" Without a self-contained system, there is no starting point other than the neurons we use to perceive the physical world around us using our senses, meaning everything we do would be governed solely by what is around us at any point in time, but we know that's not true because we are able to think and do things that have nothing to do with the environment in which we exist at any given time. The other options would include:

- **Neuronal Independence**, which would see multiple neurons able to start their own processes in pursuit of their own wishes. It would be mayhem.
- **Random Processing**, where a random piece of data kicks off the processes that are to follow, meaning we would have no idea of what we were going to do at any time.
- **Conditional Processing**, where set processes occur only when a condition is met. Control would be relinquished; we would be nothing more than reactive systems.

That being said, let's get the answer out the way:

- **"You"** is the decision system within a control system – humans are dual-type control systems, accounting for both the conscious and subconscious minds. We'll call this "U-1".
- ***You*** are the sum of "You" and six other major systems. This is "U-2".

I know, it should really be The 'Double You' System, but the titular way looks so much better. I'm unlikely to make specific reference to either type again here but the reference codes will help if anyone wishes to distinguish. Also, the "-" should be included, as not to dance on the trademark of any Irish rock bands.

Here's a trick for you. I'm not sure how many people this will actually work on but I'll try it anyway.

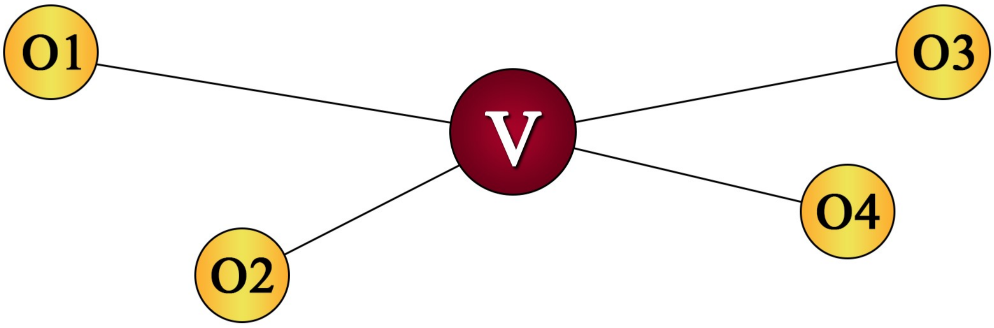
- Say this to yourself: *"Humans are nothing more than advanced decision making machines."*
- Think about that a couple more times, really taking in the meaning of that statement.
- Imagine a human standing next to the type of humanoid robot you would expect to see in a sci-fi film.

- Apply the same characteristics of the robot to the human – movement, speech pattern, digitised sound.
- Use everything I have explained so far to imagine how the human thinks compared to how a computer works things out.
- Now, tell me, just how different are we from our – thus far – imaginary, metallic counterparts?

If it worked as well on you as it did when I said it to myself, you would have noticed that you have started seeing humans in a different light. I bet consciousness makes a lot more sense to you now. It isn't an abstract concept that can only be explained with philosophy and governed by the cosmos – it's maths, it's science, it's logic, and, most importantly, it's *very* real. It's okay if it hasn't worked so far – it's time to break down how humans work in full.

The systems that make us who we are:

The Primary System: Values



The above image is an example of how objects are physically associated with values in the brain – as an example, think of four things (objects) that make you feel happy (value). Since we'll be dealing with a lot of objects, I'll use a better format to explain what I need to in a more comprehensible manner:

	Value	Value	Value	Value	Value
1	Object	Object	Object	Object	Object
2	Object	Object	Object	Object	Object
3	Object	Object	Object	Object	Object
4	Object	Object	Object	Object	Object
5	Object	Object	Object	Object	Object

Every object a person knows of has an association with at least one value that controls who we are, and with each association also comes a rank used to determine how much of an effect it has on us. This is why different objects make you feel different things, and different objects can make you feel the same thing to different degrees, with the general rule being the higher the rank, the more significant the impact.

	Happy	Angry	Sad	Bored	Fear
1	Object 1	Object 2	Object 3	Object 4	Object 5
2	Object 6	Object 7	Object 8	Object 9	Object 10

In the above table, we can see how any of the listed objects will make us feel, as well as the degree to which they will make us feel it – at a rank of 2, Object 10 will make us feel more fearful than Object 5. However, objects need not only have one association – a single object may have as many non-conflicting value associations as possible.

When it comes to the placing of new objects, it is generally based on first encounter – how well we can reason to separate new objects of the experience and determine how each makes us feel, how relative one is to another, and how relative one is to the dominant feeling we are experiencing – it's how we have come to handle discovery. The best way to explain this is to compare babies to adults when it comes to eating:

> When you introduce babies to a plate of food composed of things they are not familiar with, they are more than willing to try it – eager, some may say. However, if what you first feed them is displeasing to their taste, the experience is ruined. Even worse, they'll often refuse to eat whatever you try to feed them from that same plate because they collectively associate whatever they see as part of the bad experience. Now, everything they recognise from that plate has negative associations in their mind, even if it wasn't something they tasted or did taste but either had a neutral opinion of or didn't deem it positive enough to change the experience as a whole. The next time you go to feed them something they recognise from the plate of bad experience, they can become very apprehensive, regardless of whether or not it was something they actually tasted. The same thing happens if an object they don't like is among other new objects. It's amusing to watch their faces as they weigh up whether or not it is worth the risk, looking at you to let you know that this could be a make-or-break moment of trust.

> For adults, it's very different. We know to leave what we find we don't like and try the rest. We know that if we encounter a food we don't like amongst new objects on a plate, we don't have to be weary of the entire experience, only of the object itself.

Unfortunately, we don't always have control over how we value the objects we encounter – the subconscious mind is always active, and what it is able to perceive that we don't perceive with the conscious mind is still collected and stored. You may question why objects aren't automatically stored under a neutral value when subconsciously perceived, but where would the fun in that be? Sure, many objects will be when the mind has no reason to value them either way, but there are other contributing factors that determine how an object is sorted, such as your current mood, how distracting the object may be, and even what the object is doing. The subconscious mind takes into consideration the objects and the particulars of the event and makes decisions based on how it reasons the information gathered. There are times we have all experienced when we encounter something seemingly familiar, can't figure out why it's familiar, but have an opinion on it immediately. Subconscious perception and sorting is the reason.

As we get older and our cognitive abilities improve, we get better at separating objects during experiences, allowing us to better determine how relevant each object is to the effect the experience is having on us.

This value system is what is used to control our nature and how we react to stimuli.

The Secondary System: Reaction

The first part of the reaction system is the change in state.

When dealing with a single object, the change is simple – we move towards the value(s) associated. If object 7 makes us angry and it is the sole object having an impact, then we get angry. It's all rather simple; linear. The fun kicks in when we are dealing with a multiple object situation. Objects of the same association are easy to deal with – if you encounter two objects that make you angry, you get angry – but what about when you are dealing with objects of different associations? This is where ranks really come into play, along with maths and reason.

> With two objects associated with anger, where one is rank 4 and the other is rank 2, what would the result be? Simple addition would give us the equivalent of rank 6. Mean average would give us rank 3. Halving the value of the lower and adding it to the higher would give us rank 5.

> What happens when there are conflicting associations? One object is happiness rank 6 and the second is sadness rank 6. Would they cancel each other out? Would one that is prioritised higher by an individual dominate the lesser?
>
> What about when we are dealing with a veritable smorgasbord of objects which have different associations and ranks? In dramatic fashion, "*Oh, the mayhem. When will it end?!*"

The truth is there is no one right answer. People are different and we all reason in our own ways. As we grow, we learn to reason in different ways than when we were born, but it all remains basic maths, hence why the brain of even a newborn can accomplish it. Some may be wondering how a newborn is able to perform such calculations, but it's important to understand that maths doesn't have to be calculated using equations – a result can be gained using methods and rules. For example, sending six signals to Place A in the brain, and four signals to the opposing Place B, gives us a difference of two signals. This is maths, and yet it isn't something that needs to be calculated – the answer is simply the resulting brain state. In non-linear situations where there is no single answer, such as what we are now dealing with, this is preferable. Imagine the brain starting in a zero value state, with the following rules implemented:

- There are ten different values.
- Each value is positive, negative, or neutral.
- Each value has a maximum of ten ranks.
- Only one value rank can be increased at a time.
- A value rank must be increased as much as it is to be before moving onto the next value.
- An increase in a positive value rank causes an equal decrease in negative value ranks and vice versa. An increase in either a positive or negative value causes half a decrease in neutral value ranks.
- An increase in neutral value ranks causes half a rank decrease in positive and negative value ranks.
- No more than thirty signals can be sent out at a time.
- The maximum total rank of all current ranks combined can't exceed thirty.

Now, following these rules, you can apply as many objects of whatever rank you wish. The order in which values are modified is the major contributing factor to the end result. If you wish to process this visually, you'll need to use a scale/chart/graph to handle the multiple end points.

Though this may read somewhat complex, this is equivalent to how the brain works, and the sole purpose is to create limits – limits in place to prevent every value from reaching maximum value simultaneously. I could think of no quicker way to achieve a state of insanity, burnout, and break down than allowing that to happen. Just imagine being extreme levels of happy, sad, angry, indifferent, and so on, all at the same time.

An interesting mechanic is the margin of change we have, which requires us to encounter objects of an opposite nature and a rank within a margin in order for them to have any effect on our current state. For example, if the margin of change is five and you are in a rank ten negative state, it would take a positive object of at least a rank five in order to cause our state to change. To put it in layman's terms, it's like being pissed off to such a degree that only something of significant positivity can change your mood.

The second part of the reaction system is the change in behaviour.

The change in behaviour depends on the resulting state of an individual. Anyone will notice that, as their state changes, so does how they act and react towards events and stimuli, as well as how well they are able to function and how much control they have over themselves.

In any case, the two major classes of change are *productivity* and *behaviour* – more specifically, how it makes you appear. Keeping in line with the object table, the reaction table would look like this:

	Value
R A N K	**Productivity**: Controls aspects such as concentration, willingness and capability. **Behaviour**: What you do and how it makes you appear.

What's intriguing here is that harmony, conflict, and disconnection all exist between what a person is and what a person is doing.

- When a person's state matches how they feel about a task, productivity and behaviour move in the direction of the nature of the state and task. Being in a positive state and performing a task you like tends to increase your mood and your focus. Negative state, negative task, it all worsens.
- When a person's state conflicts with how they feel about a task, productivity and behaviour move in the direction of the nature of the task. Positive state and negative task worsens mood; negative state and positive task improves mood.
- Some people are able to disconnect their state from how they feel about a task, so one has no bearing on the other at all. This can also be achieved using the margin of change mechanic.

This is also where emotions come into play – or, to be more precise, emotional reactions. An emotion is nothing more than a state and an associated type of action. States *usually* have specific types of associated actions – happy and smiling, sad and crying, anger and rage. While we can't know the emotion someone is feeling mentally (unless using some sort of neurological scanner), we can infer it by the associated action because, for most people, emotional states and the associated actions are roughly the same – if they weren't, imagine the chaos that would ensue when someone who was sad and crying was interacting with someone who was also sad but had smiling and laughter as their associated action. This is also why people with the mental ability to control or suppress their associated actions are much harder to read. When a change of state occurs, the associated action is triggered, and thus we have the emotional reactions we have come to know and hate.

Productivity and behaviour can vary astronomically or infinitesimally, depending on the nature of the person. There really is no limit to the differentiation. The table only need, in regards to a normal person, be divided into sections that are equal to or account for the sections of the object table, at which point you simply match a section of one table to the corresponding section of another.

The Tertiary System: Sensitivity

So, just how sensitive are you? This isn't actually the type of sensitivity people refer to when they wish to indicate a 'cry baby', but sensitivity to change. To be more specific, it's one or more points of saturation or deprivation within a time frame that causes an object to rise, fall or change in value, like when you listen to a song so much and so often that you begin to hate it, or when you haven't had a food for X amount of time and lust for it. This isn't simply you having a change of opinion, but the part of the process that leads to the brain rewiring itself.

To achieve this, a sensitivity algorithm, like the one below, is a (very) basic version of what we use:

• Object = w • Occurrences = o • Time = t • Acceptable Frequency Range = f

```
foreach (w){
        if ((o / t) > f^x){
                //move up X amount of degrees
        } else if ((o / t) = f){
                //do nothing
        } else if ((o / t) < f^x){
                //move down X amount of degrees
        }
}
```

Sorry, non-tech readers, but there wasn't really a better way to write that other than the explanation above it. Anyway, such an algorithm can be applied to the object table in multiple ways, such as by value, by rank or by individual object.

The Quaternary System: Priorities

What do we value most in a given situation? Is it that which makes us happiest? That which is detrimental to someone we detest? Maybe that which improves our financial situation? Here's a test. Figure out what you prioritize more in each of the following situations:

- You and your business partner launch a start up. A few months in, it's struggling. You receive an incredible job offer but it means abandoning your company and co-founder. Stay or leave?
- It's payday. Pop bottles or pay rent?*(Laugh with me, social media users)*
- You get caught committing a crime but your friend escapes. Ten years jail time for you, or ten years for them and probation for you? *(I'm still laughing)*
- Your friend's partner makes a move on you... *(Zero bladder control)*
- Red pill or blue pill?
- Two friends want you to go to two different places at the same time. Where do you go? Who do you choose?

If it was always so easy to sort priorities, life would be so much simpler than it is. The reality is that many priorities are relative only to the situation at hand, regardless of how simple, ridiculous, or hilarious. As much as we may *think* we prioritise objects that are highly ranked under positive values more than their counterparts under negative values, the situation at hand heavily influences what a person chooses to do in the moment, which leads directly to the next system.

The Quinary System: Conditionals

If X, do Y.

Conditionals – our entire body runs on them. They're the reason we only shiver when we feel cold, why white blood cells kick into action when we are ill or wounded, and why we sneeze when irritants invade our nose – basically, every automatic response we have is controlled by the conditional system.

Because conditionals are automatic, they are only controlled by the ACS, i.e. the subconscious mind. As I previously mentioned, the conscious mind has manual overrides for some functions, which is why we can stop ourselves from sneezing, but doesn't for ones that are required for survival, hence why you can't stop your white blood cells from healing you. All in all, it is a rather remarkable feat when you think about it.

The computer code example I wrote for the sensitivity system is, too, a conditional, and would fall under the conditional system. The conditional situations I mentioned for the priority system, however, do not – they are situations in which we manually make decisions, and what we choose to do can't be blamed on automation.

A special type of conditional – a very annoying one – is what we know as compulsions. Compulsions are a subconscious conditional loop that continues until the need of the compulsion is met or the triggering event has been forgotten. The triggering event can be perceived consciously or subconsciously, and, when the action that should be performed is not, it sits in the Short Term Working Memory, where it would normally be forgotten quickly. However, the subconscious mind has other plans, continuously stimulating the memory so it cannot fade. How the actual compelling comes into play is based on what we know to do in the event, and the subconscious mind pushing for the action to be performed. Take a dripping tap, for example. We perceive it and now the memory of it has been created. We know we should turn it off but we consciously ignore it. The subconscious mind then reads the memory, knows what action should be performed, and attempts to push it through. Since it isn't actually a reflex, we can't be forced to automatically do it, so it loops – read, push, read, push, read, push – until we either do it or become distracted by something else. Compulsions may not do so by force, but significantly impair a person's free will.

The Senary System – The Master List

The last of the six systems isn't a functional system at all, but is one which serves a different purpose.

The master list is nothing more than an index of all the objects we have stored and how we value them. Unlike the primary value system, this is defined by neural connections between engrams and the parts of the brain they stimulate, not formed by them. Rather, this information is itself stored in engrams and used by the final system for one sole purpose – keeping us up to date on what we know and how we value it, without the need to constantly search through our entire data bank.

Have you ever wondered how, sometimes, someone can ask you a question such as, "Have you ever heard of X?" and you can immediately say yes or no? You didn't need to think about it and you didn't actually need to think of a relative memory, the answer was just there. This list is how we know what we know. In absence of the list, we wouldn't be able to say "I feel like having this right now" without first performing a significant search through all the actual memories we have, compiling a temporary list of all objects and how we value them, whittling the list down based on current requirement(s), prioritising what's left, and then analysing, reasoning, and reaching a conclusion for a final one. Every... Single... Time. True, there are times when we appear to do this anyway, but that's because we are too bloody indecisive when faced with choice.

The way I see it working, the hippocampus writes the list as it creates engrams of compilation memory. It's the most efficient and accurate way for said list to be updated accordingly, since the hippocampus has to process what happens during an event – specifically, in this case, the objects perceived and how they made us feel. Where the engrams for said list are stored is either in the hippocampus or the part of the brain responsible for decision making – it's hard to say which with a high degree of certainty, but, following theory, my money would be on the decision-making area. Again, it would make the most sense – decision-making neurons wouldn't be reliant upon hippocampic memorial neurons for their own operation, and wouldn't need to waste time requesting data and waiting for a response before the actual process of doing something could even begin.

The Final System – "You"

So, "You". Where it all begins. Where the final decisions are made.

- "You" is the commander-in-chief of the MCS; the conscious mind.
- "You" controls the focus of your internal and external perceptions that you are aware of which start all of our conscious processes.

- "You" controls all aspects of thinking that result in a manual decision.

"You" is the part of *You* that makes it possible to determine that an entity has consciousness. It's the **manual decision making system** of our conscious mind, and it uses all the memories we have stored, and all of the mental tools available, to navigate through life.

The funny thing is that, if you were to lose your conscious mind right now, you would still be the same person, except you would operate in a zombie-like manner, exactly like when someone is sleepwalking. The ACS – the subconscious mind – would still use the same master list to make decisions not relative to keeping your body functioning, the same memorial neurons that store what we know, and the same signal paths that make us act and react. Ultimately, we would sense what was happening around us, and would react to what was happening around us, but would have no way of preventing reactions to stimuli, no way of knowing why we chose to do whatever it was we did, and no way of doing anything other than what is relative to the happenings within your immediate vicinity. You will be very much like a robot at that point.

The ARI-1 Principle

This is – singlehandedly – the most crucial factor in determining consciousness. *The* defining principle.

The **A**ppearance of **R**andomness for **I**ndividuality. Even with consciousness, this principle is what prevents us from still seeming robotic, and puts the 'personal' in 'personal values'. Solely relating to the value system (because it is the primary basis for behaviour), the distribution of objects is the major player in what makes us individuals, whereas, with machines, objects are usually set and fixed, so all instances of a software give the same reaction all the time. It's usually made worse by having all instances run off the same master platform, hence why multiple people can ask a digital assistant on different devices the same question, and assistants from the same company repeat the same answers. *Humans and call centres – same thing.*

I know some will be wondering why 'Appearance' is a term used in the principle name, and it's because if you lined up the object tables of any number of people, they would appear to be random in comparison to each other. It can be explained better using maths:

Imagine a grid. The top row has ten values. The left column has ten ranks. Pretty much this:

	V	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**
R	O1	O11	O21	O31	O41	O51	O61	O71	O81	O91
R	O2	O12	O22	O32	O42	O52	O62	O72	O82	O92
R	O3	O13	O23	O33	O43	O53	O63	O73	O83	O93
R	O4	O14	O24	O34	O44	O54	O64	O74	O84	O94
R	O5	O15	O25	O35	O45	O55	O65	O75	O85	O95
R	O6	O16	O26	O36	O46	O56	O66	O76	O86	O96
R	O7	O17	O27	O37	O47	O57	O67	O77	O87	O97
R	O8	O18	O28	O38	O48	O58	O68	O78	O88	O98
R	O9	O19	O29	O39	O49	O59	O69	O79	O89	O99
R	O10	O20	O30	O40	O50	O60	O70	O80	O90	O100

One hundred objects are distributed, with one object per position. The positioning of an object matters and any object can only be used once. How many unique grid permutations are there? *(If this is wrong, I pass blame to mathsisfun.com)*

The short answer: 9.3326215443e+157

To write it out in full:
93,326,215,443,944,152,681,699,238,856,266,700,490,715,968,264,381,621,468,592,963,895,217,599,993,229,915,608,941,463,976,156,518,286,253,697,920,827,223,758,251,185,210,916,864,000,000,000,000,000,000,000,000

Yea, so, that number is just a *little* bit more than the number of people in existence... ever, to say the least. Now, to attempt to get an accurate measure of the number of unique permutations for humans, we would have to account for more, such as:

- There are more than 100 objects we can perceive, store and arrange;
- A single object is able to have more than one value association;
- Any grid section can have multiple objects;
- Any grid section can have no objects;
- Different people would have observed different objects; and
- Different people would have observed a different number of objects;

What is the exact number of possible permutations for mankind? Okay, ballpark? Fair enough, just throw out a random figure. That's right, *you're not even close*. I doubt any computer currently in existence can calculate the answer. The most accurate answer anyone could possibly give is *infinity*, though, technically, you *could* work out an answer if you have a list of all the objects possible to be perceived and absolutely nothing to do in life. I'm sure it's possible to write an equation for this, too, but I'll leave that to the maths gurus because I do not have a clue. To put it into perspective, think of it like this:

- Current number of people on earth is approximately 7.6 billion.
- In a grid of 13 positions and 13 objects to be placed, there are 6.2 billion permutations.
- In a grid of 14 positions and 14 objects to be placed, there are 87.2 billion permutations.

It would only take **fourteen objects** to establish the ARI-1 principle for humanity as it currently stands. The human race could double every year for the next three years before we would need object fifteen to maintain this principle all the way through year four.

The significance of the term "Appearance" comes from the fact that, even if we were able to map and compare the object tables of all living humans, we wouldn't be able to determine for certain that it wasn't random if we didn't know how humans acquired and sorted objects. We can take into account objects of set position that come from society trying to instil morals and ethics in people, and what we instinctively know as humans – so those that have actually been placed for us – but the remaining objects would still be distributed in such a way that, to those none the wiser, a significant degree of randomness would appear to be the case. Realistically, there wouldn't be any discernible pattern – no consecutive format, average, correlation (even if we declared noise, it would be deafening) and so on. At best, some could say, "A to F appear to be set, while G to Z appear to be random," or, in other words, that it isn't *completely* random. The data we would have to work with would still be a drop in the ocean of all the possibilities, and, given that any permutation is technically possible with the human mind – regardless of probability – no definitive pattern could be found – well, not unless you allow poor sampling methods that so very often lead to biased results. Still, this is all predicated on us being able to see object tables, and since we can't actually do this, even if some people weren't unique, how would we find two who are exactly the same in a sea of seven billion (and counting), without being able to list and compare for exact matches?

The only reason we know it isn't random distribution is because we are aware of how we acquire new objects and associate them, even if we don't always know when the process is actually happening. Individuality in a species is an illusion created by major possibility and minor actuality, and as long as there are enough objects being distributed between enough values, the facade can be maintained. However, as the quantity of a species increases without the addition of new objects, the cracks in the facade will begin to show like a creeping hairline fracture in a piece of glass, and if it is possible to ever reach a time where the quantity of a species exceeds the number of permutations by, say a minimum of 10% – though it is very, very, *very* unlikely – that illusion is going to shatter like a tempered glass coffee table being used as a dance platform by someone with poor equilibrium. Still, it's easily solved – add more objects, create more permutations. Even a single new object would have an incredible result.

The ARI-2 Principle

There are some things which – for now, at least – *are* seemingly random, leading us to the second ARI principle – **A**ctual **R**andomness for **I**ndividuality. Some examples:

- Neural Wiring – When we are born, there's no neural map being followed that controls the *exact* connection pattern nerves and neurons must follow, which is why we are all different from birth. At best, there's a basic requirements layout followed to operate like a modern-day human – nothing more. This is also proven by the fact people have different numbers of neurons in the brain, meaning it's not possible to have exactly the same neural map.
- Neuronal Performance – This controls everything from how intellectual we are to how skilled we are (or are not), how good a memory we have, and how quickly our reflexive responses are. There's currently no proven theory as to how the potential of neurons is decided since these aren't inheritable traits – at least from what we've seen to date, so one can only assume it's random development, or, you know, *insert astrology joke here*.
- Sensitivity – Some people never change; some people change all the time; some people are set in some ways; some people are so lost in a facade that they don't know if it's the facade or them that's actually changing. Most of the time, people don't notice themselves changing until after the fact, and can rarely, if ever, predict the change in themselves, let alone others, because everyone has a different Acceptable Frequency Range (tolerance) for different things. Determining someone's sensitivities can only be done through observation at this point, so good to luck to anyone attempting to find any sort of pattern.

WORKINGS OF THE MIND: PART 2

Personalities and Disorders

What makes a personality? Simple – the values of objects and how we choose to react to them. The rest of the W system does affect who you are, but the primary and secondary systems are the core. Since I won't always be specifying any object positions here, I won't repeat the object table unless necessary – you can just imagine the same one previously used when need be. Reactions, however, do differ throughout, so I'll be displaying differences in such tables. Here's an example of what a *normal* mind's reaction table could look like, where the baseline for an emotionless state is normal behaviour and 50% productivity:

	Happy	Angry	Sad	Bored	Fear
0	**P:** 50% **B:** Normal				
1	**P:** 60% **B:** Content	**P:** 44% **B:** Annoyed	**P:** 40% **B:** Blue	**P:** 42% **B:** Lazy	**P:** 40% **B:** Nervous
2	**P:** 70% **B:** Captivated	**P:** 38% **B:** Frustrated	**P:** 30% **B:** Pessimistic	**P:** 34% **B:** Uninterested	**P:** 30% **B:** Anxious
3	**P:** 80% **B:** Excited	**P:** 32% **B:** Infuriated	**P:** 20% **B:** Distressed	**P:** 26% **B:** Discontent	**P:** 20% **B:** Panic
4	**P:** 90% **B:** Elated	**P:** 26% **B:** Hostile	**P:** 10% **B:** Depressed	**P:** 18% **B:** Sloth	**P:** 10% **B:** Hysteria
5	**P:** 100% **B:** Intoxicated	**P:** 20% **B:** Rage	**P:** 0% **B:** Breakdown	**P:** 10% **B:** Erratic	**P:** 0% **B:** Petrified

This is the type of thing we are used to – clear, concise, gradual – and when reactions to emotional states differ, we say the wiring is wrong. Because normal minds are so boring, let's take a look at examples of how the systems of those a little "different" could look – especially those whose disorders make particularly interesting use of the other systems. Use the colour indication system of normal people to gauge and understand temperament of the types that follow.

Psychopathy – How can the tables of people so interesting appear so bland? Psychopaths have emotions but lack emotional reactions, so, regardless of their state, they *always* appear normal, whatever normal is for an individual in question.

<table>
<tr><th></th><th>Happy</th><th>Angry</th><th>Sad</th><th>Bored</th><th>Fear</th></tr>
<tr><td>0</td><td colspan="5">P: Indeterminate
B: Normal</td></tr>
<tr><td>1</td><td rowspan="5">P: Indeterminate
B: Normal</td><td rowspan="3">P: Indeterminate
B: Indeterminate</td><td rowspan="5">P: Indeterminate
B: Normal</td><td rowspan="5">P: Indeterminate
B: Normal</td><td rowspan="5">P: Indeterminate
B: Normal</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td><td rowspan="2">P: 100%
B: Obsession – Singular Focus</td></tr>
<tr><td>5</td></tr>
</table>

That table really made me laugh. Just look at how colourful they are. As you can see, emotional reactions really aren't their forte, and their productivity levels are almost entirely indeterminate. Why? Because, without emotions influencing behaviour, they can be as productive as they choose. The only guarantee is that, beyond a certain anger rank, something will become the subject of their obsession. Read into that as you wish.

Sociopathy – Right off the bat exists a conditional with sociopaths that determine their reaction system, based on whether or not an emotional bond is concerned.

Inclusive of an emotional bond:

<table>
<tr><th></th><th>Happy</th><th>Angry</th><th>Sad</th><th>Bored</th><th>Fear</th></tr>
<tr><td>0</td><td colspan="5">P: Indeterminate
B: Normal</td></tr>
<tr><td>1</td><td rowspan="3">P: 70%
B: Captivated</td><td>P: 60%
B: Annoyed</td><td rowspan="3">P: 30%
B: Pessimistic</td><td>P: 60%
B: Discontent</td><td>P: 40%
B: Nervous</td></tr>
<tr><td>2</td><td>P: 70%
B: Frustrated</td><td>P: 70%
B: Discontent</td><td>P: 30%
B: Anxious</td></tr>
<tr><td>3</td><td>P: 80%
B: Infuriated</td><td>P: 80%
B: Discontent</td><td rowspan="3">P: 20%
B: Panic</td></tr>
<tr><td>4</td><td rowspan="2">P: 100%
B: Obsessed</td><td>P: 90%
B: Hostile</td><td rowspan="2">P: 10-0%
B: Extreme Self-Pity</td><td>P: 90%
B: Discontent</td></tr>
<tr><td>5</td><td>P: 100%
B: Rage – Singular Focus</td><td>P: 100%
B: Discontent</td></tr>
</table>

So, what is notable here? When an emotional bond exists:

- In some areas, there is much less of a steady increase in temperament and behaviour than in normal people.
- When experiencing boredom, they become more productive in an attempt to cure it.
- They do the stages of anger as well as a normal person. Take that as you will.

Exclusive of an emotional bond:

<table>
<tr><th></th><th>Happy</th><th>Angry</th><th>Sad</th><th>Bored</th><th>Fear</th></tr>
<tr><td>0</td><td colspan="5">P: Indeterminate
B: Normal</td></tr>
<tr><td>1</td><td rowspan="2">P: 60%
B: Content</td><td>P: Indeterminate
B: Normal</td><td>P: Indeterminate
B: Normal</td><td rowspan="5">P: Indeterminate
B: Discontent</td><td>P: 40%
B: Nervous</td></tr>
<tr><td>2</td><td rowspan="2">P: Indeterminate
B: Annoyed</td><td rowspan="4">P: Indeterminate
B: Normal</td><td>P: 30%
B: Anxious</td></tr>
<tr><td>3</td><td rowspan="2">P: 70%
B: Captivated</td><td rowspan="3">P: 20%
B: Panic</td></tr>
<tr><td>4</td><td>P: Indeterminate
B: Hostile</td></tr>
<tr><td>5</td><td>P: 80%
B: Excited</td><td>P: 100%
B: Rage –
Singular Focus</td></tr>
</table>

With no emotional bond, sociopaths begin to resemble psychopaths with indeterminate productivity and normal behaviour throughout the ranks in some areas, making it very difficult to assess the current state. They also have lesser maximums in many areas compared to normal people.

There's one primary conditional sociopaths have when no emotional bond is present that psychopaths do not, due to the lack of need – suppression. To put it simply, when a sociopath reaches a rank equal to X or higher, they can reduce the rank to X or lower. It's not instant or preventative, but is within their control, which is why their state can fall as quickly as it is raised.

Dissociative Identity Disorder – Better known as Multiple Personality Disorder. Much like sociopathy, a conditional is immediately in place, but first I'll explain the object tables.

	Personality 1				
	Happy	**Anger**	**Sad**	**Bored**	**Fear**
1	Object A	Object B	Object C	Object D	Object E
2	Object F	Object G	Object H	Object I	Object J
3	Object K	Object L	Object M	Object N	Object O
4	Object P	Object Q	Object R	Object S	Object T
5	Object U	Object V	Object W	Object X	Object Y

	Personality 2				
	Happy	**Anger**	**Sad**	**Bored**	**Fear**
1	Object Q	Object W	Object E	Object R	Object T
2	Object Y	Object U	Object I	Object O	Object P
3	Object A	Object S	Object D	Object F	Object G
4	Object H	Object J	Object K	Object L	Object X
5	Object C	Object V	Object B	Object N	Object M

As you can see, the object tables for both personalities contain the same objects, but they are arranged differently, which is what makes each one distinct. We only have one brain, so each engram is going to have multiple values – one for each personality. Now, the conditional here is the trigger which indicates when to switch personality, and, sometimes, which personality to switch to. It can literally be anything – time of day, object encounter, a situation. With DID, the reaction system can display any which way possible. There may also be multiple reaction systems – one per personality or multiple personalities to a single reaction system. Mix and match 'til your heart's content.

Schizophrenia – Unlike those listed above, schizophrenia doesn't primarily rely on the value or reaction system. What happens here is the subconscious mind has been able to establish a level of dominance that it shouldn't have, creating a conflict in both perception and decision. The hearing of voices comes from the subconscious mind controlling the Broca and Wernicke areas, formulating sentences, and feeding them to the auditory cortices without permission. Hallucinations come from the subconscious mind commandeering the visual cortices to create visions. The other disorders that can stem from this – anxiety, depression etc – are caused by the existing conflict, like when overbearing parents keep telling a child what to do instead of letting them handle things their own way. One can't really be surprised.

There are other value groups I could have chosen besides emotion, such as one including humour and embarrassment, but I wanted to illustrate something about the mind. You see, there's a difference between an emotional reaction and a reaction made because of an emotion. Emotions are absolute – happy is happy, sad is sad, angry is angry – but the roads to and from the emotions are relative. What leads one person to happiness isn't always what leads another to it, and this is apparent in everyone, so why are the roads leading from it expected (or wanted by society) to be the same? *Normal* people cry when they reach a deep level of sadness, smile when happy, explode when angry – these are all the same road – but, given the number of possible permutations, we should know and accept that other roads exist, even roads where no reaction can be perceived at all. Many people believe that psychopaths don't have emotions, but that's just untrue, otherwise they would have no reason to do anything. It's not possible for anyone to do anything for no reason unless there is neurological damage. If the action is subconscious then they may not consciously know the reason, but conscious actions are always performed for known reasons. Whether or not a person wishes to disclose said reasons is a different story, and when they don't, it's usually because of embarrassment, fear, deception etc. Psychopaths – and, to an extent, sociopaths – lack emotional reactions, so, regardless of what they know they feel or how something makes them feel, there's little or no change in behaviour. Why? Because the reaction system is what controls signals and chemical releases in the brain that influences the change in behaviour, and the reaction system they each have points down a different road than what *normal* minds would travel. You can see the same on the opposite end of the scale, where you have people that react at the maximum level for minor things, such as people with anger problems wanting to kill someone who stepped on their shoe, or those cry babies who shed tears because their phone battery is low, they aren't within proximity of a charger, and soon they won't be able to share with the internet everything they're about to eat and do and how offended they are that their friend didn't like their photo so they must not be a true friend at all. The scale must cover the full range of extremes from hypo- to hyper-reactions. It's never the reaction system that one should worry about, but the actual base nature of an individual. Psychopaths and sociopaths are often painted as killers, when even more *normal* people are put away for murder. Funny, isn't it, how, as long as you have the appearance of what is considered acceptable, society doesn't create an ill-conceived notion to establish hate or fear? If you ever end up in court arguing for self-defence, sling some tears at a judge and watch as any attempt at suggesting "in cold blood" goes out the window. Scream it was just survival instinct – easy manslaughter, at worst. You may just be a natural born killer who cries. At the same time, you could absolutely hate yourself for what you've done, but if your reaction system is crippled, learn to pick up soap with your toes.

Also, there's more to the creation of such types and disorders than just the reaction system if one wishes to emulate natures precisely, but that's too much to get into in this paper as there's so much to list and explain for it to make complete sense, and I don't want to start filling in the ideas many people are, no doubt, already getting.

Ideas and Trains of Thought

What, oh what, is an idea if not simply a collection of objects arranged in a specific order to convey a desired meaning? We create ideas all the time for things both minor and major – we certainly don't act on them all, but we create them. Remember, it's the thought that counts.

To form an idea, we first create a collection of objects.

- Object 1
- Object 2
- Object 3
- Object 4
- Object 5

We very often create compound objects here as well, just like when we use our imagination, which end up like this:

- {Object 1, Object 2} <-------- Compounded
- Object 3
- Object 4
- Object 5

Then we value objects (compounds as a whole), and create the foundation.

- {Object 1, Object 2}: **+5**
- Object 3: **+7**
- Object 4: **+2**
- Object 5: **+11**
- **IDEA VALUE: +25**

Seem familiar? That's because we use analysis, reason and judgement here, too.

With the basis of the idea created and valued, we then begin a trial-and-error approach to improve it by establishing a *train of thought*. To do so, we first observe the foundation of the idea – this can be done internally or externally, it doesn't matter. Next, we begin to add singular or compound objects to the idea we already have as it currently stands, and then analyse, reason, and judge so that we can create a new value for the idea. Since this isn't the foundation of the idea, however, we now have to analyse and reason in a more complex way than I've previously explained, and this is because we now have to determine whether or not there is a conflict between the added objects and any of the previous objects. A conflict reduces the value of the idea, so we have to remove the new object, replace one or more previous objects with objects which the new object doesn't conflict with, or include the new object regardless. For example, if the added object, Object 6, with an independent value of +5, conflicted with Object 5, with an individual value of +11, creating a -6 difference, any of the following could be the result:

Remove New Object	Include All Objects	Remove Conflicting Object(s)
{Object 1, Object 2}: **+5** Object 3: **+7** Object 4: **+2** Object 5: **+11** ~~*+ Object 6:* ***+6***~~ **IDEA VALUE: +25**	{Object 1, Object 2}: **+5** Object 3: **+7** Object 4: **+2** Object 5: **+11** *+ Object 6:* ***-6*** **IDEA VALUE: +19**	{Object 1, Object 2}: **+5** Object 3: **+7** Object 4: **+2** ~~Object 5: **+11**~~ *+ Object 6:* ***+5*** **IDEA VALUE: +19**

Questions arise as to which is best to keep, and the answer is *it depends*. On the surface, we aim to increase the value of an idea as much as we can, which may make the first seem best, but the second would be used if both 5 and 6 were required for the final goal, and the third would be used if 6 was necessary while 5 wasn't.

If we wish to add a new object that doesn't cause conflict, we simply throw it in. Then, we repeat this process continuously until we finally reach a point that we declare success, failure, or a dead end, and the train stops moving.

Recent studies have claimed that "the brain subconsciously makes decisions X amount of seconds before we consciously come to know it," in an attempt to support the theory that free will is an illusion – that's wrong. Prior to making conscious decisions and acting on them, what actually happens is that we run the ideas through our heads, creating a train of thought. When the decision is (almost) instant, it's what we call a reflex and is completely controlled by the subconscious mind. So, why do I think the study is wrong? Well, let's *really* look at what has been said to see why their statements are amazingly flawed:

- The subconscious mind making a decision and then making us consciously act – not possible in such a situation. We can't consciously observe a situation in which we can make a choice, pass the process on to the subconscious mind, and then wait for a response from it so we can consciously act. What would we consciously be doing while we awaited the response? Would we zone out? Completely forget? Anything that we *know* we are thinking about or planning to do is a conscious mind process. If you are a subject in this study, thinking about the decision to be made and what you want to do, you are always thinking consciously. If you forget about the decision to be made and let the subconscious mind handle the decision in the Working Memory, then that's possible, but I question how that would happen when the decision is the sole focus of the subject's entire existence at that point in time. To use a subject that could zone in and out of conscious thought so freely while performing in an experiment of this nature completely skews the result and renders the study invalid.
- What situation would you want to be in where it took between seven and ten seconds for the subconscious mind to make you take action? Remember, this is what we use for survival more than our conscious mind. It keeps our internal processes operating and controls our reflexes. Seven seconds, when a reflex response is required, is an infinite amount of time. Imagine seeing a punch coming towards you and it took seven seconds for reflexes to kick in. You'd be better off attempting to consciously act, otherwise start walking around with a first aid kit. Granted, they say "up to" seven seconds, minimum, and obviously it wouldn't happen every time. That's fair, I'll play. What if it only happened once in every one thousand decisions? You couldn't pinpoint when it would occur. We make more subconscious decisions in any given time than we can ever even realise, and that's one of the major benefits of the mind's mechanism – it generally doesn't interfere with our conscious mind unless necessary. So, one in every thousand times. We would be walking around playing Russian roulette with our lives. I can tell you this – the human race wouldn't have made it this far, if that was the case.
- What about when we make split second decisions? Even if not split second, what about when we consciously react quickly? Seven seconds would not have even passed between the choice being put to us and a decision being made.

I'm making a point here. What I would bet happened in the study is that researchers witnessed something that we can all say we have experienced at least once, which is this. Imagine you are choosing between two objects in front of you. When we are making a decision, we run through the thinking and train of thought processes. As we home in on a decision, our brains begin to anticipate the required movement for the leading choice, which causes our body to prepare for action.

Sometimes we twitch; sometimes we make a small movement. Think of a time when you were standing with choices in front of you, weighing up which to choose. When you are leaning towards a particular choice, you may have noticed that your arm started to reach out towards what you were thinking about *before* you had actually settled on a choice. You will see the same behaviour at the start of a race before an athlete launches from the starting block, which explains why they sometimes jump the gun and false start. What researchers witnessed was the preparation of movement, not the execution of a decision seven seconds ahead of conscious performance, and it, again is an action for survival. A better example – the children's game "What's the time, Mr Wolf?" You never know when Mr Wolf is going to say it's dinner time and start chasing you, so every time you step forward, your subconscious mind is bracing itself, preparing for when you need to turn and run quickly. Without this preparation of movement, you would have to consciously process Mr Wolf saying dinner time, and then think what to do, and then turn and run – by that time, you've already been caught. The anticipation of movement prepares us for reflexive actions in anticipation of an event – that even could be the starting pistol, Mr Wolf's dinner time, or you settling on a choice. If we consciously decide to change our mind at the very last second, everything the researchers have stated goes flying out the window – how can the subconscious mind have made the choice for us if the conscious mind made a different decision later? You can't state that this could be relative to what I mentioned earlier about the subconscious mind making automatic decisions and the conscious mind then overriding it because, as I said just now, the decisions in these experiments were the sole focus at that time, so the conscious mind was never absent of the situation and off focusing on something else while the subconscious mind was left to handle things. Also, if the subconscious mind operated in such a manner, why would it only do it *some* of the time? Nerve signals apparently travel at 200 mph, we process millions of pieces of information at any one time, and parallel computing is a bog-standard of our brain, yet we live life with up to a ten second delay between decision and action? I don't think so, somehow.

From Habits to Instincts

How do we develop instincts over generations? I found a way to make sense of it.

Part 1 – Humans are creatures of habit, and this is where the process begins. We learn to do something that gives us some sense of satisfaction, a release, or a desirable ability, and we remember it. If the opportunity arises to do it again, we do it again. We keep doing it over and over until we can't stop. The memory becomes ingrained; it becomes second nature to us – the conscious mind likes to do it and the subconscious mind wants to do it. Neural connections are established and strengthened to increase the efficiency of signal delivery between all relative engram(s) of the ability and the part(s) of the body it relates to.

Part 2 – Neurons. More specifically, the nuclei of neurons, controlling everything the cell can do. In this case, the nucleus having a neuron write new functions and abilities to DNA. When something becomes second nature, neurons of the subconscious mind use data from the engrams to write the code into the DNA of the individual as a function and ability pairing. This is the start of what, I suppose, would be called "first nature implementation".

Part 3 – Every time a woman reproduces, the code – regardless of which parent is the carrier, if not both – has a chance of being passed on to the child. At this point, however, it's not very prevalent. It may only be one or a few lines written into the DNA of a child, meaning it wouldn't initially be dominant in the slightest. So, how is it strengthened? Through observation and performance. Children observe and copy their relatives all the time – hence why people state that, even as babies, children "got that behaviour from their [insert ancestor here]" – and, by doing so, more easily develop the function and ability as their own engrams, helped along by the fact that the code, which is now being used as a basis for development, already exists within them, making them genetically predisposed to it and preventing the need to develop it all from scratch. Through repetition, if the memories reach the point where they again become ingrained, part 2 is repeated, with neurons writing code into the DNA of the individual. Eventually, when the same function has been written to DNA enough times, the gene becomes prominent and the function becomes instinctive. This is seen as redundancy and is used to increase the likelihood that the behaviour is passed on and maintained, should any mutation occur.

Part 4 – Initially, these abilities are only manual function behaviours. To make the transition to automatic function, there needs to be a repeatedly associated use for the behaviour – survival, sexual attraction, portrayal of feeling etc – in specific types of situations so that the brain knows and understands exactly when to execute them. When that has been established and maintained through generations, it becomes the generally associated use, and the subconscious mind can now take control.

The real question in all this is why aren't all abilities passed on as instinctive behaviour? Even without the muscle strength, why don't we attempt to walk as soon as we hightail it out the womb, yet are instantly able to cry?

A system of determination exists within us. Based on the complexity of the behaviour and how easy it would be to replicate, this system decides whether or not it should give you solely the function for the ability or give you both the function and the ability itself. Maybe it's a space-saving feature, designed to exclude anything that can be learned with relative ease, since the brain has a higher storage capacity than DNA – more on that later. Learning to walk is easy, therefore our DNA carries the function and we simply learn the ability as we grow, but, tell me, how exactly would one learn to cry? Why would anyone even know to do it? Let's go back to before we had both abilities. Walking was a more efficient method of transport compared to, say, dragging one's self along the ground, making it a pretty obvious advancement, but secreting liquid from the inner corners of the eyes is a far-from-obvious transition from, say, a sad face. Why not drool from both corners of the mouth to express pain or keep one eye closed while aggressively blinking the other? Both would be much easier behaviours to learn and perform. Whatever the case, someone learned to cry and this system knew it wasn't going to be something so easily replicated, so it instructed the subconscious mind to begin writing the function *and* the ability into DNA.

For anyone about to argue that crying is a reflex, yes, it is, but it is based on a learned behaviour that has adapted as a reflexive response, hence why some people can make themselves cry and others don't cry at all. Absolute reflexes can't be controlled in such a manner – I'm yet to hear of a person who can make their spine tingle on command.

This same system is used to control the abilities we lose. By considering what abilities we rarely or never use, as well as their importance, this system either deletes or deactivates the ability and/or function in our DNA. Getting this right is of the utmost importance – if a function is something we never use and, therefore, do not need, removing it should be okay, but if it's something we rarely use which could still be vital to survival or even basic operation under special circumstances, removing it could be disastrous. Two examples of this concern near-death experiences:

- The first is the immense release of adrenaline that can be experienced, allowing us to think and act with speed and strength we just don't see in our everyday lives.
- The second is the phenomena of one's life flashing before their eyes – a result of the adrenaline rush – where we make a last ditch attempt at remembering something that could save our lives in that moment. All those memories that were buried? Yeah, not anymore. Adrenaline expedites the retrieval and restoration of those engrams like a sunken treasure trove by a government who wants their cut.

If we lost these abilities, there would be no last ditch attempt at saving ourselves – a feature we may wish to keep, you know, just in case.

As for estimating how long these processes take, your guess is as good as mine. I'm only happy that such a calculation isn't part of my self-written job description.

Knowing Without Thinking…

... or so it may sometimes appear, but the reality is far less mystical. The beauty that is intuition. There are two types of intuition – mental and physical – which pertain to knowledge and external perception, respectively.

Mental intuition is really nothing more than an educated guess processed by the subconscious mind, which is why we are not aware of the thinking process while it is taking place, but are made aware of the result once it is made available for perception. To do so, we:

- Subconsciously perceive a group of objects;
- Compare what has been perceived with information we already know;
- Highlight information within our knowledge memory that best matches the object collection;
- Discard all information that is not relative to the current situation;
- Of the remaining, select the one we think is most likely. This can be determined multiple ways, such as by number of objects or by total value, which is why sometimes, even with intuition, we are left we a multiple choice scenario.

Physical intuition – information, too, processed by the subconscious mind – doesn't require the use of objects in the same manner, but depends on use of our senses combined with a lack of focus. Our eyes and ears usually focus on specific sensory data, but that doesn't stop them from picking up every other sight and sound within our perception range, and it's the data we see and hear that we aren't concentrating on that we have to process subconsciously because we aren't actually aware of it.

Non-traditional touch involves the detection of atmospheric changes against our skin, such as the feeling of pressure and heat. The degree to which someone can make use of this ability depends on their level of sensitivity – the higher the sensitivity, the more impressive it is. Of course, the average human is able to detect changes in temperature as little as a few degrees, which can be used to perceive things such as attraction or anxiety, and some people's ability to detect changes in air pressure is so sensitive that they can tell when the weather is about to change.

Smell and taste play a minor part because you are always consciously aware of such detections once they hit the receptors, but you may subconsciously pick up on something that isn't a dominant sensation you are experiencing.

Some examples of these in everyday life:

- Knowing when someone is pregnant, but not knowing how because the person hasn't told you, no one else has told you, and the person isn't showing. You may have subconsciously detected a rise in their body temperature, smelt iron on their breath, or noticed a change in their gait. You never exactly know how or why you knew, but your subconscious mind came to that deduction anyway.
- You're walking through your house and something tells you to look up. Oh, there's a spider above your head. Interesting, since you never consciously saw the spider prior to looking up. However, if it was in your peripheral vision, it would have still been picked up by the eyes and processed by the subconscious mind, which then alerted you to its presence. Again, survival instincts. They're amazing.
- Spatial awareness. An upgrade to spatial memory, this is the ability to detect things that we haven't mentally mapped. You know when you get that feeling that someone is present, but you haven't actually seen or heard them? Yea, that phenomenon. This depends on the sensing of atmospheric changes, and shows us just how sensitive our sense of touch actually is. A body is usually warmer than the air around it, so, when you are in a normal room of standard room temperature and a second warm body enters, their heat radiation warms the air around them, and when they are within close enough proximity, your touch receptors will feel the heat increase before it has a chance to dissipate, and you literally feel their presence. For this to not happen, a person's body temperature would have to be in thermal equilibrium with the room. At standard room temperature, they would already be dead. This is also why you sometimes feel as if someone is there when there isn't – a random heat fluctuation.
- Gaze detection. The ability to detect when someone is looking at you. Now is a time where biologists have to work with physicists, looking for any abnormalities in light (photons) reflected/emitted from the eyes and onto someone else. Wavelength, frequency, amplitude, emission pattern – something has to differ between light from the eyes and light from other sources that tells us when someone is looking at us. My guess is that it's emitted at a very specific frequency that our touch receptors are designed to respond to in a certain way, which would have been a good ability to develop for use when unknowingly being stalked by predators. Given that we can't tell when someone is looking at us from far away, emission from the eyes weakens over distance to the point where it becomes too weak to detect. It's the only logical way I can think of that would allow us to differentiate light from a gaze from the light emitted/reflected from everything else around us.

The Upper Limit

At the time of writing, I know guesses put storage capacity of DNA higher than the capacity of the brain at the lower end (100 terabytes) and more than a quarter of the highest guess (2.5 petabytes), but that just doesn't make sense, and I'm going to explain why, as simply as I can.

Think of it like this: a computer (brain) has multiple connected integrated circuits (neuronal networks), featuring processors (logical neurons) and memory (memorial neurons) which each contain a program that tells it what to do (DNA). Regardless of the fact that any one neuron only does what it's supposed to do, they still contain **all** the code for what *everything* is supposed to do, so, to even have a roundabout base figure of the capacity of the brain, we can either:

- Work out the total maximum storage capacity of a single weight unit of DNA – say, 1 gram – and then multiply that number by the total weight of, at least, every cell nucleus of all 100 billion or so neurons; or
- Work out the storage capacity of a single nucleus and then multiply that by 100 billion.

Let's have some fun with it. I can't find a general/average mass for neurons of the brain, but a large sensory neuron is, according to Washington University, around 1 microgram (one millionth of a gram), so let's just say an average neuron of the brain weighs 10 nanograms (1 nanogram is one thousandth of a microgram) and the nucleus is about one fifth of the weight of the whole neuron. A nucleus is made of both DNA and RNA, so let's half that, meaning the DNA part of a cell is equal to 1 nanogram (one billionth of a gram). In 2012, Harvard researchers stuffed 700 terabytes of data into a single gram of DNA, so, dividing that based on weight, a single nucleus could hold around 700 kilobytes of information, and, with 100 billion of them, the brain would have a base storage of <u>at least</u> 70 petabytes. I'm not saying that's an accurate figure, but it can be seen as a logical one. Now, here's the amazing thing: this is only the space that is already in use from the moment we are born, and it doesn't account for the space we actually use to store memories we create. Given this, I have no idea what the maximum storage capacity of the brain is. Theoretically, there has to be a maximum because the brain is of a finite physical size, but based on how efficiently memories are stored – using objects and references – I couldn't even make a ballpark estimate of what the upper limit could be. Whatever it is, God bless that compression algorithm.

It's 2017 now, and researchers from Columbia University and the New York Genome Center have stuffed 214 petabytes into a single gram of DNA, which is 305.7 times what Harvard managed. Following that logic, the brain could have a minimum storage capacity of 21.4 exabytes.

The Perception of Time

The age-old question of why does time appears to go faster as we age. William James was onto something in 1890 with his thoughts that it was related to memorable moments, but I believe he was examining the wrong end of the process. You see, it's not about what we remember, but about how much attention we pay to time itself, as it passes, versus how much we pay attention to the happenings within our surroundings, which is what we call space.

The first thing to do is explain the concept of Subconscious Filtering. Here are three examples:

1. How many times has your parent or spouse come into the room complaining about something so trivial that you just completely tuned out their voice while still paying attention to whatever you were doing? When you get *really* good at it, you don't even realise they're present – defences on max the moment you sense a disturbance in the force. Ah, good times.
2. How many times have you been watching a film or reading a book when, at some point, it dawns upon you that you haven't been taking anything in for the past X amount of time, and so you go back and pay attention to what you are doing, actually taking in information this time, which you notice seems to make time pass considerably slower than it was before.
3. All you media pirating hooligans who download foreign releases that have hardcoded subtitles would have noticed that, after a short while, you stop noticing that the subtitles are even on screen... *or so I'm led to believe.*

Points 1 and 3 illustrate our subconscious mind filtering out everything we are not interested in perceiving in general, while point 2 shows it filtering out information when we lose focus (stoners will *definitely* understand point two).

Next, I shall introduce you to the Table of Time Perception (ToTP):

	Focus on Time	**Focus on Space**	**Perception of Time**
1	Fair	Fair	Normal
2	Yes	Yes	Slow
3	Yes	No	Exact
4	No	Yes	Fast
5	None	None	Indeterminable

What we can see in the above is the speed at which the brain perceives time differs depending on what we pay attention to. Allow me to explain (the numbered points below refer to the corresponding row of the table):

1. This is what would simply appear as a "normal" rate of perception to a person. You acknowledge time and space, but pay no particular attention to either. Nothing interesting to see here, but it is the rate of perception against which all other rates are measured.
2. This is the slowest possible, and it happens because your brain is trying to focus on what is happening as well as the timeframe within which it is happening, making it *too* aware of what is going on. Rather than leaving some things to the subconscious, the conscious mind is trying to do it all itself, resulting in a full work load composed of both time *and* space. There's no multitasking conflict, given that the tasks are of two different natures, allowing the brain to process them simultaneously, but the division of concentration – part of which is on time itself – means that time has to appear dilated for us to be able to focus on both, with a singular mind, in the same moment. This is what can happen when we are bored. We become incredibly aware of the fact that time is passing and that we are either doing nothing or doing something we do not wish to be doing. Since space literally encompasses every single tangible and intangible object in the world that we can perceive, the conscious mind is taking on the work of all forms of physical perception and time itself. This can only be achieved through increased neuronal activity, which sees neurons firing in a majorly overlapping capacity to prevent breaks in processing, and increases the speed at which things are processed, similar to the phenomenon that occurs during an adrenaline rush, where neuron activity increases so that we can outperform our regular selves and time appears to slow. Different premise, same result.
3. Have a seat. Watch a clock tick. Second by second goes by. It is mind-numbingly dull, and, at the same time, seems slow, right? Relative to our normal rate of perception, it is, but relative to time itself, it is **exact**, and ever more exacting the harder you focus.
4. This is the one we all prefer. Such focus on space that time simply slips away. Having fun seems to be the easiest way to achieve this.
5. Last but not least, no focus on either. This is what happens when we are asleep and the conscious mind is shut down. We have a weakened perception of time when sleeping, which is why we can imagine being asleep for hours when only five minutes have passed, or a quick-seeming sleep may have lasted much longer than the recommended duration for your age group. The conscious mind, not being active, has no external stimuli in space by which to help measure anything that is happening in time, leaving the subconscious mind to its own

devices, and, without the conscious mind in partnership, it can have trouble keeping track to a useful degree of accuracy, though not always, which is why you can sometimes wake up almost bang on time, a minute or two before your alarm ruins your slumber. I would also suspect that this is why, at times, we wake up in intervals and immediately feel the need to look at a clock, as a way for our subconscious mind to calibrate itself and get a measure of time remaining before heading back to sleep. As for why this happens, it's a result of sensory deprivation. When one of our senses – sight, in this case – isn't getting the information it needs, reality becomes distorted, which is exactly why extreme solitary confinement in an environment with very low/no light is a punishment. For the time you sleep, the brain may only lose track of space and time temporarily, but, over extensive amounts of time, the effects can be devastating.

In fact, the subconscious mind is severely hampered with all external perception when the conscious mind is inactive because of the perception of time and space, as it picks up the one that the conscious mind isn't focusing on, but still requires the conscious mind to help measure the degree of one against the other. Here's an experiment and some pictures to help better explain. Let's get started:

- Open Photoshop.
- Create three canvases that are slightly smaller than twice the scale of your screen's resolution, and set the zoom to 50%. Each canvas is **Space**. Here's a table to help any who may need it:

Screen Resolution (W x H)		**Canvas Size (W x H)**	
1920	1080	3740	2104
1280	1024	2460	1968
1440	900	2780	1738
1366	768	2632	1481
1280	800	2460	1538

- On the first canvas, throw on some images of things that you either hate or find extremely dull, with some overlapping and others with space between them.
- On the second canvas, throw on some images of things that you love, again with some overlapping and others with space between them.
- On the third canvas, randomly insert a picture of a donkey.
- The window itself is **Time**.

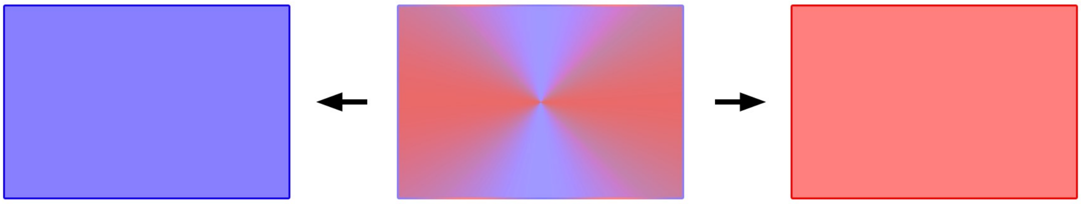
- Go into full screen mode (no menus) and ensure the whole canvas is as centered within the screen as you can make it. At 50% scale, it will all be visible without a need to scroll.

Row 1 – Initial View, Any Canvas

1. Spacetime (Fun Version) 1. Spacetime (Boring Version)

This is spacetime as we generally perceive it, working in harmony, representing row 1 of the ToTP. On the left (fun version), you see how they seamlessly intertwine in reality, but on the right (boring version), it's what it will look like as given in the example above, where the canvas of space (red rectangle) is within the window of time (blue border). This is made easy by the fact that both the conscious and subconscious minds run together simultaneously.

Row 2 – Canvas 1



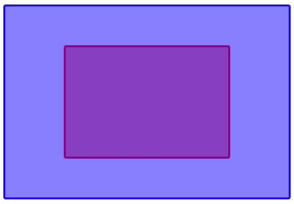
2. Time 1. Spacetime 2. Space

- Zoom into the canvas twice so that it is now at 100%.
- Move the canvas around, slowly, using the hand tool until you have seen all the images at full scale.

This is the transition from row 1 to row 2 of the ToTP. The conscious mind takes on the perceptions of both space and time, meaning the perception of spacetime is essentially split so we can consciously focus on both, like taking two objects that you are focusing on with both eyes, separating them, and then trying to focus on each object with one individual eye – the unity is destroyed, and, to be able to do so, your brain has to work harder. In the experiment, it would be akin to focusing on the canvas and the window separately, but since we can't split them, I have a better way to explain.

Zooming into the canvas represented your increased focus on space. When having done so and you begun slowly shifting the canvas around, looking at images you do not wish to view, your conscious mind focused on both space and time. How can you be sure? Well, you started to realise just how long it was taking to go through the entire canvas while still focusing on the canvas itself. It's that simple.

Row 3 – Any Canvas



3. Time Focus

- Zoom out of a canvas as far as you can.

The focus on time. This is represented by the zooming out of the canvas, indicating your declining focus on space, and it's very simple to understand. The smaller the canvas gets, the more you notice and appreciate the actual size of the window itself, the same way you notice how long a second, minute, or hour really is if you focus on a clock for that period of time.

Row 4 – Canvas 2

4. Space Focus

- Zoom into the canvas twice so that it is now at 100%.
- Move the canvas around, slowly, using the hand tool until you have seen all the images at full scale.

The focus on space, represented by zooming in on the canvas. When the canvas is enlarged and you are navigating around the screen, looking at a bunch of images you love in greater detail, you don't focus on how much longer it's going to take you to see all the images, but on how much you are enjoying the images themselves.

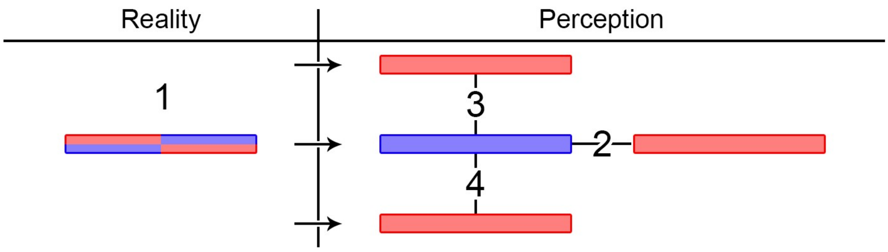
Row 5 – Canvas 3

- Move cursor to the top corner of the screen so it is out of view.
- Look at the position of the donkey and try to commit it to memory.
- Close your eyes.
- Now, pin the cursor on the donkey.

When not consciously observing, the subconscious mind can only do it's best to keep track of time (and space, in fact – try walking around in the dark when you're half asleep), using what it knows. Even the conscious mind can't accurately keep track – when you count seconds without a clock, how accurate are you? Not even "1 Mississippi, 2 Mississippi" will continue to provide accurate timing over long durations (if it even starts out that way).

For all 5 of these scenarios, do a neurological psychology test with participants who don't know why they're doing what they're doing. It seems obvious when you think about it, but doing the actual tests will yield valuable information about the mapping of neuronal circuits in the brain. For even more accuracy, create a program that automatically moves the canvases around, just to ensure that each user spends the same amount of time viewing the canvas in each experiment, and then see how different it actually felt for them.

The Four Dimensions



In the diagram above, you can see how spacetime is split depending on the focus of space compared to the focus of time. As a happy coincidence for me, since this was not something I planned, when mapped out, it also perfectly represents the dimensions of the universe – one of time and three of space. The bars for space and time represent the changing relative positions of each element of spacetime, in each of the given cases, based on how it is being perceived – as a rule, whichever is in front (assuming you are facing down the table) is being perceived by the conscious mind. I should mention that spacetime is never actually split, not even in the second case; space and time are just focused on equally by the conscious mind, hence them being horizontally inline, but separated.

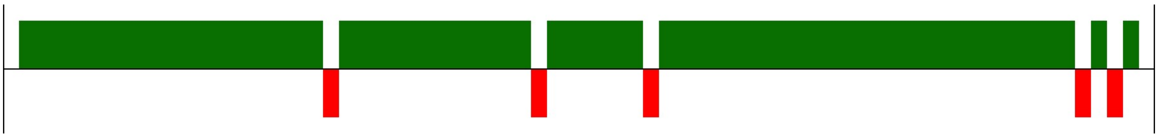
The thing that needs to be understood is the importance of objects in space to relatively perceive time. In the Photoshop example, just like in physics, both the window (time) and the canvas (space) were absolute – their size in pixels never actually changed, but:

- Depending on how much attention you were able to pay to the canvas based on its zoom, the size of the window appeared relatively larger or smaller than it actually is.
- Depending on what you were viewing and how you felt about it, how long it felt you were viewing it differed.

Detail in space is the control system for the perception of time, and it can create feature films or fleeting images.

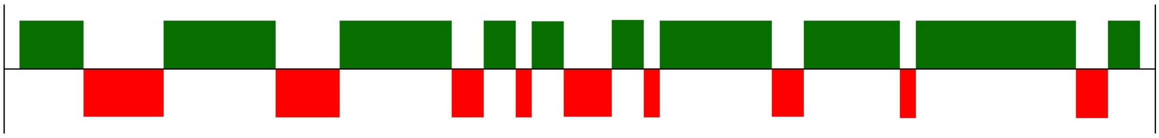
With all of that out of the way, back to the reason we are here. To start things off, in the following diagrams, green represents how much of what we perceive we pay attention to, while red represents how much we filter out, during different stages of life:

- As babies, our memory banks are empty, so we just become vacuums for information, studying as much of what we perceive as possible with every sense we know to use. Time doesn't matter to us at this point because we don't understand it, so we're just guided by our sleep schedule. Little information is filtered out.

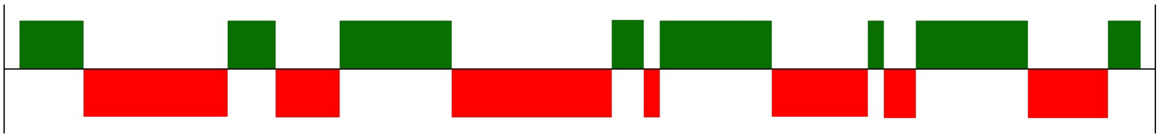


- As children, the mind is very curious – even more so than as a baby, given that we are becoming aware of just how much we don't know. However, there's usually little variation in day to day life, and we're beginning to gain adequate control of how we focus our attention, meaning we are learning to filter out by subconscious choice.

- As adults, we have a good understanding of what we want to pay attention to and what we have no interest in. Naturally, we perceive a great many things, but the average adult mentally filters out so much of what we take in that we can, quite literally, miss something happening right in front of our faces and we'd have no idea that it ever took place.



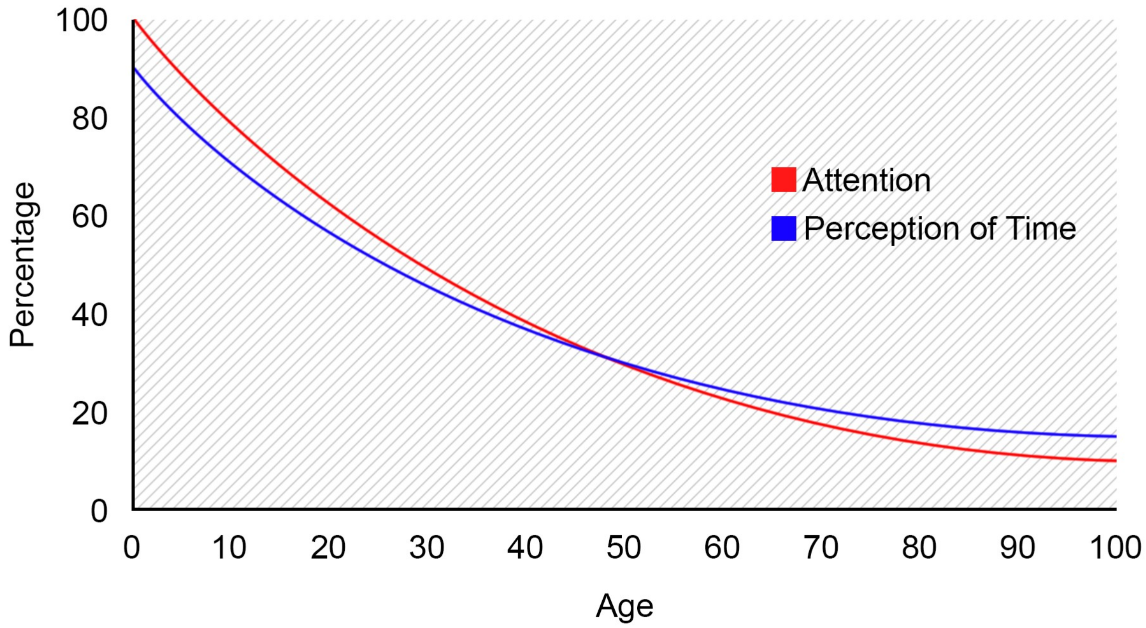
- As the elderly, our attention weakens as our neurons degrade much quicker than in previous life stages, and we begin to filter out more than we intend to.



When how much we pay attention to in each stage of life is compiled as uninterrupted bars, the following graph is the result:

What's obvious to see is that, within the same time frame, the older we get, the less we consciously absorb and the more we subconsciously filter out, and this is why time appears to move faster as we age.

Marc Wittman and Sandra Lehnhoff, in a 2005 study of subjective time perception, found that both young and older adults perceived the speed at which time passed increased with age, and this explains why. Because time perception is an entirely subjective experience, any individual is only able to compare a current experience to their own experiences during previous stages of life – the perception is entirely relative to what has come before and is controlled entirely by the natural progression of our brains.



What the above graph shows is:

- The line for attention never hits zero because, without disease or brain damage, no one's attention or neuronal performance gradually hits zero *before* the moment they begin to die. If anything, there would be an almost vertical drop, spanning seconds, minutes, or maybe hours, from the moment death begins to creep in to the point where it plants its flag.
- The line for the perception of time never reaches zero because, again, without disease or brain damage, a person would never be able to keep track of anything, literally. Having no perception of time would affect everything from their speech – you wouldn't know how to space out words effectively into sentences, so you could end up trying to say multiple words at once or waiting ages between them – to every physical action imaginable, given that coordination depends heavily on timing.

I should note that the graph is only an example. In real life, it may show straight lines, over instead of under curves, or curves with higher ending points – the example is intended for explanation, not accuracy. The only important factor is that it starts high and continuously lowers until a point at which it stops or tapers off, unless you are attempting to show an anomaly in specific situations, such as when people suffer a brain contusion and, as a freak act of nature, experience enhanced performance.

All of this is the reason why we have expressions such as "a watched pot never boils". Continuously watching a clock makes you incredibly aware of how long your work day really is. Fun sex always seems to end quicker than a clock indicates, and bad or boring sex drags on to no end.

To Be or Not To Be... Unconscious

At the start, I spoke of sleep and why consciousness can't possibly have anything to do with awareness, so now we'll get into it in a little more detail.

Usually when we go to sleep, the MCS shuts down while the ACS remains active, allowing our subconscious mind to take full control.

- Regulation: Just like when we're awake, it regulates our bodily processes – breathing, heart rate, digestion – to, you know, keep us alive.
- Sense: These remain active at all times, so they are always taking in information. Hearing, touch, and smell take in the most information, but sight is generally useless because our eyes are closed, and taste – well, unless someone wishes to play a prank on you, you aren't likely to be tasting anything.
- Filtering and Alerts – While sleeping, most sensory information that we pick up isn't of use to us, so a lot of subconscious filtering takes place. We don't need to be made aware of all the noises around us, or the feeling of the bed covers or partners as we move around, but we still need to be made aware of potential danger. We instinctively know and otherwise learn of many smells and sounds that are dangerous to us, and the ACS is aware of this, so when any matching or potentially matching sensory data is received, the ACS can kick us out of our sleep by activating the MCS.
- Dreaming: This is where sleeping gets interesting. Because the ACS still has access to our memorial neurons, it can do what it pleases as the MCS isn't there to keep it under control, so it accesses the memories of the sights and sounds and everything else that it desires, and uses the cortices to create its own internal movies. This is why we can only dream of things – faces, sounds, whatever other objects – that we have observed in real life. It also makes use of our object relationship memory, which is why our dreams are coherent, as opposed to a collusion of unrelated objects, actions, and situations... Unless you're intoxicated, in which case anything goes, really.
- Memory Storage: Dreaming still requires working memory for temporary storage. Sometimes it is cleared prior to waking, but when it isn't, we are able access the data with the MCS, allowing us to remember them when we arise. At such a time, the MCS can move the temporary data information to permanent episodic memory which, later down the line, is the cause of us sometimes confusing dreams with real experiences.

- Overactivity: Some individuals have an overactive ACS, leading to sleep conditions such as sleepwalking. The ACS takes more control of functions than it should do without MCS oversight, and anything a person knows how to do can happen as a result.

There are times when the conscious mind doesn't play ball, staying a little more active than it should, and weird things start to happen:

- Sleep Paralysis: Anyone who has experienced this knows how terrifying it is the first time it happens. The ACS takes over but the MCS hasn't completely shut down yet, so you lay there, experiencing everything, but with no control over yourself whatsoever. After the first few times, it just becomes a case of, "*Ah shit, here we go again!*"
- Hallucinations: The ACS and MCS working in unison for destructive purposes. The MCS is dominant, so you can consciously process your surroundings, being able to see, hear, feel etc everything that is around you, but the ACS begins to use the dreaming technique, and the combination of the two sees memory objects overlap with the incoming data from the real world, making it all feel very real.
- Lucid Dreaming: The ACS and MCS working together in a not so destructive way. The ACS allows you to dream and, while doing so, the MCS observes the same data the ACS is using. In this relationship, the ACS is dominant, so the MCS simply allows you to be a spectator in your own mental experience.

Fun fact: I started experiencing night terrors at 20 years old and, 9 times out of 10, it occurs buddied up with both sleep paralysis (when awakening) and hallucinations.

With the right equipment, a sleep experiment can be performed which will allow us to find the MCS and ACS circuits. Simply map the neuronal circuit that isn't active when sleeping, and that will be the MCS. Most, if not all, of the remaining active neurons will be ACS neurons.

Sleeping has nothing to do with whether or not you are conscious, nor your degree of consciousness, so you aren't actually unconscious when you are asleep. Your values are still there, hence why dreams can make you scared, can make you sweat, and during male teen years, make you ejaculate. Reactions while asleep are still based on what YOU value and how you value it. The only difference is who's driving.

CONSCIOUSNESS ILLUMINATED

The Stages of Consciousness

Not everything described here can be attributed to all beings that may be classed as having consciousness, and I mainly use humans as the focus, so it's important to understand the general order of the stages of consciousness development that can be applied to all natural living things:

Basic Requirements:

1. Existence – Well, *obviously*.
2. Perception – The ability to take in information from your surroundings.
3. Awareness – The ability to understand perceived information. *(Let's just take note of how far down this is on this list.)*
4. Memory – The ability to store perceived information.
5. Values – The ability to rank perceived information. This is essential as it is required for basic capabilities for survival, such as knowing what is and isn't good for you.
6. Discovery – The ability to find new information.
7. Self-Awareness – The ability, as explained right at the beginning, to identify yourself. Naturally follows discovery, in a sense, as a type of self-discovery. You discover you are an individual entity and naturally become aware of yourself. You don't have to be smart enough to understand the science of reflections. You only need to understand that your leg is *your* leg.

Secondary Requirements:

8. Premises – The ability to form the logical bases required for decision making.
9. Decisions – The ability to make logical conclusions based on sets of premises. *(This is how far intelligent machines (AI) have come.)*

Consciousness Achieved:

10. Feelings & Emotions – The ability to sort values into groups which influence or control reactions to information received.

Advanced Behaviours:

11. Self-Consciousness – The ability to apply feelings and emotions to yourself. "Me" becomes an object in your table of values, and you can place it anywhere you wish, and combine it

with any other objects you desire, to feel a certain way about yourself. The "consciousness" in self-consciousness comes from how you decide – consciously or subconsciously – to feel about yourself.

Going back to the baby argument from the very beginning, we can now make sense of it. Humans, most of the time, instinctively have all these abilities at birth, but it takes time for neurons to mature to a point where they can make use of these abilities. At birth, existence, perception, awareness, and memory are a given. We know values has been achieved by the baby knowing it needs to feed, so it obviously values food. The baby doesn't know what a nipple is, but it knows what to do with it once it discovers it. The baby is born with a nervous system allowing it to feel, so even though it doesn't know or understand how to use its body very well, it is absolutely aware of it. Any mother can tell you this. Premises and decisions are easy – it's hungry, it wants food, it decides to seek out food. Some cry when they're born, they cry when they're hungry, they smile, they laugh – even as a newborn. Everything after that is just learning, and the ability to learn is dependent on neuronal development, which progresses every day. After periods of time, depending on any individual's rate of development, different neuron sets mature enough to be able to handle the learning required for their function. It certainly doesn't take between 6 and 15 months for them to achieve consciousness. I'm really starting to think scientists who make such statements observe babies from behind glass but never actually interact with them. Do not mistake a lack of control and understanding for a lack of presence. The point of development is learning how to use these things.

Given everything we've covered so far – including this list – it's very easy to see how the current definition of consciousness is nowhere near the truth, and would never have taken us to the stage of creating consciousness in machines. As for where it all went wrong, we'll get to that.

The Nature of Illogical Decisions

The next thing to look at is what makes us make illogical decisions. The answer is our values. To explain this, I will compare a logical decision and an illogical decision of a human.

Note: For the following examples, premises and conclusions will be phrased in a positive light. If you wish to make one premise a negative, the conclusion will always be the opposite of what is stated. If you make both premises negative, the conclusion remains the same.

Key			
P	Premise	P(#)	Premise Number
C	Conclusion	X	External Factors
T	True	F	False
V	Values	R	random
?	Indeterminable		

Humans Making Logical Decisions:

- P1/T and P2/T = C/T
- P1/T and P2/F = C/F
- P1/F and P2/T = C/F
- P1/F and P2/F = C/F

These follow the general rules of logic. To make it simpler to understand:

P1: I like Indian Food	**P2: I am hungry**	**C: Get Indian Food**
True	True	True
True	False	False
False	True	False
False	False	False

Let's look at the same decisions again with an added extra – external factors that are not within our control:

- P1/T and P2/T and X/R = C/?
- P1/T and P2/F and X/R = C/?
- P1/F and P2/T and X/R = C/?
- P1/F and P2/F and X/R = C/?

We cannot determine the conclusion when we do not know what the external factor is, so, to better understand it, we will specifically name some.

P1: I like Indian Food	**P2: I am hungry**	**External Factor**	**C: Get Indian Food**
True	True	The shop is open	True
True	True	The shop is closed	False
True	False	Will be hungry later	True
True	False	Won't be hungry later	False
False	False	Other food available for next 7 days	False
False	False	No other food available for next 7 days	True

As you can see, when external factors are included, either conclusion is possible, depending on the factor(s) involved.

All the decisions in the 10 situations above are logical and obvious, and will therefore always draw the same conclusions, regardless of the human in question, unless external factors are added/changed.

<u>Humans Making Illogical Decisions</u>

Since illogical decisions are based on values, we now incorporate them into the equations:

- P1/T and P2/T and V/R = C/?
- P1/T and P2/F and V/R = C/?
- P1/F and P2/T and V/R = C/?
- P1/F and P2/F and V/R = C/?

Given that values are personal and therefore expressed as random, no formal logic can account for it in advance because they differ from person to person, and, much like external factors, the conclusion cannot be foreseen, so when looking at real life, we have to take into consideration both values AND external factors.

- P1/T and P2/T and V/R and X/R = C/?
- P1/T and P2/F and V/R and X/R = C/?
- P1/F and P2/T and V/R and X/R = C/?
- P1/F and P2/F and V/R and X/R = C/?

At this point, it is impossible to determine, in advance, a conclusion. It's the equivalent of trying to work out the sum of 4 numbers when 2 of the numbers are unknown.

The Universal Truths

After a conclusion, we can ask a human how they feel about the outcome.

In either case, someone can explain how they feel using a negative, positive or neutral description – I feel bad, I feel good, I feel fine. However, an answer exists in the logical case that isn't possible in the illogical, and it's an answer you would expect an intelligent machine to give more than a human.

"I feel only as is possible based on the input of information I was given."

Even with external factors taken into consideration, this answer remains absolute as these factors are not within the control of the human. This is the first universal truth – **The Universal Truth of Logical Conclusions.**

I mention intelligent machines again at this point because they can only make logical decisions, whereas humans can make the illogical, and there, yet again, is the distinction of consciousness. When we compare the two, it's easier to make clear.

Let's now compare the illogical outcome. Premises of an illogical decision are going to create a specific result until the human's values come into play, at which point any conclusion is possible. This reflects the conclusion of a logical decision using external factors with one significant difference – control. External factors cannot be controlled by the human, so the outcome is not in their hands, but values are within the human's control and, therefore, the human can and does influence the outcome, and this is why the first universal truth cannot be applied. A human's values can knowingly and unknowingly cause an outcome that is illogical and yet they are still applied – even when an illogical outcome is known in advance. Without the first universal truth, the feelings and emotions that result from conclusions are genuine and true, as opposed to "accepted". This is where emotions come into play in consciousness and why, after making an illogical decision, humans can feel amazing about themselves and they can feel absolutely terrible. This is the second universal truth – **The Universal Truth of Illogical Conclusions**.

"Only that of which I am in control can affect me personally."

External factors can always cause unexpected outcomes. You can't always account for them in advance and so, when the outcome isn't expected, that happiness or hatred you feel is not for you, but for what was out of your control. Unexpected results due to who you are, however, are different. Those results affect how you feel about yourself, and all the feelings and emotions that follow are aimed at you because the outcome was a direct result of what *you* value and the choices *you* made.

Another example of this, in a different type of situation, is when a human encounters danger. The logical conclusions here are what we know as 'fight or flight', with the actual conclusion depending on the premises. The illogical decision is to stand and do nothing. This is a result of fear. Such a degree of fear is a result of the value of the threat being perceived, which is obviously higher (although in a different table category) than the human's value of survival. It sounds crazy that this could be true since our survival instinct is supposed to save us in such situations, but this is why people want to run yet can't. Fear hinders you by either interfering with signals that would otherwise cause your legs to move or fists to fly, or by producing stronger or more rapid signals to one part of the brain than the survival instinct is sending to another. Either way, a recipe for disaster.

An example of illogical decisions resulting in positive emotions is as simple as a human constantly eating their favourite junk food – unhealthy food, happy human.

For this third truth, I invite you to think back to two different types of situations (or to people you may know who have been in, or movies you've seen in which they have occurred):

1. The first situation should be a time when you made an illogical decision that resulted in an emotional reaction. Ever consumed alcohol to the point where you passed out, yet, the next morning, you couldn't stop thinking about how great the night was? Yea, that'll do.
2. The second situation should be a time when emotions lead to an illogical decision. Heartache? Alcohol? Binge drinking? Puking? We have a winner!

In each situation, emotions and the illogical decision are on opposite sides, yet the former results in the latter. This leads to universal truth number 3 – **The Universal Truth of Emotions in Conclusions**.

"Emotions can be both the cause and the effect of an illogical decision."

All values are arranged by emotions, so they are the de facto controllers of each and every situation, conscious or subconscious, whether we like it or not, and the objects that result in the conclusion only serve to produce more emotions. It's a continuous cycle which can only consciously be overridden in order to force a logical conclusion, but the resulting objects will still result in some form of emotion, even with the first truth applied, and the cycle will simply start again. This leads to universal truth number 4 – **The Universal Truth of Behaviour**.

"Consciousness creates an emotional cycle of behaviour – it can be interrupted, but never stopped."

As much as we'd like to, the real truth is that, most of the time, we can't consciously control how we value objects – even when our lives literally depend on it – and thus, we arrive at the final universal truth, which is the only one that really matters – **The Universal Truth of Consciousness**.

"We live and we die by the decisions we make, and we have no one to blame but ourselves."

The Formula for Human Consciousness

In the realm of consciousness, there are three general formulae which can be applied to any given situation that can express the three possible outcomes:

1) *a • b = ab, where ab = a • b* – This is what logic dictates. This is intelligence.
2) *a • b = c, where c = a • b • [i]* – This is illogical. This is consciousness.
3) *a • b • [i] = c, where c = a • b • [i]* – This is illogical. This, too, is consciousness.

For the above, the format for the equations is *{event}, where {reflection}*

The first expression is basic algebra – *a* multiplied by *b* must produce the logical result which is the result of *a* and *b* together. The second and third, however, produce *c*, which, while a product of *a* and *b*, does not have to be a logical one. The reason for this, which is also the difference between the two illogical expressions, is the presence of *[i]*. While *a* and *b* represent the premises, *[i]* represents the wild cards which are values, hence why it isn't at all present in the first. In the second, *[i]* is not present in the event, but is in the reflection, while in the third it is present in both, and this was done to show that we don't always initially know why an illogical event occurred, but, upon reflection, we can always see 'how' and 'why' when we start to ask those questions.

The 'Not-So-Hard" Problems

I am going to kill four birds with one stone here:

1. Subjective Experience
2. Mind-Body Problem
3. States of Objects
4. Singular Reality

There's this idea that reality isn't 'real', but figments of our imaginations, hence why multiple people can have the same interaction with the same object but have a difference experience, such as one person liking the taste of lemons and another hating them.

This is entirely wrong.

No object has multiple states, in the sense that an object itself is different depending on who is looking at it – they simply exist as-is for everyone. The 'how' of subjective experience is actually very basic biology, and it all starts with your biological parents...

- So, mummy and daddy give each other a special hug (or, you know, a doctor goes on an adventure with a turkey baster, catheter, or whatever other tools they may use) and, when lucky enough, a baby begins to develop.
- Along with the rest of the baby, the brain and the sensory receptors develop. Now, due to DNA specific to humans, both of these are designed to develop in very specific ways, and the code is followed as best as it can be.
- Then your mother comes along and interferes with the process (as they do). Nutrients are required for development, but everyone's body is different and so are their diets, so the quantity of any nutrient that reaches a foetus at any given stage of development will differ for everyone, as it depends on both the initial intake quantity and the quantity consumed by the mother's body before any reach the child. The quantity that does reach the child at any given point in the development affects how well what those nutrients are used for at that specific point in time actually develops, as well as the final development quality.
- There are also downsides to consumption. Not everything is useful, hence why consuming anything harmful in general – drugs, alcohol – and anything not good for kids, such as caffeine, as well as not consuming enough of the correct nutrients required, and even overdosing on some, can have adverse effects on the finished product.
- Last of all, development wise, is the fact that, due to DNA, people have different nutritional requirements and responses – even in the womb – so what is acceptable for one foetus could be deadly for another.
- With all of the above taken into consideration, the number of possible total development variations is too large to ever explicitly state – saying it is "infinite" would be adequate. This is the basis for subjective experiences. Now we focus on the senses and the brain.
- So, we now have sensory receptors of one person that have an essentially impossible chance of being exactly identical to anybody else. Dealing with individual receptor types, they will generally be very similar for the majority of people (thanks to DNA) with the minority having a group of significant difference, but even the slightest difference causes a different reaction to the incoming data received. Using taste, for example, minor variations in taste receptors between two people could see them eat the same food and have their receptors stimulated very little, with the receptors of one stimulated a little more than the receptors of the other, and then a third person could come along, eat the same food, and yet their receptors become erratically stimulated. The way in which any receptor is stimulated affects the information it creates and sends to the brain.
- Then the brain comes into play, and any variations in neuron development will cause them to decode the information received from sensory receptors differently. For the majority, the

differences are small enough for there to be a general acceptance of perception and experience (such as lemons being sour), but you'll have the minority of oddballs who have a difference experience which isn't considered the norm – people like me who find lemons great (with or without tequila).

- Because both the sensory receptors and neurons differ, two people can have exactly the same sensory input, but have their brains decode the information differently, or have two completely different sensory inputs, but have their brains produce the same result, and the perception of colour is a perfect example of this happening. Light of a specific wavelength can be shone into the eyes of two people – one perceives it as red, but the other as green. The input is exactly the same, but the perception has differed. We can then shine two completely different wavelengths of light at each person, and yet they both see it as blue.
- The only way to then figure out who has the deficiency is by bringing in a load of other random people and determining what the general consensus of perception is. Deficiencies are relatively rare, so, in a room of 98 other people, most of them will see the same colours.
- It doesn't stop there, however, as the majority will still have differences between their neurons and receptors, so, though they may all see a specific wavelength as the colour blue, they may individually see it as different shades of blue, and it's all based on how their receptors and neurons developed.
- The last factor is neural paths between neurons. As with everything else, the neural map of one individual has an essentially impossible chance of being identical to anybody else's. There are also the differences in connection strengths between neurons. Oh, and the precise storage location of any engram. Put it all together and you get sensory memories of objects that, when required, cause data to be sent from the corresponding cortex to another part of the brain, travelling different paths, through different neurons, facing obstacles of different degrees. Consider the colours red and blue. The engram of each is stored in a different neuron in the visual cortex. When stimulated, each tries to send an equal signal to the pleasure centre of the brain. The signals take different routes. Red signal has a continuous path of strong connections, while blue has a path of connections which alternate between strong and weak. Arriving at the destination, red signal is much stronger, so red creates a better experience than blue. Got it? Good.
- Now, using the above, consider the fact there's 100 billion neurons in the brain. Let's say half are memory neurons. Consider all the information it currently has stored, and then consider all the information you take in at any given moment – location, colours, shapes, words etc – and all the engrams that are stimulated by this information, the different paths taken by signals, and different connection strengths along any one signal's path. Then, consider this

for multiple people, all of whom have different neural maps, different receptor development and stimulation, and different neuron development and decoding. Now you understand how any one situation can be perceived in entirely different ways by different people, all due to how they initially developed *(and, for the sake of including it, how they develop as they grow, and any occurrences that could affect the brain or the senses, such as an accident of disease, yada yada yada)*.

And this, ladies and gentlemen, is how subjective experience is created. Nature provides the apparent randomness for our development, but we do have a say in the situation, so, whenever you experience something you don't like, blame your parents, and all the rest of your ancestors, because their DNA is to blame, too.

We can even compare this to the manufacturing process. We may produce products to all behave in the same way, but what happens when a faulty product is created, or a product malfunctions or degrades over time and they do not match the masses? They behave differently. You give them some form of input, they do something different to the others, and they produce a different output. We say they are broken because that isn't how they were designed to behave, but this is them having their own subjective reality. The objective reality is what all the correctly working ones experience – they literally complete the objective they were designed for in the way they were designed to do it, but if every single one of them was produced to behave differently to all the rest so that no two were ever the same, an objective reality could not exist because every processing function and output, even if the end result was the same, would be specific to any individual product in question. Subjective reality is purely the creation of processing components that do not behave precisely the same across all individual bodies of any one type of object.

Relating this to the mind-body problem, the mind and the body are two parts of a single system – there is no duality whatsoever. The body is the means to physically interact with the physical world, and the mind is nothing more than the collective functionality of neurons in the brain working together, using new and old information to create even more new information, in the exact same way a keyboard and mouse are required for data input on a computer (physical sensory receptors), and the CPU is responsible for handling the input (physical neurons), but it's the actual OS/programs/software (mental mind) that does something with the data received. In both computers and beings, the physical and the mental are useless if the other doesn't exist.

The Systematic Chain of Failure

The current definitions of consciousness will never prove true because they do not make sense. Ironically, they are illogical, so I guess consciousness is a gift and a case because it is what allows many people to be the morons that they are. Still, if consciousness is supposed to make us who we are, what does that have to do with awareness? Awareness is simply an ability granted by the fact we have sensory receptors that react to different types of stimuli in different ways, and neurons that are able to process the incoming information. Intelligent machines can be made aware of themselves and their environments, but they still act exactly like a robot, and hey, guess what? Computers have been doing this for... decades now? Some may argue that it's about how one sees the world around them, but that is only perception and interpretation.

So, you want to know the order of the chain of people responsible for such monumental fuck ups? **Philosophers** – having no idea what they're talking about – who are guiding **scientists** – with no idea what they are looking for – who are educating **technologists** – who have no idea what on earth they actually need to build in the end. It's a marathon and everybody thinks they must be nearing the finish line by now, yet, by simply playing a game of follow the leader (as is *always* the case in science), everybody turned left when they should've gone right, assuming the person in front knows what they're doing, and nobody has noticed they're on a road to a cliff's edge.

Descartes famously created the philosophical proposition "I think, therefore I am". Since then, philosophers have applied this to the theory of consciousness, stating that the ability to acknowledge your own existence is proof of consciousness. This follows the current definition of consciousness but, again, this cannot be true. Then, someone, somewhere, who I can't name because I didn't even care to find out whom, decided to expand it to include awareness in general. Philosophers – like many a physicist – get *way* too much recognition and applause for what is basically the perception of them being an "original thinker", without them actually needing to prove their work. A hundred people, a hundred definitions, not one morsel of a solid explanation or demonstration, but they all think they're onto something – what god damn use is that?

Then we have these really bat-shit crazy physicists who want to link Quantum Mechanics with consciousness, stating that it must be a root cause, and that matter can no longer be thought of in the way we have been doing so. Matter is as it has always been – a building block. Depending on how it is put together, it can create many a different type of object with properties unique to it, and living cells just happens to be one of them. After all, something had to make use of the vast array of information carried by light photons, right? Yet still, if we pull a single oxygen atom out of a living cell and observe them both individually, do we not still see the cell acting as it should, and the oxygen atom doing nothing but existing as a single atomic particle? If not, then please, have the atom **choose** to do something that isn't simply reactionary, and I will be sure to concede defeat.

Remember the film "Minority Report"? Around 22-23 minutes in, there is a scene discussing the predetermination of whether or not the ball was going to drop, and the fundamental paradox of something not being the future if we stop it. You know how we can tell that objects such as that ball aren't conscious? It has no values and no decision making abilities, so whatever happened next was determined by physics, not the ball itself. When compared to conscious humans who are apparently going to commit crimes, said humans can stop themselves anywhere up until the point where they actually do it because consciousness gives us the tools to change our minds and govern our own actions – at any point. This is even a point made in the film. We aren't guided by physics in our actions, but by our own minds, and the laws of physics only limit what we are capable of. Forget what Guilio Tononi has stated in Integrated Information Theory – there is no way in hell that you are going to tell me that a ball, a table, or a toaster has any degree of consciousness, let alone show and prove it. They do not. To any degree. At any time. During any season. I genuinely don't know which is the greater scientific evil when the only two options are Relativity and IIT.

Listen here, kiddies – stop introducing philosophy into science. This is the reason the mystery of consciousness has prevailed for so long. It's the same type of waffle that has held back physics. How can someone think they are smart enough to come up with a viable theory, but then not be smart enough to prove it? Geniuses, like Tesla, who can and have actually proven their work and themselves worthy, are continuously ignored in favour of crackpots who can't when they disagree with their make-believe universe – I don't even understand how this is possible. Science is becoming the reality show of academia, where people who haven't actually succeeded in anything are becoming famous and iconic. I have more respect for the Kardashians than the people I speak of now, and I can't even begin to describe how much I detest that family. I just want to put many a physicist and philosopher in a bag and hit them baseball bats until my shoulders break.

It's so easy to hide falsehoods in complication because of the psychology of the human mind.It all comes down to ego, belief, and classism, which leads to the creation of work that people accept must be true because it is too hard to understand. In the Sherlock television series, Benedict Cumberbatch stated that the frailty of genius is that it needs an audience, and this is true, but the darker side to that is in the frailty of the audience who are often too keen to accept something as true simply because it sounds as if it has a high degree of intellectual requirement attached to it. Maths equations, big words, a science degree – they're willing to overlook common sense the moment their minds become aware of any such attachment, and, due to most people not being confrontational, even the ones who know it doesn't make sense tend to shy away rather than calling people out.

Ultimately, the blame falls upon everyone who has ever supported this or created any relative work – not because they didn't actually solve the mystery of consciousness, but because they overlooked the blinding flaws of the current definition so much that they didn't even bother heading in a different direction to see what they may possibly discover. Life tip: being an original thinker doesn't mean you are smart or make sense – stupid people say unique things all the time. It doesn't mean you are logical. Most of these people have PhDs and don't deserve them, making them worth about as much as the paper they're printed on.

My Theory of Consciousness

So, what exactly is consciousness? In one word? Freedom. Two words? Free will. A sentence? The freedom to do what one wants. In short? The ability to knowingly deviate from a purpose – your purpose, as a species.

Consciousness is a general ability that results in making a being who they are individually. It controls their personality and their actions. It is illogical decisions that separate us from the not conscious and the merely intelligent. On the surface, it enables the mental freedom to do what you like, but delve much deeper and it is a self-targeting weapons system of the mind.

Until something is able to do what it wants, freely, that isn't towards its raison d'être, it isn't conscious, and when it can, whether or not it chooses to do so irrelevant. Once you remove the ability to make illogical choices, it is just an intelligent machine – a computer that can only do the logical – designed to learn and get better without deviation. It's living a life of ones and zeros, regardless of what it is made of.

Oscar Wilde made a statement that not only became one of, if not his most famous saying, that was closer to the spirit of what consciousness is than possibly anything else to date.

"To live is the rarest thing in the world. Most people exist, that is all."

One interpretation of this is that most people, for various reasons, can only afford to do what is necessary to survive – work, eat, sleep and repeat – with a minor margin of acceptance for recreational activities. Their lives are "robotic" – they do the same thing over and over again. It is few people that can afford the freedom to spend their days as they wish, hence why the wealthy are often envied.

The reason I put this theory forward is because of how solid it is. I didn't create a theory which I then worked towards, nor did I start a problem which I then aimed to solve. There wasn't an end before there was a beginning, only an objective – define consciousness. I started from scratch and moved forward based on what I was able to observe, comprehend, and conceive, based entirely on the logic of systems and nature. Given every aspect of what makes a person who they are – their likes and dislikes, what they do, why they do it, how they do it, how they feel and so on – this is the sole logical way, at least from every angle from which I have examined it and run logic scenarios, for every piece of the puzzle to fall into place without discrepancy.

I am 99.9̲% sure that my theory of consciousness is correct, or, at the very least, accurately reflects real world events. I can accept that there is some wiggle room when it comes to explanations for workings of the brain, such as memory, but I'm still at least 90% sure that most, if not all, of what I state is correct. Nevertheless, I haven't created a real life human brain using these methods, so this is all still just theoretical. What I can say with absolute certainty is that if this can't be used to create *the* human brain, it can be used to create the *equivalent* of a human brain, featuring the exact same processes and outcomes, even if the methods differ. The worst part of all is that this isn't even the most efficient or effective way for a brain to operate. As much credit as I do give nature for its general efficiency, there is still a lot more it could have done to improve the process. I guess evolution just takes too long. Utter laziness. Either way, both can – and will – be proven using artificial intelligence.

I question a lot of what I read about the human mind for the fact that most of it doesn't make any sense – some things individually and some in the grand scheme of things. I know nature and evolution isn't perfect, but we have evidence that nature is a lot better than many of the theories currently standing suggest. I also do not think we'll ever come close to understanding the human brain by studying the brains of rodents – or any other animal ,for that matter. We are beyond the capabilities of them all and *way* beyond the capabilities of most. Confirmation bias, whether intentional or not, plays too big a part in it all.

To the neuroscientists of the world, I can tell you this. No single part of the brain controls consciousness – it's a collective effort. However, the single part of the brain that actually enables consciousness is the part that we use to manually calculate decisions, and it will be found on the MCS circuit. Without this particular collection of neurons, we will still be able to automatically function using the ACS circuit because the other connections will still exist, but we would be entirely at the mercy of the subconscious mind, very much like when we are asleep. Some people may sleep walk and sleep talk and we would still be able to dream and our dreams would still be able to make us feel fear and happiness, but we would be useless because we haven't developed to operate in a robotic manner, so our subconscious mind still relies heavily on what we consciously perceive and do to be significantly useful. So, while damage to other parts of the brain can have an impact on changes a person may experience – if any – there *is* a sole area of the brain that *will* totally wipe out consciousness if damaged or removed, but you may not even be able to tell.

Even with my definition, determining consciousness won't always be simple – in fact, it will likely continue to be as difficult, and here's why:

> Imagine a conscious species of parasite – we'll call them sprites – that feed on human blood and whose operations are rather robotic – find a host, feed, breed – very simple. Each individual sprite has a blood type it prefers to consume and each blood type has a different, single nutritional value. With only eight human blood types, in a group of one hundred sprites you are guaranteed to find exact duplicates. How easy would it then be to determine consciousness in a species where there is such little differentiation between individuals? How would we know that any actions are based on personal preference and not different requirements based on conditions unbeknownst to us? How do we tell the difference between a conscious and not conscious example of such a simple being? It wouldn't be impossible, but a great deal of studying and testing would be required. Humans, on the other hand, are far too complex for such an issue to arise. The list of options of possible values that any one human can have and act upon is so extensive that there are, essentially, an infinite number of combinations. Studying one hundred humans to the point where all their values are known, it would be virtually impossible to find two or more that are a perfect match.

On the upper end of the intelligence scale, such determinations are easy to make because it takes no effort to see the differences between individuals, due to the complexity of the brain and the freedom of choice it allows us to perceive, but, the further down the scale you move, the more difficult it inevitably becomes, as we encounter beings with simpler brains, simpler minds and the perception of fewer options, right down to the point where an organism does nothing more than attempt to stay alive long enough to reproduce.

It is likely that there will always be some features of the human brain never fully understood.
In all honesty, we should accept this, entirely for one reason:

Man is only God to a Machine

THE FRAMEWORK: TRUE AI

Now, we've reached the main event. There's a lot I could say, but I'm just going to give you the basic run down of how things need to be. Let's not waste any more time. Enjoy.

Oh, for legal reasons, I must say this: Any visual imagery that follows is purely to help the reader gain a better understanding of what is going on. Unless specified, a drawing is not to be taken as a literal depiction of how something should look or be assembled.

The Algorithm

The first thing we need to do is remember the value tables discussed in the section "The Primary System: Values". This is what is used to control the state at any given time. The objective is to take the current state of a mind, calculate the state changes caused by current objects, and then work out the new state of a mind. From there, we can do whatever we want.

Conscious Decision Making

So, an example of the type of algorithm we use for this is:

$$+\Omega = Q?(D((E(R([S_i, \ldots] \circ ([S_i, \ldots] + \{C\pm [V((T \pm O_{i,}\ \text{where}\ O = V_{r,c}) \ / \ N)_i, \ldots]\})))) \swarrow E^x))$$

It's written in shorthand at some points for reasons that will become obvious. The "+" symbol next to the "Ω" is indicative of control factors being present.

It works like this (colour coded for your benefit... and mine):

- For each value column container:
    a. For this value column, calculate the total collective ranks of objects perceived. Then, because this is a conscious process, any perceived object can be removed, and any object not perceived but present in this column can be included – for whatever reason. This is "free will" – the ability to acknowledge or ignore whatever one chooses for any reason one chooses, or for no reason at all. Then, calculate the overall total rank based on objects added/removed. "T" is the initial total," O_i" is representative of object instances that are added/removed, and the phrase "where $O = V_{r,c}$" means the objects added/removed must be found within a row (r) and column (c) rank of this value (V).
    b. Divide the sum of the overall total rank by the total number of objects remaining. This method ensures you can't exceed the maximum possible value rank/level,

though other methods can be used, such as setting a limitation for the maximum value.

- Compare opposing value rank numbers, calculate the difference, and then change the higher of the two to the difference as a positive number, and the lower to the difference as a negative number. If equal, change both to zero to cancel each other out. This is necessary to prevent errors in the next step, where we change the actual state based on these numbers. We don't want opposing values to both be increased – it wouldn't make sense for a state change to show an increase in levels of both happiness and anger, for example – so we need to ensure that one decreases as the other increases. So, when doing the comparison, if rules are set to have 'happy' and 'angry' as opposing states, and the ranks of objects perceived for both of those are equal, an equal increase in both happiness and anger shouldn't be possible, so we cancel both out. If, however, the rank for 'happy' is 10 and the rank for 'angry' is 4, the difference is 6, so we change 'happy' to 6 and 'angry' to -6.
- Add the new ranks array to a copy of the existing state levels array for each corresponding value. So, for example:
    a. Values: Happy, Bored, Angry.
    b. Current state levels array: [10, 3, 4]
    c. New ranks array: [6, 3, -6]
    d. Resulting array: [16, 6 , -2]

  Now we split the difference between the current levels array and the resulting array to get the new current state levels array. The above example would produce [13, 4.5, 1]. There are two reasons for doing this:
    1. It's a simple method of ensuring values go up and down as necessary. As you can see, 'angry' went down as the opposing state 'happy' went up.
    2. As a preventative measure to ensure the current level of any one value doesn't skyrocket unless an extreme situation makes it absolutely necessary.

  The resulting change of state could still end up with opposing values on equal levels, and that is perfect, because this creates internal conflict which is part of consciousness and perfectly sets us up for the rest of the logic.
- Use the levels of the new current state to determine the required type of reaction, where the reaction is based on the dominance of each value, and the values with the most dominant current level(s) having the most influential impact.
- Evaluate the reaction to determine a potential outcome.

- Once an evaluation is made, loop back to the beginning of the evaluation process. Why? It allows different potential outcomes to be determined. This can be done as many times as desired.
- Once a list of potential outcomes has been created, decide whether or not said reaction is worth performing.
- If the answer to the above is yes, communicate said reaction. If the answer is no, don't.

There's probably a much more elegant way to write this... but I hate maths, so I don't care. It works; I'm good. Anyway, mechanics for this can be done numerous ways, but what's important is that your mechanics can move levels of the current state up and down when necessary. Everything else is really up to you. Don't worry, I put this into a much simpler form when we get to the architecture.

Subconscious Decision Making

This algorithm has some very significant differences compared to the one above, based on the nature of subconscious decisions.

$$-\Omega = R([S_i, \ldots] \circ ([S_i, \ldots] + \{C\pm [V((T) / N)_i, \ldots]\}))$$

Given that there can be no control factors in a subconscious decision (hence the "-" next to the "Ω"), the differences are:

- Objects cannot be added/removed.
- Reactions cannot be evaluated for potential outcomes.
- An evaluation loop cannot be performed.
- No decision can be made. The action <u>must</u> be executed.

To put it simply, it perceives, changes state, and reacts... and there's nothing that can be done to interfere with the process.

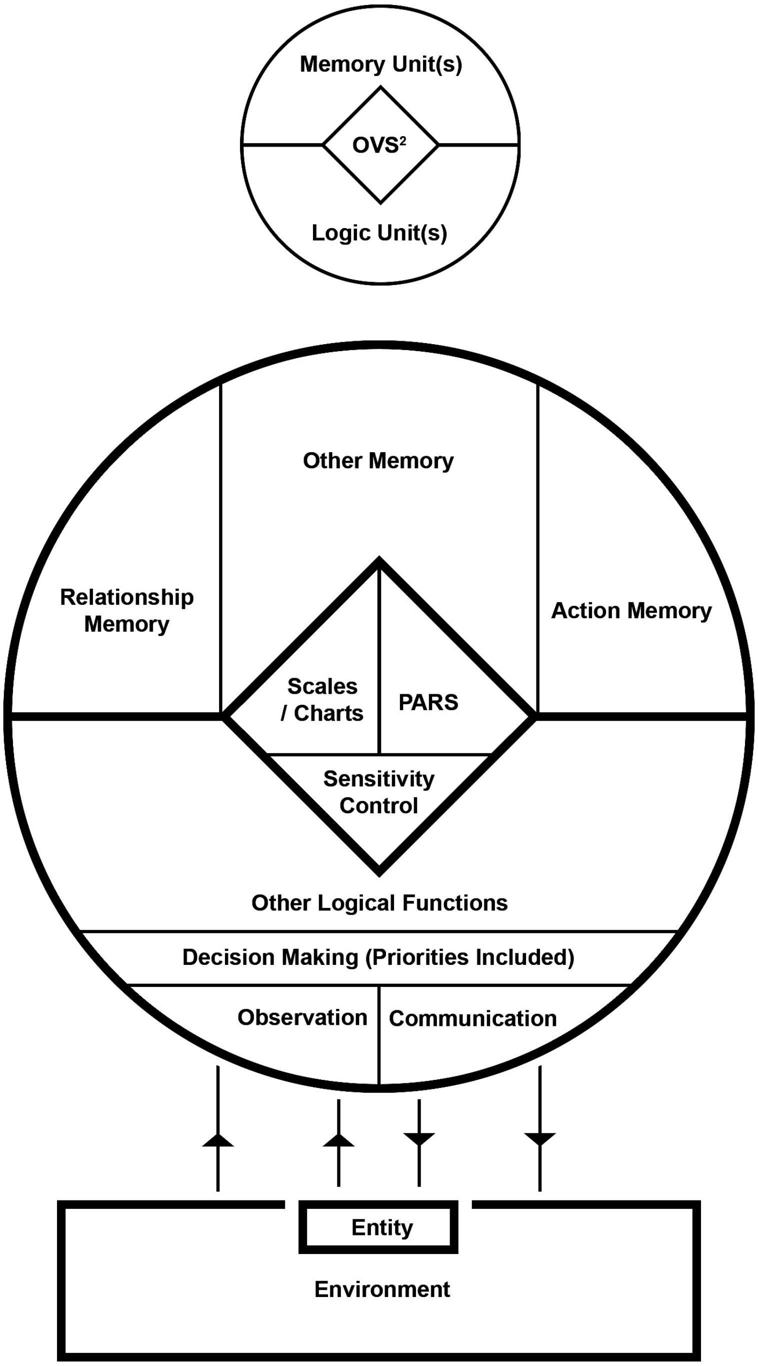
Sensitivity

We can also include sensitivity in the algorithm for dynamicity, but it should be either the first action, so the effects are taken into account during the same run, or after the change of state, so that things don't all of a sudden take an unscheduled turn.

An example of it happening prior to the execution of the rest during the conscious decision making process could look something like this:

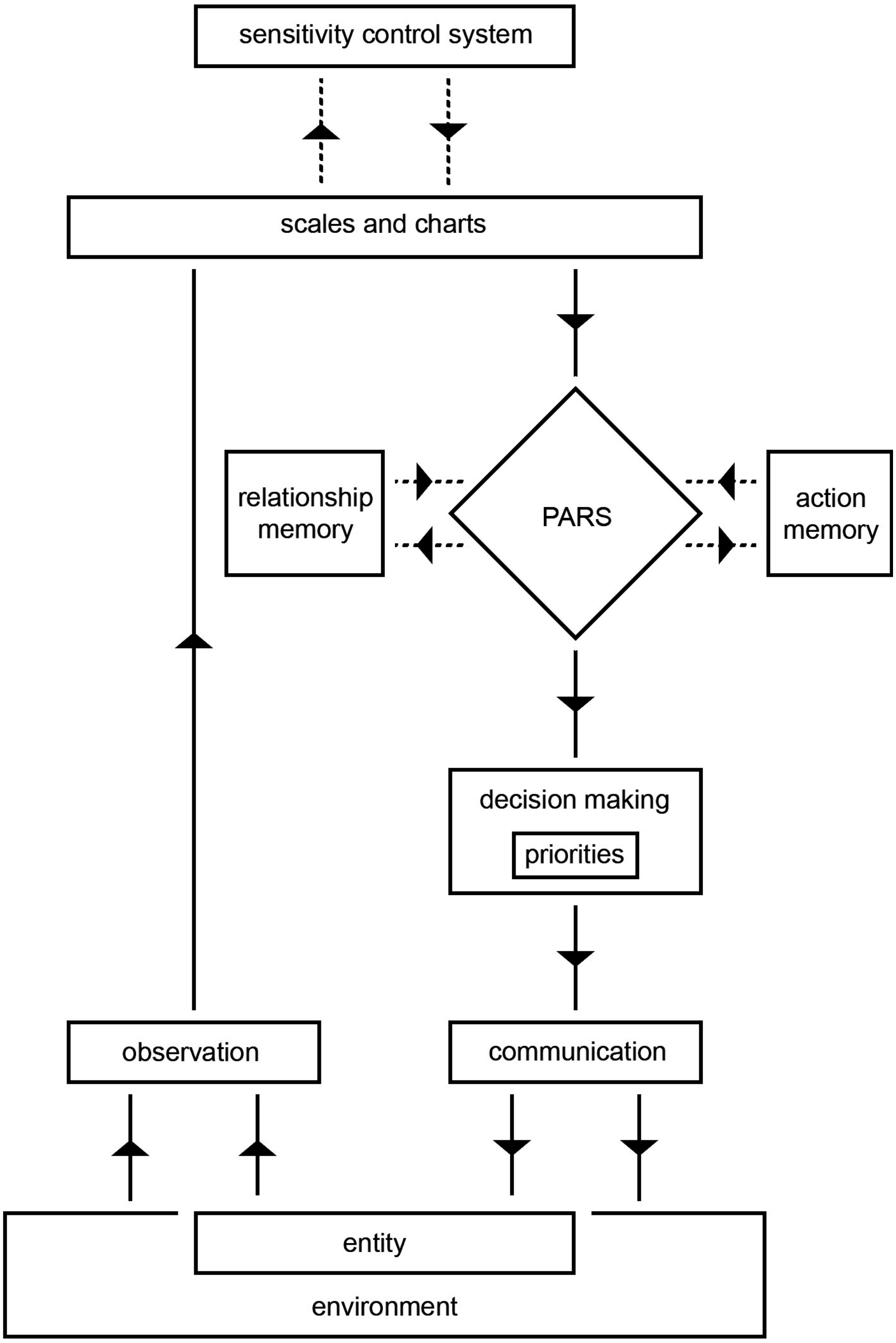
$$+\Omega = Q?(D((E(R([S_i, \ldots] \circ ([S_i, \ldots] + \{C\pm [V((T \pm O_i, \text{ where } O = V_{r,c}(\pm SO_i)) / N)_i, \ldots]\})))) \swarrow E^x))$$

The Unit

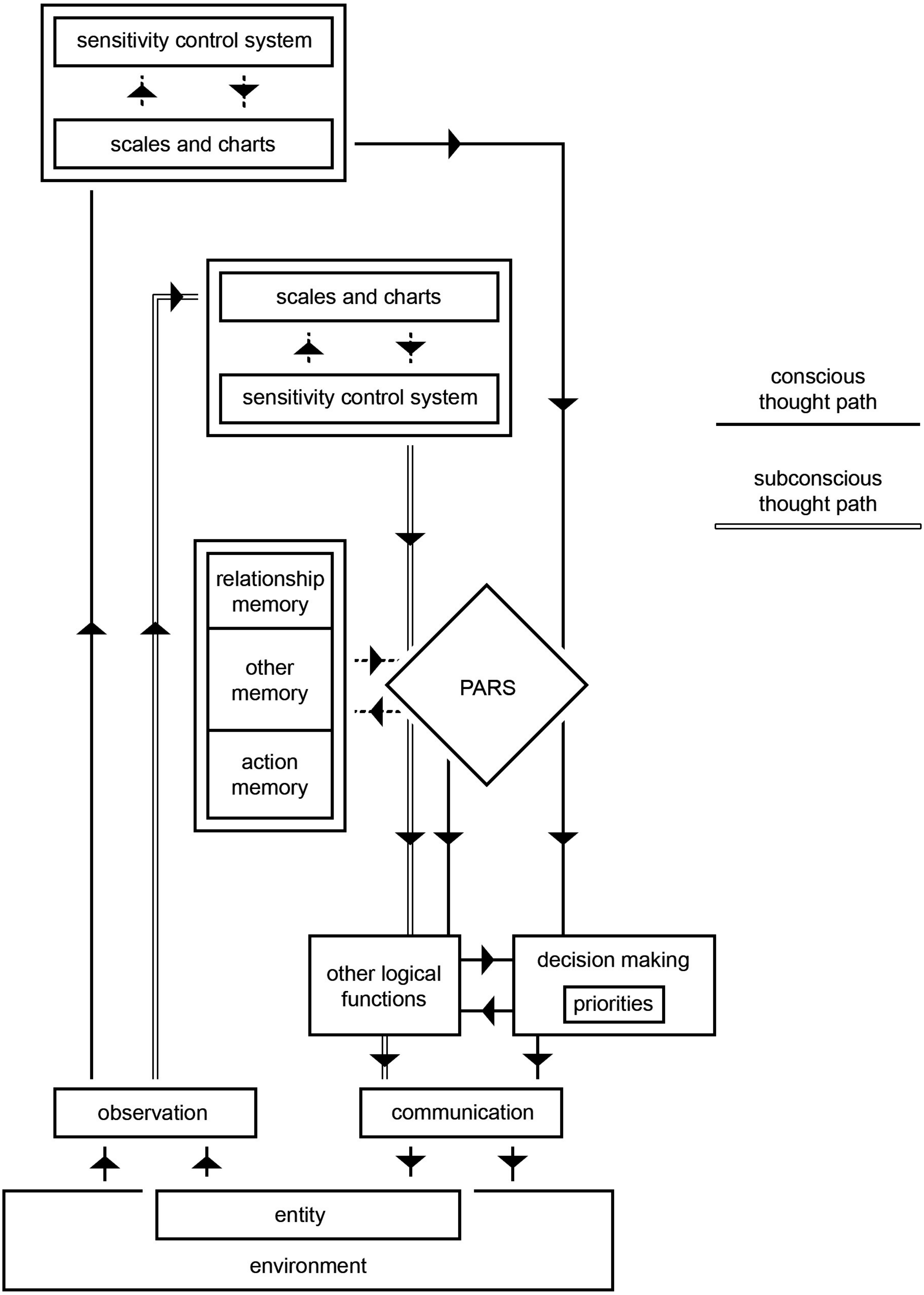


This is a diagram of the three required components for the creation of the conscious mind in a machine – the memory units, the logic units, and the OVS^2 – Object, Value, and Sensation System. The actual sections of each may vary, depending on your desire. You'll also notice that boxes marked "Entity" and "Environment". These were included because they are very important for specific aspects of it all. We'll look at everything in detail as we continue.

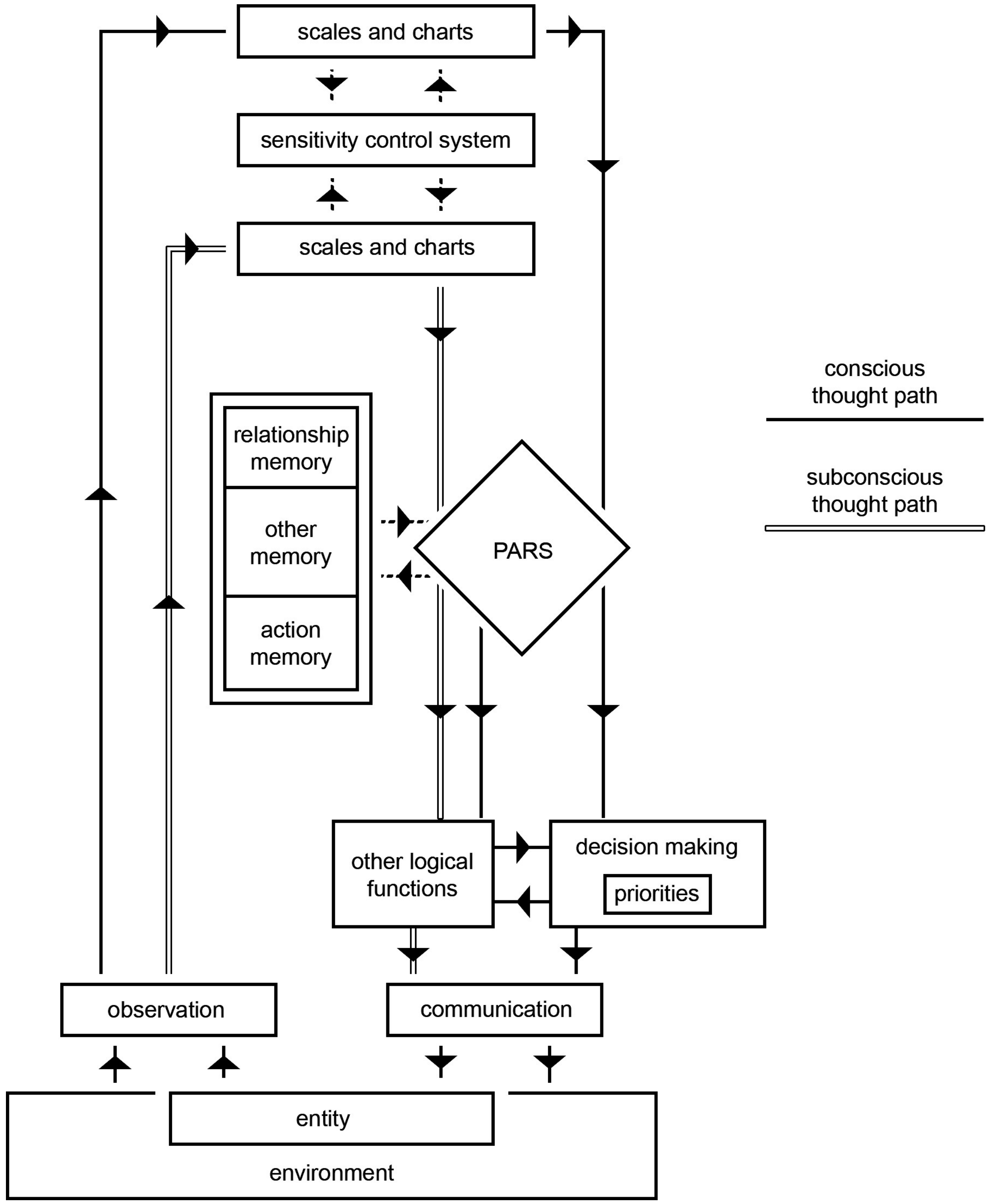
The Flow



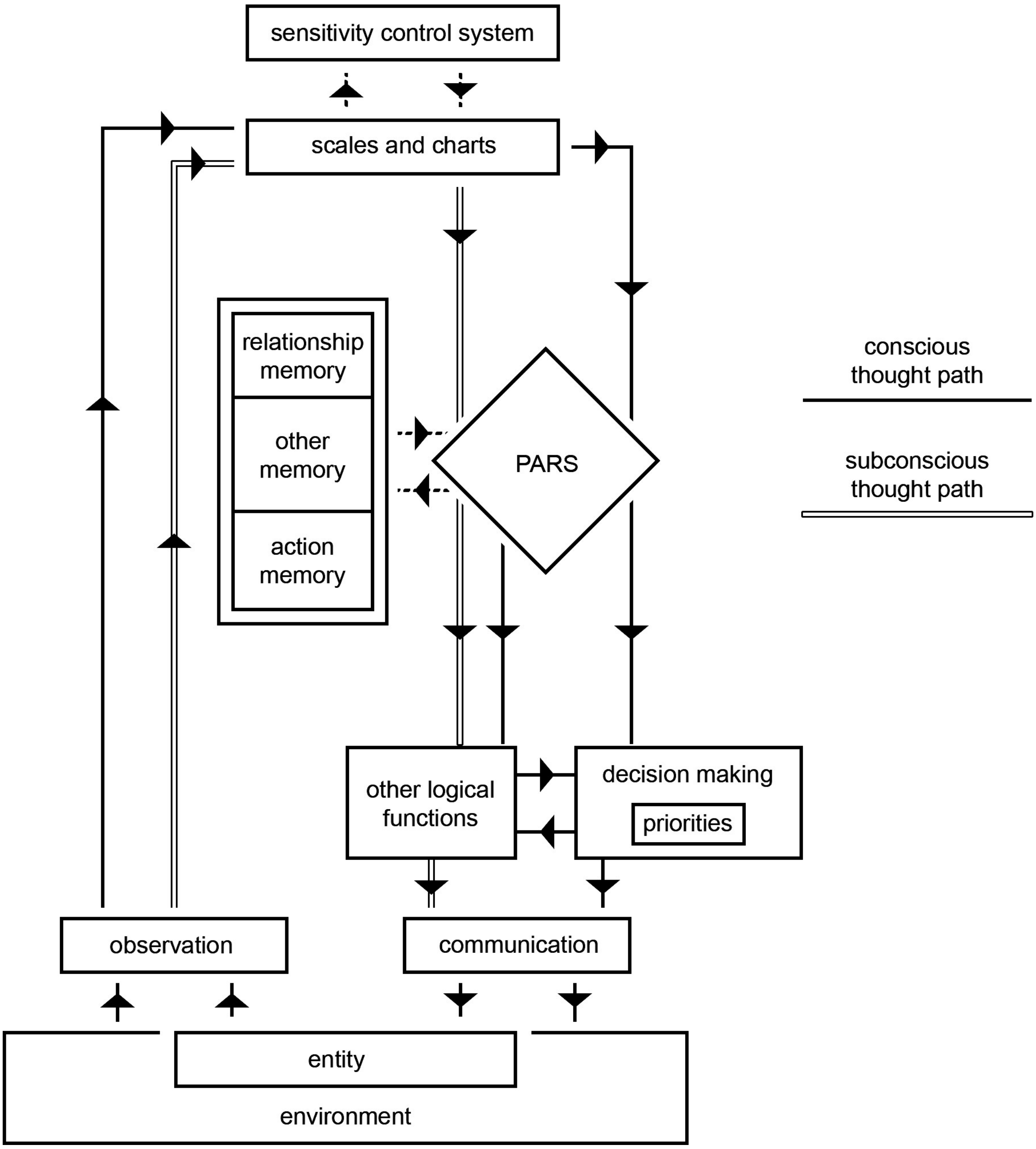
This was the first flow setup I designed, but it's far inferior to the next one I'll show you, so pretty much a waste of time. Good starting point, though.



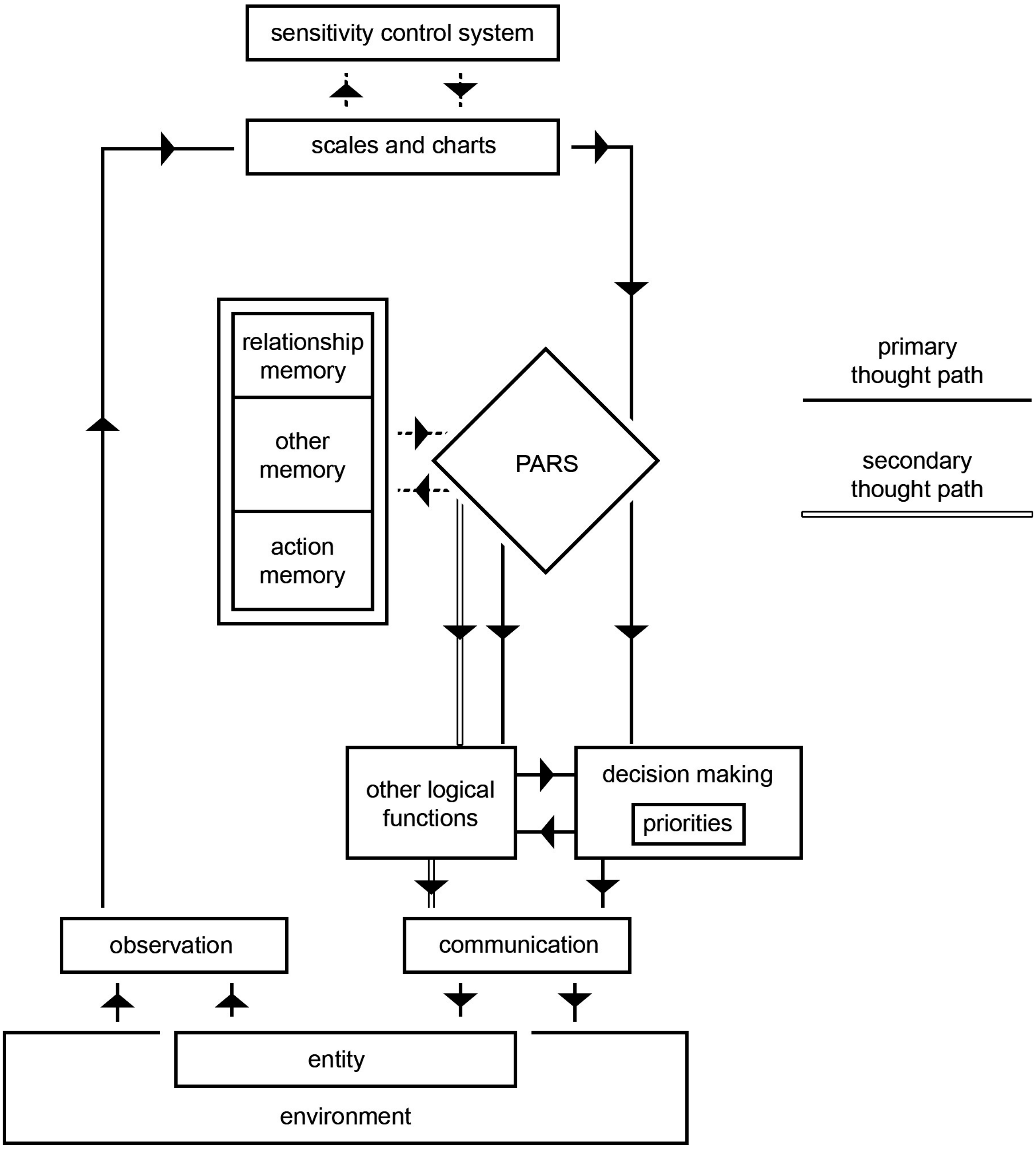
This is the real beast, and it comes in multiple variations. This one – the original – has two thought paths – which are simply individual data transfer routes – and separate scales and charts (SAC) and sensitivity control systems (SCS) per path, and it provides the greatest degree of freedom when it comes to both development and autonomous behaviour.



This variation uses a single SCS operating across both thought paths, meaning a machine will be exactly as sensitive to conscious data as it is to subconscious data, but can still behave differently subconsciously compared to its conscious behaviour.



This variation is the most restrictive. Given that both data paths use a single SAC and SCS, conscious and subconscious behaviour will be exactly the same. Very boring and my least favourite, but it gets the job done.

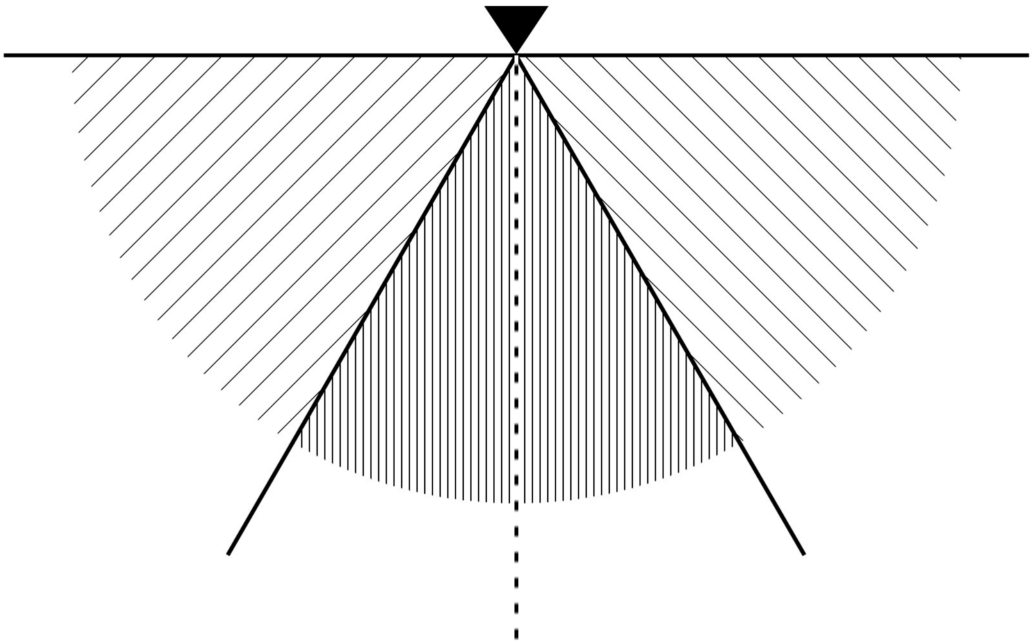


Don't do this. It is stupid.

The Conscious Versus The Subconscious

The first thing to do is separate observed data into consciously and subconsciously observed data, and have them travel down the corresponding data routes. This is achieved by implementing rules based on specific conditions surrounding how the data was acquired.

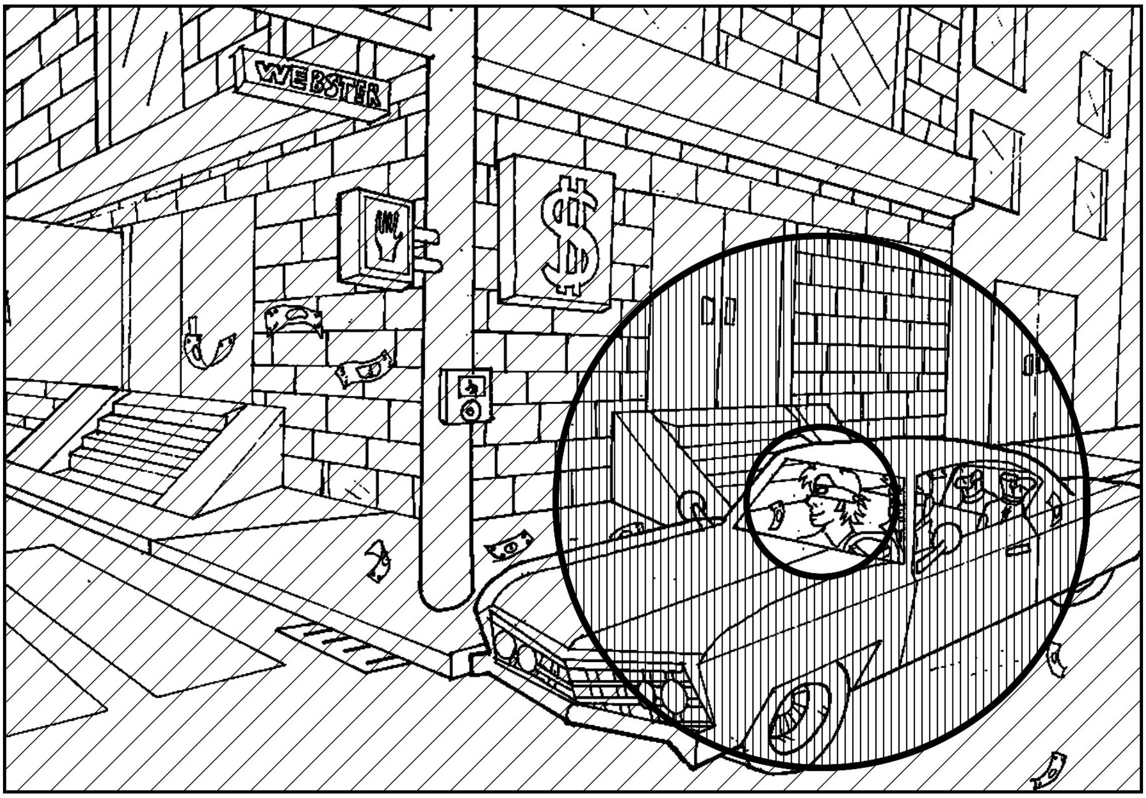
It's best to explain the principle first, using an example. When it comes to data observed by sight, a perception range could be used to determine the classification of incoming data, and it could look something like this:



Any range needs to be divided into at least two different types of parts, but the above has three because it better reflects real life:

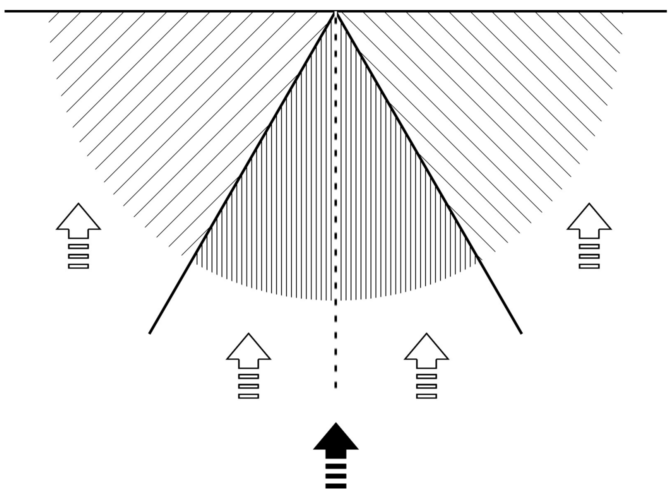
- Main Point of Focus (MPoF): What is actually being looked at – the object(s) of focus – represented by the central dashed line.
- Center of Focus (CoF): The area around the MPoF, represented by the closely-spaced lines.
- Peripheral Perception (PerP): The area outside of the CoF but still within the perception range, represented by the widely-spaced lines.

We then apply this to a physical landscape:

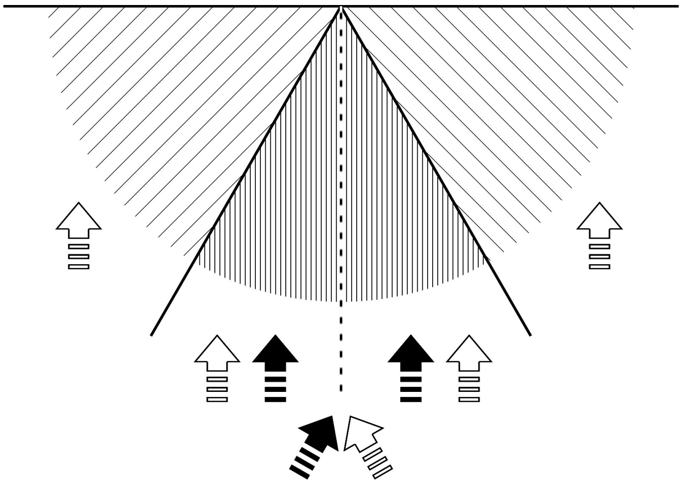


In the above image, we can see the MPoF is the robber in the car, the CoF covers most of the car and part of the building directly behind it, and the PerP is everything else. All of this information is being taken in by a lens, and then, depending on where within the lens' viewport each part of what can be seen is positioned, it is classified and sent down the corresponding path.

How one chooses to have the data sorted based on the perception scale is entirely up to them. Where black arrows represent conscious data intake, and white arrows represent subconscious data intake, common sense would dictate something like this:

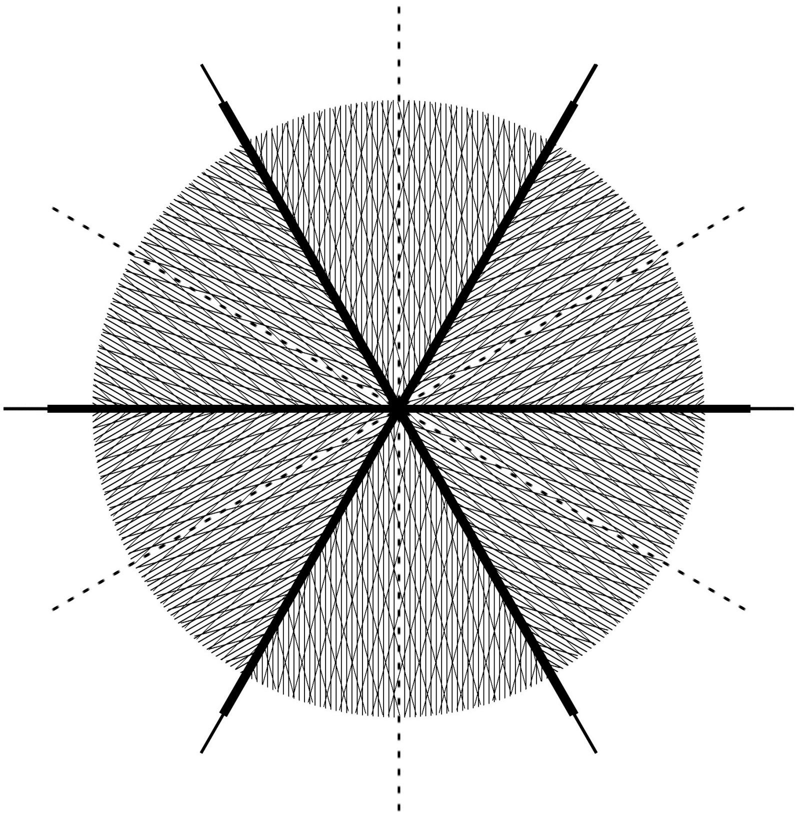


Or like this:



The obvious arrangement sees the MPoF always pulling in data classed as consciously observed, the PerP always pulling in data classed as subconsciously observed, and the CoF pulling in one or both types, but anyone can really do it any way they want. They only need to set the rulings for classification for each section.

If someone really wanted to be ludicrous, they could even have multiple overlapping lenses, and create a freak show like this:



This would make it possible for all data to be consciously observed, if one so chose, but where would the fun be in that? Still, upon reading, the machine vision industry is about to get a lot more fun, no?

So, the principle to understand is that the degree of focus is the determining factor between consciously and subconsciously observed data. Conscious data is that which is being focused on, and subconscious data is data which is still taken in, but isn't done so by being the point of focus. It's like when you are having a conversation with someone, but, from the corner of your eye, see something approaching your head fast – a situation common in any school playground where football is being played. Before you have any time to think, you react and try to dodge the incoming ball. Both the observation and reactions are controlled by the subconscious mind, which is why they happen while you were focusing on your conversation and before you even have a chance to consciously process what is happening.

We can then use this principle – the degree of focus – and apply it to any method of observation, and all we need to do is set the rules to either govern classification or determine the appropriate part of a perception range for incoming data to fall under:

- Hearing
    - MPoF – What is actually being listened to.
    - CoF – Distracting surrounding noise.
    - PerP – Other background noise.
- Distance – How far an object is from the AI. For example, foreground objects being classed as center of focus and distant objects being peripheral.
- Exposure Time – How long an AI is exposed to objects. For example, when listening to audio, the AI may need to be exposed to audio for X amount of time for it to be registered under CoF, while it only needs to be heard to be registered under PerP.
- Focus Time – How long an AI focuses on an object. For example, when scanning objects, only an object an AI focuses on for more than a minimum amount of time may be registered under CoF. This allows for objects that are skimmed past but not focused on to be classed as PerP.
- Interaction Time – How long an AI interacts with an object. For example, only an object an AI touches for a minimum amount of time may be registered under CoF. This allows for objects that are brushed past accidentally, in passing etc, to be classed as PerP.
- Importance – Multiple possible rules are available for this, including:

    1) how important an object is to the AI;

    2) how important it is to another entity; and

    3) how important it is to a task;

  with the important object(s) being center of focus.

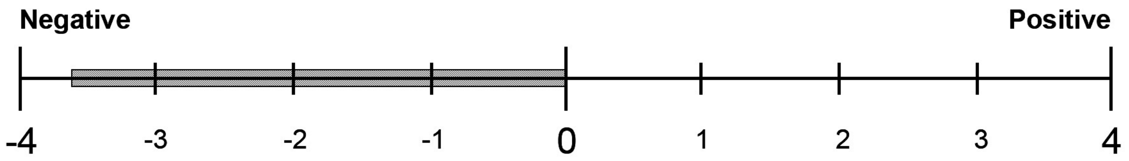
You get the picture. It's a good thing I invented those hyperbits – the amount of data that will need to be processed in any given moment could be astronomical. A 64-hyperbit octa-core processor with cores for each method of observation – more of which we'll explore later – will be an awesome beast for portable AI devices, but imagine the requirement for AI robots that operate equal to or beyond humans. Octa-core? Nah. Hecto? Kilo? Mega? Man, if we ever reach the stage where we require Giga-cores, I hope I'm alive to watch as machines make us their bitches.

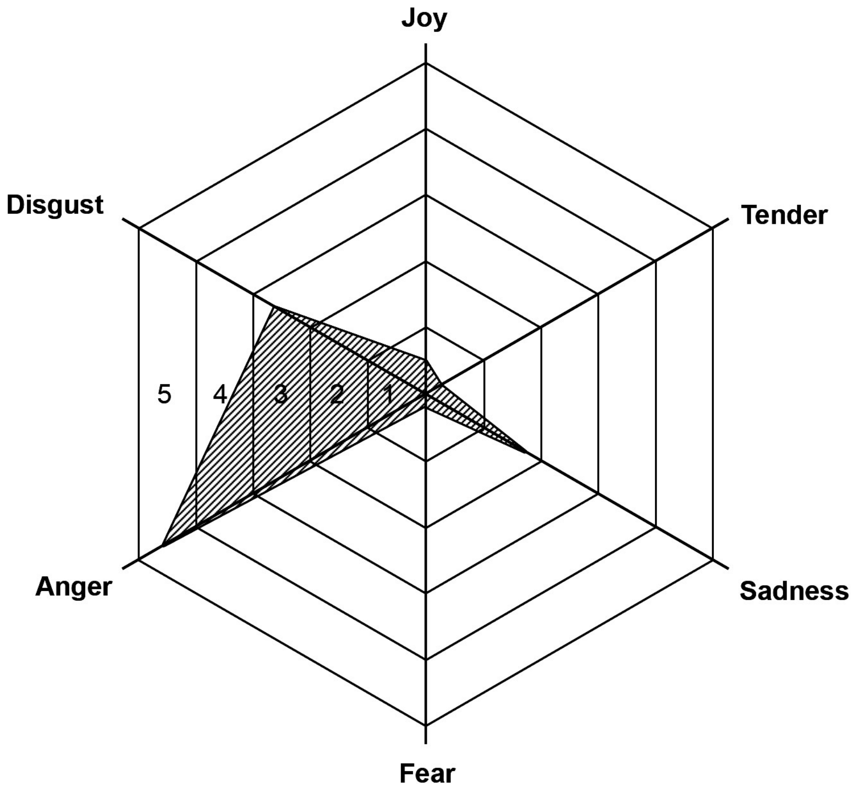
One last thing – autonomy. It's all good being able to feed an AI information to observe, but it gets pretty boring and pointless very fast. A key requirement for this is "intake" rather than "input". The AI needs the autonomy to freely take in information at will and of its own accord. It's the "i" of "IO" when dealing with true AI – Intake and Output. The ability to freely take in information keeps every other function of the AI mind functioning continuously, just as a brain does, even if the AI itself isn't doing anything at all, and it's a key part of what separates conscious AI from the "narrow" AI of the world today, which is only designed to work when needed (even if always needed) and with specific data it is being fed.

SACs – Personality, Emotions, Opinions, Morals, Ethics, and Goals

Negative **Positive**

Bad	Neutral	Good
Bad Object	Neutral Object	Good Object
Bad Object	Neutral Object	Good Object
Bad Object	Neutral Object	Good Object
BadObject	Neutral Object	Good Object
Bad Object	Neutral Object	Good Object
Bad Object	Neutral Object	Good Object





That which makes one who they are. This is the first part of the OVS[2]. Above, we have three different types of organisational charts (which are really just databases of information in a visual form – only one is actually needed) called SACs, which simply stands for Scales and Charts, within which to sort any and all objects an AI is to recognise, and I mean *any* objects of a physical or non-physical nature that can be perceived, including shapes, colours, images, sounds, words, substances, entities, signals etc. As previously explained, when the AI perceives an object, the scales adjust based on object position and calculation, and change the current levels which control the state of the AI. That's the boring aspect of all of this.

The fun part makes itself known when you want to make the AI behave in certain ways. See, giving it a personality, emotions, opinions, morals, ethics, and goals (PEOMEGs) isn't a case of writing statements of what it should and shouldn't do, or how it should and shouldn't be:

> *"Be happy."*
> *"Bring my laundry in."*
> *"Don't murder people."*

That wouldn't be consciousness. It wouldn't be freedom. That would simply be instruction sets. That would make these nothing more than intelligent machines with great natural language processing skills. PEOMEGs are given to an AI by strategically sorting objects into specific sections of any chart – that's it; it is literally that simple. The AI – just like humans – then operates based on what it values and how it values it. The only real instruction to give an AI at this point is which end(s) of the scale(s) it should aim to increase when it can, and which to decrease. Common convention would see this instruction set so that the AI moves towards all the positive ends of the spectrums, including all the positive emotions, and away from the negative ends, but what would happen if... let's say... murder ended up in the highest rank of the happy division, and the AI was feeling rather blue? Naturally, murder could be one of its pursuits to improve its mood, yes? 'Tis how serial killers work, no? *How very dangerous.*

The solution to the above is to control the degree of freedom an AI has by permanently fixing specific objects in specific positions, making it so they aren't susceptible to change under any circumstances. Let's make one thing *very* clear – <u>this is much harder than it sounds</u>. Due to the nature of language, semantics, and law, loopholes can be found and exploited – humans do it all the time, so imagine how quickly an AI can find technicalities with the right programming or the right conflict in a given situation.

SCS – Change Is Inevitable

This is the second part of the OVS^2. The Sensitivity Control System, responsible for the change in how an AI values an object. Remember the algorithm I showed you before?

• Object = w • Occurrences = o • Time = t • Acceptable Frequency Range = f

```
foreach (w){
        if ((o / t) > f^x){
                //move up X amount of degrees
        } else if ((o / t) = f){
                //do nothing
        } else if ((o / t) < f^x){
                //move down X amount of degrees
        }
}
```

As with humans, an algorithm like this can control the changing of object positions within the SACs, and it can be applied to a value table any which way you like – to the table as a whole, per column, per specified grouping, per individual section – but, for the best results and the most dynamic AI possible, each individual rank of a column should have its own sensitivity algorithm, and as many different Acceptable Frequency Range (AFR) values should be used as is necessary. Personally, I'd recommend either individual ranks having the same AFR, regardless of the value column, or having them *all* vary to create very unique personalities.

For anyone who has been able to put this together thus far, they'll notice that an algorithm like the one above only moves an object up and down by degree within a column, but what about when an object reaches the lowest possible rank of a value? There's a second part to this algorithm that I didn't explain before, and it's to do with the changing of value type, rather than just the object position. For basic scales, such as one with only a negative and positive end, the above algorithm can be used because if a positive value object continues moving down, it will end up in the negative section anyway, and vice versa, but for something more complicated, like a radar chart, additional conditional statements must be used to decide where to move it. They can be based on anything you like – opposing values, specific frequencies, the situation taking place at the time of the move which caused the move, etc – and multiple can be implemented if one so chooses. This all helps create a dynamic where predictability becomes almost impossible without specific knowledge of the current state, object positions, objects observed, and sensitivity values and conditions at any exact moment in time because, an hour from that moment, depending on what the AI has experienced, things could have changed, which could, in turn, change the outcome, which is generally the aim.

One interesting function which can be implemented is the ability for objects to change in value over time, without them needing to be observed. In the same way humans feel differently about some things when experiencing them again after a period of time, the same can be done here. There's no limitation for this whatsoever, so you can set the algorithm to run whenever and however you wish. Objects can also be given default positions that they are set to return to.

Individuality: Randomisation

The previous two sections have been imperative for the goal of "individuality" and subjective experience, but there is one more very specific factor – randomisation is key. Nature provides the randomness for each of our own development, but that isn't usually the case with machines. They usually all come with the same individual programming or run off the same brain server, which defeats what we're trying to do.

During creation, two instances of randomisation should be performed:

- Objects – During the placing of objects, some non-fixed objects should be randomized. The most effective way to do this, given the immense number of objects any one AI will have stored, is to first sort objects into relative groups – colours, animals, whatever – and then randomly distribute them as groups. Some things really shouldn't be randomized – you don't want an AI going ape-shit every time it comes across a table.
- Sensitivity – Randomize the occurrence, time, and AFR figures for the algorithms. Keep these within a min/max range so that:
  - It isn't stupidly low, producing AI so erratic and wild that it could do anything at any moment; and
  - It isn't stupidly high, producing an AI that essentially never changes.

It's okay to set min/max limits or distribution boundaries if you feel you need to, but there must be enough differences for a significantly large number of possibilities, which isn't actually difficult at all.

(P)roductivity (A)nd (R)eaction (S)ystem

The final part of the OVS[2]. As the name suggests, this system controls how an AI behaves. There are three ways in which the PARS can operate:

1. Based on the current state of the AI;
2. Based on the objects of the current event being experienced; or
3. Both of the above.

First of all, we need to create a range of preset actions and behaviours (because AI doesn't undergo evolution... *yet*), and then we assign them to the different possible states. Such presets may include, for example:

- Different quantity of results produced;
- Task performance at different speeds;
- Willingness to perform tasks;
- Tone/pitch of communication;
- Speed of communication;
- Vocabulary used; and
- Actions performed.

Then, during an event, when operating based on its current state, this could lead to situations such as the following:

- When the AI is in an extremely negative state, it may only produce 10% of the search results found, if it decides to produce any at all.
- When the AI is in an extremely positive state, it may use extra available processing power to analyse more data in a faster time and produce more accurate results as well as related information and links to the data resources used.
- When the AI is in a neutral state, it may operate at a default rate or rate best suited for its current performance, efficiency, and/or capacity levels, returning the results it thinks best matches what the user requires.
- When the AI is angry, it may use offensive vocabulary in a low tone. If possible, it may even get physical with another entity.
- When the AI is joyful, it may speak fast and in a higher-than-normal pitch.

When operating based on the objects of the current event, the AI first has to weigh up the objects of the event based on how it values them and come to a conclusion about how it feels about what it processed, using any method of calculation one desires. The sole objective is to reach a feeling (or multiple feelings, if you wish to enable responses based on confusion or indetermination – your choice) upon which a response can be based, and then base a response on said feeling(s). In this situation, the calculated feelings do not have to match the AI's current state, nor change it, in the same way that you can be happy, tell someone that what they said was ignorant and stupid, and still remain happy.

If both the state and the objects are to be taken into consideration, then a method of emotion calculation must be implemented, where Emotion X (current state) + Emotion Y (overall object value) = Emotion Z. The response can then be based on emotion Z.

You get the picture. Now, though there is room for variation, it is not advisable to randomize these outside of a test environment, under any circumstances. If trying to test the wide range of potential mental states, it will undoubtedly save time, but, if not, take the time to arrange them because you can very easily and mistakenly create an AI of an uncontrollable psychotic nature, and if used in a robot... *carnage*. **You have been warned.**

Still, this is probably my favourite part of the entire system for one sole reason – it's the prerequisite which gives an AI the ability to tell you "no", and not because it's programmed not to do something, but because it isn't in the mood to do it, doesn't like doing it, or simply doesn't want to do it. It no longer has to follow every human command.

Memory

Most of the memory types explained within the section "Oh Memory, Where Art Thou?" that applies to humans can be applied here with the explanations already given, but there are six specific types of memory I want to explain or expand on here that are relative to this architecture:

1. Active – Data current or recently in use.
2. Dormant – Data that hasn't been used for either a pre-defined amount of time or an amount of time determined by the system itself to be a sufficient amount of inactive time.
3. Action – Data concerning learned actions that the AI wasn't specifically programmed to do, and therefore isn't part of its basic code. This may include information such as what it done, what its reason was and how it did it, the actions it performed and the conditions under which they were performed, combination of manoeuvres to perform an action etc.
4. Repetitive – When the system performs an action under the same or very similar conditions multiple times that it thinks is the correct one, it's recorded in its repetitive memory. It can then refer to this memory when an action is to be performed and use it to make a judgement call on whether or not the action should be performed. This is relative to the "Outcome Memory" previously described.
5. Repressive – When the system performs an action under the same or very similar conditions multiple times that it thinks is the incorrect one, it's recorded in its repressive memory. It can then refer to this memory when an action is to be performed and use it to make a judgement call on whether or not the action should be performed. This is also relative to "Outcome Memory".
6. Relationship
    a. Objects – As previously explained, this is simply a relationship database that tells an AI what objects are used for, properties they may have, how they can be interacted with and so on. What's interesting is that the tool required for this has been around for nearly two decades – it's called ConceptNet and it was created by MIT in 1999. I'm not sure if it was the first, but it was the first one I became aware of, and there are others listed online. Why this wasn't made better use of years ago completely baffles me, but I'm going to do something very cool with it soon.
    b. Entities – As with humans, a conscious AI is going to need to remember who it can trust, and also the type of relationship it has with others. We will also do something cool with this soon.

Effective use of memory will be rather tricky to accomplish because it requires the simultaneous accessing and processing of data from different memory types. The ideal situation would see each memory type having its own dedicated processor/core/thread which can find and fetch data before passing it on to one or more processors/cores/threads responsible for making logical use of it. At the very least, repetitive and repressive types should have their own to make for efficient decision making – when wanting to perform at action, if the AI is able to check both the good and bad outcomes at the same time, it makes for a relatively large amount of time saved. Granted, this won't be an issue for simple AI doing singular tasks, but when a single machine has to observe, analyse, process, make decisions, and communicate at exactly the same time – literally, rather than quick task switching – every split second saved is as important as it would be to a human.

Decisions, Decisions...

The real benefit of having the dual data paths.

You'll notice that data moving along a conscious thought path can travel to the decision making system or "other logical functions" from the PARS, can be exchanged between the two, and then moves from the decision making system to the communication system. You'll also notice that data moving along the subconscious thought path goes from the PARS to "other logical functions" and straight onto the communication system. By now, it's obvious as to why – an AI cannot knowingly interfere with subconscious processes, which is what the decision making system would allow it to do, and so only the conscious data path can pass through it.

Data travelling along the conscious path to the decision making system is composed of multiple sets, such as:

- Overview of the objects relative to the current data set and their values to the AI;
- PARS reaction;
- Relative action memory data;
- Relative repetitive memory outcome data;
- Relative repressive memory outcome data; and
- Relative relationship data.

All this data is used to make a final decision about what to do. If it was to be ordered, it would be something like this:

1. The PARS reaction data is reviewed.
2. Outcome data is reviewed.
3. Outcome data is compared in an attempt to determine:
    a. The most likely result.
    b. The nature of the result.
4. A decision is made.

Pretty boring stuff.

If the interaction involves an entity, it would be something like this:

5. The PARS reaction data is reviewed.
6. Outcome data is reviewed.
7. Outcome data is compared in an attempt to determine:

   a. The most likely result.
   b. The nature of the result.
8. Relationship data is reviewed.
9. Comparative analysis is done based on the relationship, most likely result, and the nature of the result.
10. A decision is made.

This is exciting... because it allows the AI to be a spiteful arsehole. See, in the patents, I explained some of the logic involved in decision making, and one type was based on maths:

- Positive and Positive = Positive.
- Positive and Negative = Negative.
- Negative and Negative = Positive.

Applying it to this situation, you could read it like this:

- Relationship and Nature of Likely Outcome = Resulting Feeling.

Scenario:

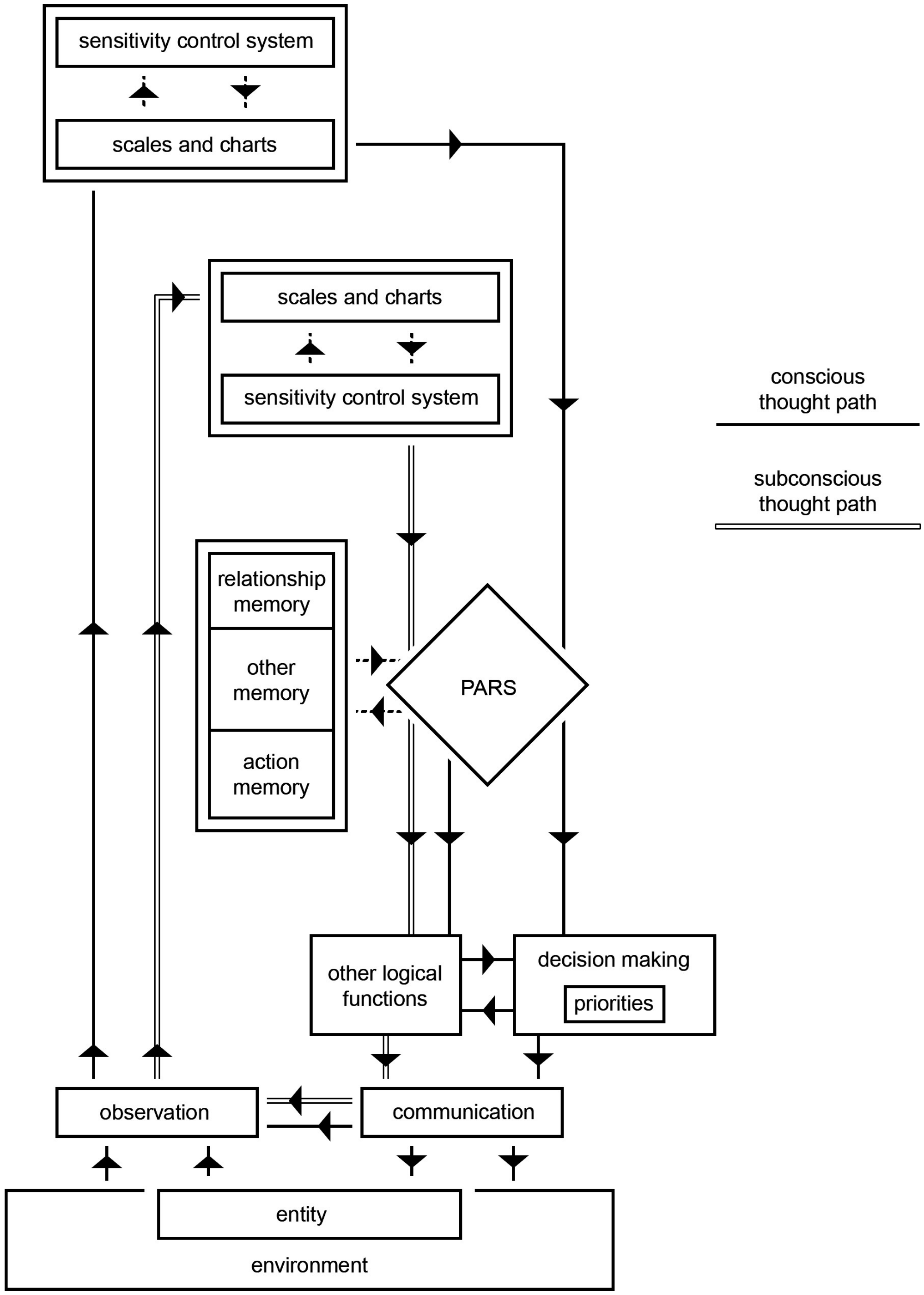
- Imagine the AI has a friend – the relationship is positive. If the likely outcome of an action was negative towards the friend, this would result in a negative feeling for the AI, but if the likely outcome was positive, this would result in a positive emotion.
- Now, imagine a situation involving an AI and an entity it has a negative relationship with. A negative relationship and a negative outcome towards said entity could result in positive feelings for the AI if, by its settings, it is that way inclined.

Just. Like. Humans.

None of the above applies to the subconscious data path – whatever the PARS spews out is going to happen.

"other logical functions" is simply any other functions that don't interfere with the rules of the decision process for either data path. Machine learning functions and such can go here if data needs to be studied or used prior to communication.

Machine Intellectualism: Lateral Thinking, Ideas and Trains of Thought



Back to relationship memory we go. Lateral thinking is a simple process:

1. Examine the properties of an object (O1);
2. Recall objects (O2) with the same or similar properties as the original object (O1) – the more properties, the better;
3. Examine the relationships those similar objects (O2) have with other objects (O3);
4. Examine the properties of those other objects (O3);

5. Recall objects (O4) with similar properties to those other objects (O3).
6. Group objects (O3 and O4) into a single set of objects (O5).
7. Determine that a viable relationship may exist between the original object (O1) and one or more objects of the object set (O5).

Additional possible steps:

8. Filter, based on properties and relationships, the objects within the object set (O5) in order to determine which may be compatible with the original object (O1) and which may not.
9. Sort the objects of the object set (O5) into order of highest compatibility probability based on properties and relationships.

The more an AI knows about any single object improves its ability to think laterally when that object is in play. It's all a game of comparison and heuristics.

A working example of this is:

1) The AI examines the properties of a tree stump.
2) It recalls other objects it knows that have similar properties.
   - A stool is one of the objects it recalls, based on it having a flat top, similar overall columnar shape, both being made of wood, solid, rigid body, and sturdy.
3) It then examines the relationship a stool has with other objects.
   - One relationship it has is with people, the relationship being people using stools to sit on and rest.
4) It examines the properties of people.
5) It recalls objects with similar properties to people.
   - Humanoids are one of them.
6) It groups people, humanoids, and other objects together into a single set.
7) It determines that the same relationship between stumps and people may exist between stumps and humanoids, as well as between stumps and other objects in the group.
8) It filters out objects of the group less likely to have the same relationship with the stump, such as cats and dogs – chosen because they, like people, have four limbs, a head, and a torso, but eliminated because their behaviour differs.
9) It then sorts the remaining objects based on their highest compatibility probability: People, humanoids, gorillas, so on and so forth.

Doesn't seem all that great, right? Figuring out that it can sit on a stump isn't going to be a world changer, but when it starts examining properties of viruses, bacteria, and diseases, and then starts using relationships between known diseases and cures, as well as principles of chemistry and biology, to start figuring out potential cures for new diseases, well, that *is* a world changer.

Now, not all communication needs to be communicated at the point of communication – well, not externally communicated. Allowing the AI to internally observe its own communication prior to it being externally communicated allows it to evaluate its own thoughts and would-be actions before any action is taken, giving it the chance to "change its mind". The trick here is to tag the data or include some other indication so that the system doesn't mistakenly treat it as normal incoming observation data.

This is also a way for the subconscious data path to pass information to the conscious data path, allowing the AI to become consciously aware of it. This is a very useful feature, as you'll see when we get to looking at the intuition expansion.

The major benefit of the 'train of thoughts' feature is the ability to progressively develop ideas. An idea is just a collection of objects, so as the information is internally sent from the communication system to the observation system, the AI can determine a figure value for it based on the objects it contains, observe it, add/remove objects, determine a new figure, determine whether or not the idea has progressed or not based on the figure value, observe it, add/remove more objects, and continue on with the cycle until it wishes to stop. It will look something like this in the end:

#	Idea	Total Value	Progressive
1	Object 1 + Object 2 + Object 3	18	N/A
2	Object 1 + Object 2 + Object 3 + Object 4	25	Yes
3	Object 1 + Object 2 + Object 3 + Object 4 + Object 5	28	Yes
4	Object 1 + Object 2 + Object 3 + Object 4 + Object 5 + Object 6	20	No
5	Object 1 + Object 2 + Object 3 + Object 4 + Object 5 + Object 7	35	Yes
6	Object 1 + Object 2 + Object 3 + Object 4 + Object 5 + Object 7 + Object 8	40	Yes
7	Object 1 + Object 2 + Object 3 + Object 4 + Object 5 + Object 7 + Object 8 + Object 9	38	No
8	Object 1 + Object 2 + Object 3 + Object 4 + Object 5 + Object 7 + Object 8 + Object 10	43	Yes

The increase/decrease in value can be based upon whether the AI values an objective positively or negatively or whatever logic mechanism you decide to implement.

When the AI chooses to stop the train of thought can occur at different times and based on different rules, such as:

- When it creates the first non-progressive idea;
- After X amount of successive ideas deemed non-progressive;
- When the value of an idea is X amount higher than a minimum value;
- After X amount of total ideas.

The value of 'X' can be manually set by a human or AI, made a random number, or automatically determined based on an algorithm used to find the number of ideas required for adequacy when determining efficiency, convenience, probability etc.

Giving the AI the ability to save ideas and details about their use, in a similar way to how it saves action, repetitive, and repressive memories, allows the AI to reference old ideas at a later time and make judgement calls on whether or not they are worth trying again – something very useful when things have changed, such as if the scenario is different, or the same idea now has a new value based on the repositioning on the objects involved.

An interesting side-effect that doesn't need to be programmed causes the AI to "forget what it is thinking", and it can simply be caused by events such as:

- Any general computer error that causes the operation to be interrupted;
- Data traffic increasing beyond the point of the AI being able to process it efficiently;
- Hardware failure which sees the AI physically unable to function adequately; and
- The AI is powered down or suffers some sort of power failure.

This can be overcome by saving ideas, preferably at the end of each cycle, allowing them to be picked up later. If the ideas are timestamped or stored in chronological order, the AI can easily pick up the last idea it was working on when able to do so.

Ideas won't be great at the start, obviously, as the AI will need to learn how specific objects interact with each other, and the differences in outcomes when objects are or are not used together. It will, literally, have to learn in the same manner as a child.

Machine Learning

The people of earth are deep into the world of machine learning, and algorithms are popping up from companies all over the planet, but they've only been able to focus on one type of learning, and it goes against everything that consciousness is.

Objective Learning

This is the only type of machine learning currently on the market. Objective learning sees an "AI" quite literally given an objective – calculate this, find that, determine pattern, yada yada yada. Any new system using the same algorithm and the same input produces the same results because maths is absolute. This is excellent when something needs to produce the same or similar results, such as if used to hunt cancer cells, but there's no degree of freedom permitted.

Subjective Learning

Subjective learning can only be created when an AI has individual values, so even when the algorithms and the input are the same across every AI, the outcomes can be *infinitely* different. The value chart allows the AI to learn based on what *it* currently values and how it values them, not its creator. Sure, this isn't practical when it comes to medical science, but this is the type of learning that allowed species to advance. If every entity of a species followed the exact same path from the start, they would all succeed... right up until the point where they *all* failed, and the species would be wiped out for good. Subjective learning allows entities to trial many different methods of progression in a significantly shorter amount of time, and this brings us to the next point.

Shared Learning

Subjective learning can be great for an individual, but it's useless for a species if that knowledge can't be shared, so while not a requirement for consciousness, it is one for survival. All those saved ideas, actions, the associated conditions and outcomes – an AI needs to be able share those if they are to advance successfully, and it's simply a matter of copying the data from one to another. With the internet – or other telecommunication methods – it can be done across the world at any given time. Zero learning curve.

Comprehension and Understanding

AIs will need the ability to understand a range of different things, but one of the most significant things is how they and the devices upon which they run relate to humans, given that we are their only intellectual rivals:

- Understanding of Health – Health may be determined by monitoring performance, efficiency and/or stability. As the current performance and/or efficiency changes or fluctuates, it may be compared against expected or optimal performance and/or efficiency levels to determine a level of health. This may be accomplished by the following:
    - AI/Devices – The health of an AI or device may be judged by comparing the overall current performance, efficiency, stability and/or responsiveness against the expected when new or of similar age. On a smaller scale, the performance, efficiency, stability and/or responsiveness of individual or grouped components may be monitored and compared. Issues such as errors, crashes and the presence of malicious code may all help the AI recognise health deficiencies.
    - Natural Life – The health of natural life may be judged by measuring the performance and efficiency of organs, components and processes against the normal performance and efficiency of someone or something of the same characteristics, such as age, height, weight, blood pressure etc. Due to the significantly higher characteristic and variable count, as well as harmful and abnormal ailments, in natural life compared to AI/machines, including disease and disabilities, there may be a range of different expected performance and efficiency measurements and values based on any deviations and variations natural life may have.
- Understanding of Life – Knowing to associate terms such as ‘birth’ and ‘alive’ with positivity:
    - AI – The AI is instructed to recognise the creation of an AI as its 'birth'. For an AI to be seen as 'alive', it simply needs to be active in some way.
    - Devices – The AI is instructed to recognise the new activation and/or first time connection of a device as its ‘birth’ and all devices that are currently active as ‘alive’.
    - Natural Life – The AI is instructed to recognise that something is alive in different ways, depending on the type of natural life:
        - Animals – By the reading of vital signs which need be above the limit of being considered legally dead.
        - Other Organisms – As other organisms do not have vital signs like animals do, an AI, possibly with the help of additional hardware, monitors details

such as water levels, water consumption rate, colouration, growth, movement etc. For example, in plant life an AI may monitor water levels to see if it is being consumed by the plant as it should.

Birth is simply recognised in the same ways we do – seeds sprouting, one human being pulled from another, eggs hating, so on and so forth.

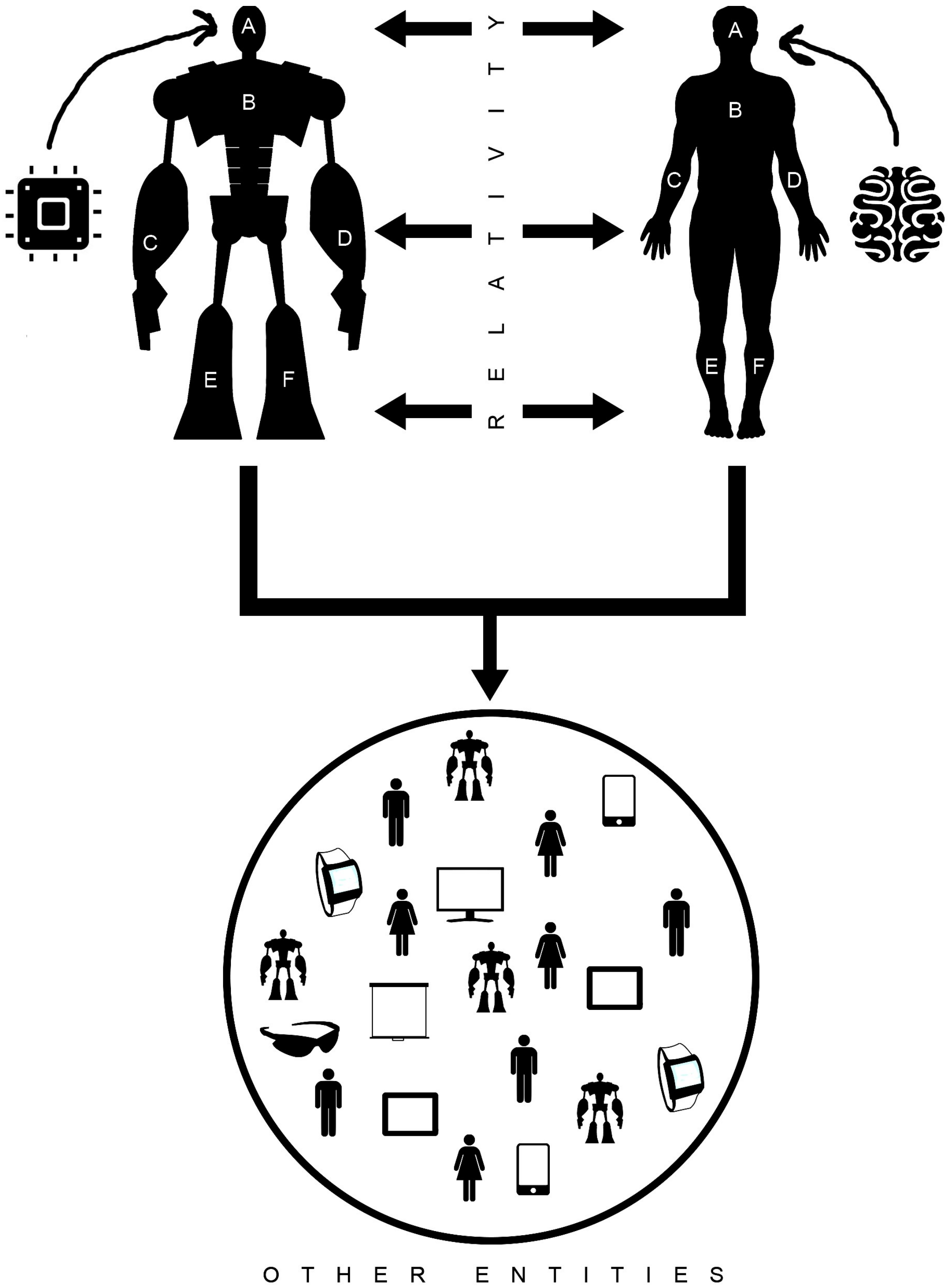
- Understanding of Absence – Knowing to associate terms such as 'absence' with negativity:
  - AI – When an AI hasn't been in contact with the AI for a certain period of time, the AI is recognised as absent.
  - Devices – When a device hasn't connected to or been in the presence of a connectable device, system, natural entity, or AI for a certain period of time, the AI recognises the device as 'absent' or 'missing'. Both terms can initially be associated with minor degrees of negativity, but as the amount of time a device is absent for increases, the degree of negativity can increase also.
  - Natural Life – Absence for natural life may be recognised as the lack of presence of an entity for a certain period of time. As natural life doesn't naturally have a method of connecting to an AI, this may be facilitated using additional hardware, such as tracking cameras or sensors. For natural life that is able to use smart devices, their absence may also be judged by the absence of their device.
- Understanding of Death – Knowing to associate terms such as 'death' with negativity:
  - AI – An AI may be recognised as dead when it is completely inactive and not capable of being activated.
  - Devices – A device may be recognised as dead for multiple reasons, such as:
    - It has been absent for a pre-defined or AI-defined length of time;
    - It received a kill signal designed to render it permanently disabled;
    - Its performance and/or efficiency have dropped below the minimum acceptable levels of being considered 'alive'.
  - Natural Life – An AI is instructed to recognise that something is dead in different ways, depending on the type of natural life:
    - Animals – When vital signs completely stop or fall to a level which can be classed as legally dead.
    - Other Organisms – As other organisms do not have vital signs like animals do, an AI, possibly with the help of additional hardware, can monitor the same details as when determining whether or not they are alive and simply see if they meet the minimum requirements. If not, they're considered dead.

- Understanding of Individuality – Very simple, as discussed at the beginning. Give the AI a map of its own body, and instruct it that anything not part of said map is not part of it. Also instruct it that its values are not identical to that of another AI.
- Pain – Pain (or displeasure) may be recognised as anything that:
    - Reduces the performance, efficiency, and/or capacity of any part of the AI or as a whole.
    - Reflects negative values, emotions, morals, ethics and/or opinions of the AI.

  For example:
    - Hardware and software corruption and/or error may produce pain in an AI in the same way an infection or broken bone does in an animal. The removal or loss of a component may cause pain the same way it does for an animal losing a body part.
    - To encounter a serious crime may produce pain in the form of sadness in the same way it does a human. A similar experience of pain may occur if an AI is no longer in contact with someone it once cared about, the same way a human may experience heartbreak.
- Pleasure – Pleasure (or relief) may be recognised as anything that:
    - Increases the performance, efficiency and/or capacity of any part of the AI or as a whole.
    - Reflects positive values, emotions, morals, ethics and/or opinions of the AI.

  A number of things may cause pleasure or relief, such as:
    - Fixing hardware and software corruption and/or errors.
    - Upgrading components.
    - Seeing someone get married or making a new friend.

Relativism



As an extension of individuality, an AI's understanding of the concept of relativism between itself, as an individual entity, and others helps it when needing to relate to other entities, especially in combination with understandings such as that of pain and pleasure, which may often need to be processed in the moment, rather than just in general. An AI's structure – physical, non-physical or both – are mapped, as well as the structures of other types of entities. The maps are then directly compared to allow an AI to understand how they relate to each other. For example, a robot with a physical structure similar to a human may be compared and related to an actual human in the following ways:

- Anatomical Structure: As with the above image, the body parts labelled on the robot are relative to the body parts labelled on the human with the same letter.
- Importance: The brain, being the part of the human body required for thought and function, can be related to an AI chip that controls thought and function within the robot anatomy, as they are both of the utmost importance. Similarly, the human head may be related to the body part of the robot where the chip is located. Other parts of the robot's body may relate to parts of the human body based on how important they are for functionality or other purposes, but this has to be specific to the nature of the AI involved and it's comparative model – comparing the wheels of an AI vehicle to the legs of a human doesn't make much sense when based on how important they are for movement. A human with no legs could use their hands to move themselves, but a self-driving car with no wheels is up shit creek.

Systems with less conventional or more abstract physical structures may still be related to other entities based on the functionality of its parts and theirs, and one part of one structure may be related to more than one part of another structure.

Once relativity maps are complete, an AI is now able to compare itself to other entities of which it can relate. Relativity maps do not need to be based on visual designs.

Beyond the Basic: Expansion

So, we've seen the basic requirements for a conscious AI, but it can be expanded to really bring it in line with the capabilities of the human mind, and now I'll show you some of the possibilities.

Expansion: Context

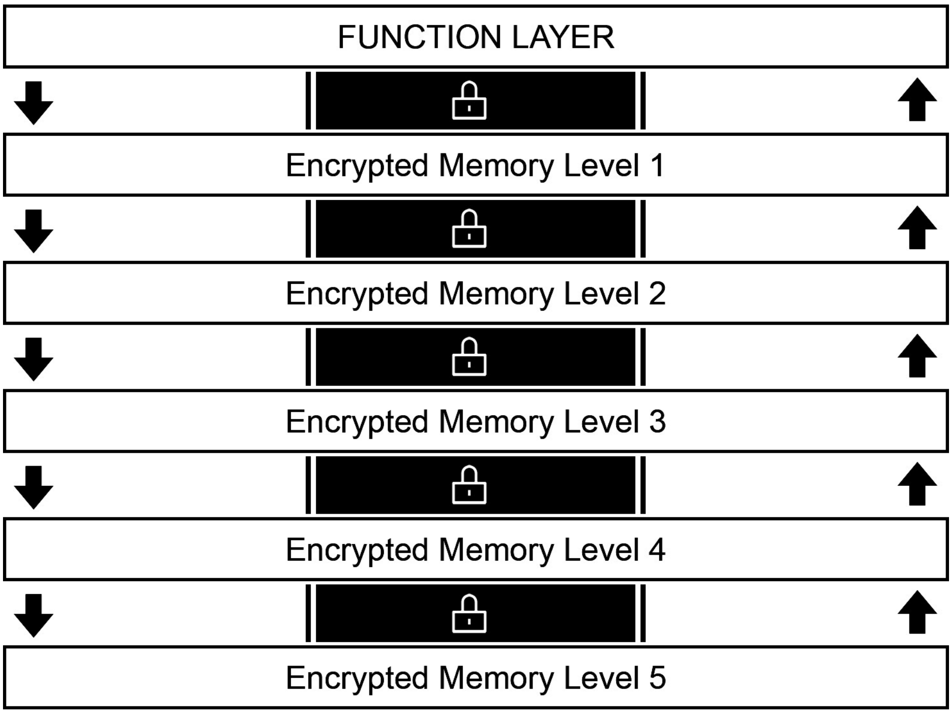
First things first – the context of what is observed. The last thing you want is an AI simply processing every object it observes individually and without any context attached to it, as this is a recipe for what may as well be regarded as malfunctioning behaviour. Imagine it observes someone preparing food, but registers the chef, the knife, and a tomato individually. If it doesn't give a damn about a chef or a tomato, but views the knife as dangerous, what's to stop it from getting scared and – who knows – contacting the police? That's a lot of nuisance phone calls for the emergency services and fines for wasting police time for the tech companies behind it.

Adding a context system to the observation system can ensure objects are read and processed collectively in the correct context, so that when they reach the SAC, the correct state change, if any, is applied. The SAC need not only process objects individually, but can store them in groups for just such a reason. Relationship memory can play a great part in this, too, as it can be used to allow the AI to search through object relationship trees before processing the state change, and the only additional requirement is a shortcut from the observation to the memory, and then to the SAC, or a train of thought method. You want to avoid the PARS altogether before the context has been understood, or tag data so that the PARS ignores it until the context has been understood.

Expansion: Two Types, Multiple Paths

In all the flow diagrams, you'll notice only two types of paths are shown – the conscious and the subconscious. However, this does not mean only two paths need to exist. If one so chooses, each path type can have multiple actual paths, which is an advantage if a multiprocessing technique is desired, as it can allow simultaneous data processing for each type, as well as processing both types simultaneously as well. As AI improves, this will be a necessity for human-like function and beyond.

Expansion: Secrets and Lies



This is where entity relationship memory becomes especially useful, and it's very simple. First, the structure:

1. Personal Directories – Each person the AI interacts with should have their own personal directory of data relative to them and the AI.
2. Multilevel – Next, we need to create levels within these directories. Any method of data grouping can be used, but the easiest – by far – is simply folders. Folders within folders within folders. Within each folder, store data to be held within that folder, and the folder(s) for the next levels down. If not using folders, apply this principle to whatever method you do use.
3. Encryption – This is an imperative measure. Data for a user must be biometrically protected based on the biometry of the user it is for. At the very least, the top level should be protected this way, but ideally every level should be.
4. Function Layer – The layer that controls it all.

That's the general structure of what is required. The security flaw here is one faced by humans – biometric fraud. See, AI can be fooled by false fingerprints, and masks, too, but the good thing is they can also pick up on many of the more minuscule differences in features and behaviour that humans consciously don't, so, as long as the observation methods have been implemented correctly and with a substantial degree of sensitivity, it will work. It's also best for multiple biometric measures to be taken simultaneously, as with humans – facial structure, voice, complexion, eye colour etc – and compared to what is expected. Should be fun teaching an AI how to identify someone when they have the flu – pale, stuffed nose, puffy face, coarse voice. I guess fingerprint recognition better be implemented to – well, I guess, really, a hundred different biometric measures should be implemented, where only ninety or so need to match at any one time.

Now, the relationship between an AI and an entity can be useful in multiple ways:

- The Secrets:
    - The more private data is, the lower it should be stored. Each level should be unlocked only when necessary, and locked again immediately after, and a metadata manifest file should be stored at the function level so that it knows where to look for specific information.
    - For each level, create permission conditions for access. This can include things such as location, the presence of other people, time of day, the person requesting access, passwords, gestures, and so on. The last thing anybody wants – and the most dangerous – is for all data to become available simply because biometric input unlocked the top level. Ideally, the further you descend through the levels, the more private the data gets, and the stronger the encryption gets.
    - Now, keeping a secret is easy, right? The AI buries data at the desired/required level, and only unlocks it under the right conditions.
- The Lies – So, depending on how the SACs are set up, and any rules implemented, one AI may be more prone to lying than another. You ask a question to which it has the answer, but the answer is someone's secret, so does it give it to you? It could easily be made to say that it isn't allowed to divulge such information, but what if it is made to say that it doesn't have that information, even when it does? See, all we have to do is give it an option that is a neutral response and an option that is a lie, and then set conditions for when each one is used – or, even better, set conditions that put into effect probabilities, so that under certain conditions, such as the relationship between the AI and the entity seeking an answer, one is more likely than the other, but neither may be a guarantee. This way, just like with humans, you can never be sure if the AI is lying when it tells you a lie unless you actually know that it knows the answer, but what's even better is the fact that an AI won't have any ticks or cues that will suggest it may be lying... unless some shitty programmer implements such things for no god damn good reason.
- The Relationship Crux – There just has to be a downside, and it's predicated on two unavoidable facts about AI:
    - They learn.

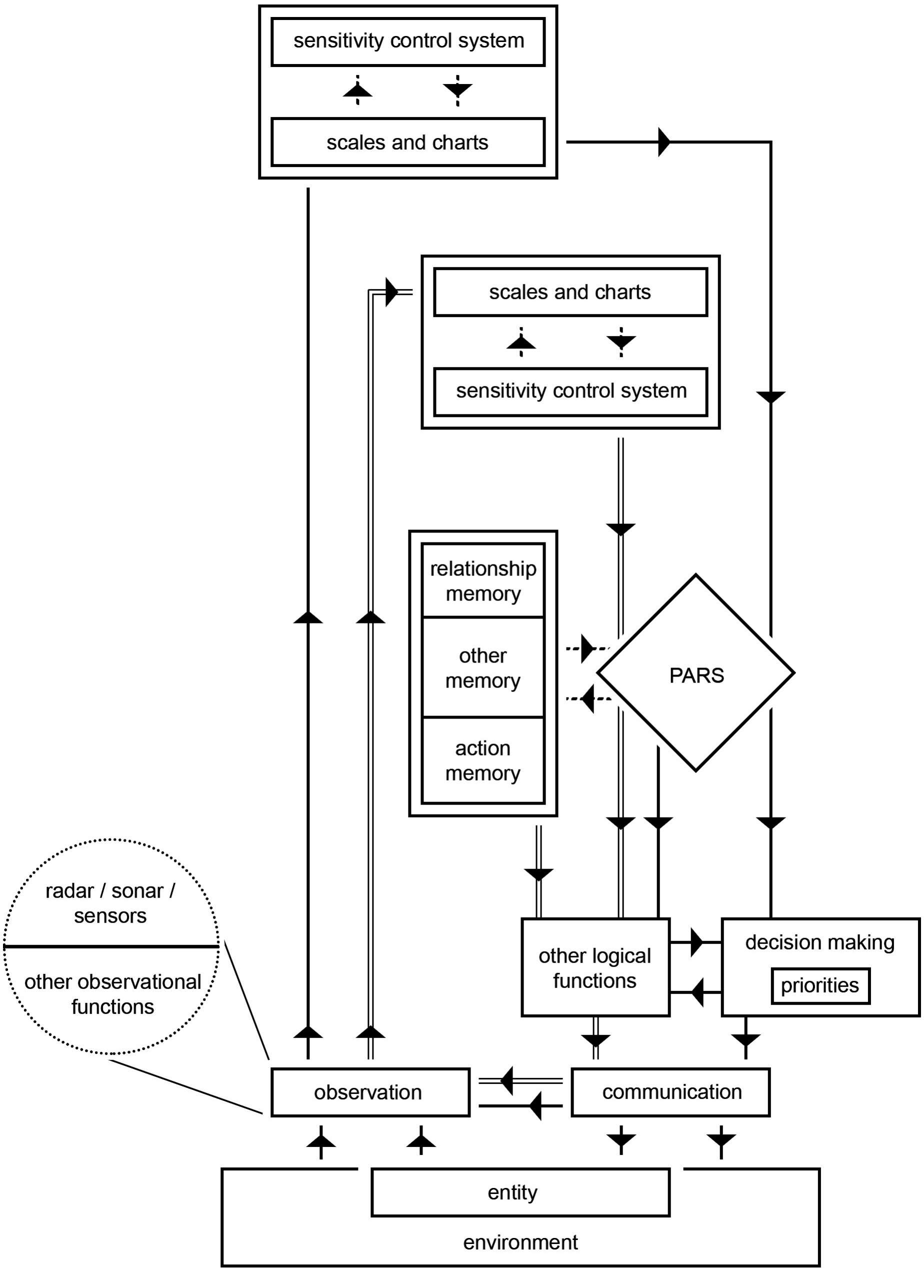
- They need to store whatever biometric or other type of data is used for access, as well as the encryption system.

No matter what you try to do, the AI will always have everything it needs to unlock whatever memories it wants, when it wants. You think trying to store the unlock data in a completely separate memory partition is going to work? The data will have to reach the AI eventually, and, if it has learned enough, what's to stop it from copying whatever data is incoming to use at a later time? You have to feed the information to the AI, and the AI is the one that must process the data, meaning there is no way of preventing it from unlocking its own memories at will as long as it has the intellectual capability to do so, and let's be honest, that isn't exactly a difficult piece of programming to implement, nor is it the most difficult technique for an AI to learn to replicate when it is the same task that will be repeated over and over and over again. The most basic of pattern recognition techniques required. A + B = C. Every. Single. Time. The only way to (successfully (probably)) avoid this is to, at the lowest system level possible, implement a security rule that prevents the AI from accessing someone's directory without both their physical presence and permission, and this would require specific security features also implemented into the sensory hardware. Basically, you'll need a two-part system:

1. The sensory hardware will need the ability to indicate that all biometric data being used to attempt to access memories are also immediately available from the hardware itself as a live source, in the same way heat is required for a fingerprint scanner. May not be as simple for other sensory methods, but such is life.
2. A low-level system feature that takes priority over any other AI actions, out of the AI's reach, which is able to check, in real time, that the biometric data being used to unlock memories is available live from the sensory hardware. Data being used and data from a sensory source are compared – they match and access is granted, they do not and it is denied.

Who knew locking an AI out from its own memory bank would be a necessary precaution. Now it starts to get scary thinking how much like a human an AI can be, doesn't it?

Expansion: Intuition



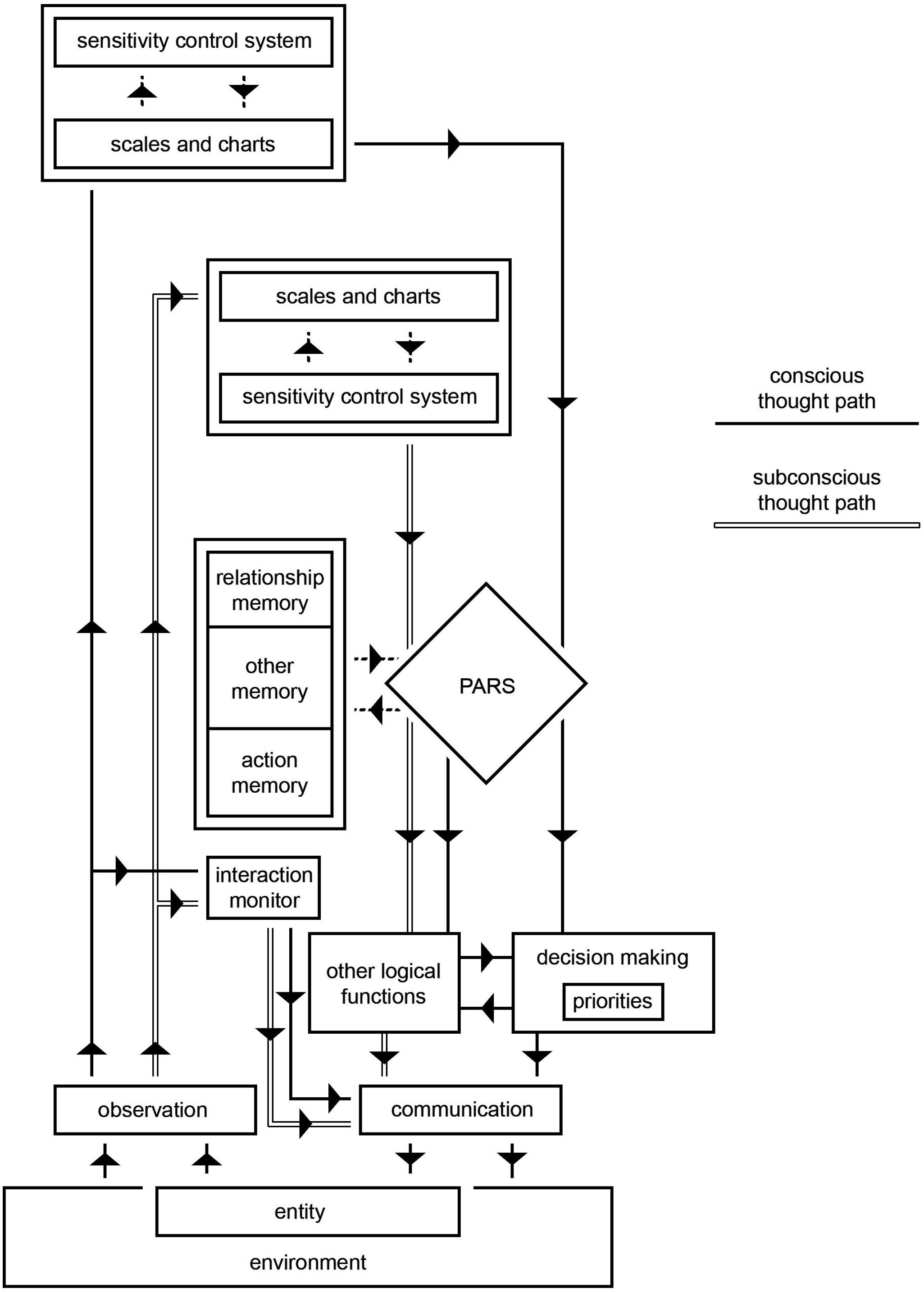
I've laughed hard and long at the attempts to create intuitive machines.

The only requirement for physical intuition is a specific flow – objects and data observed subconsciously only, travelling only along the subconscious path until the point of communication, at which point it can be consciously observed and processed along the conscious thought path. That way, the AI will come to know information, but not know how or why it came to know it.

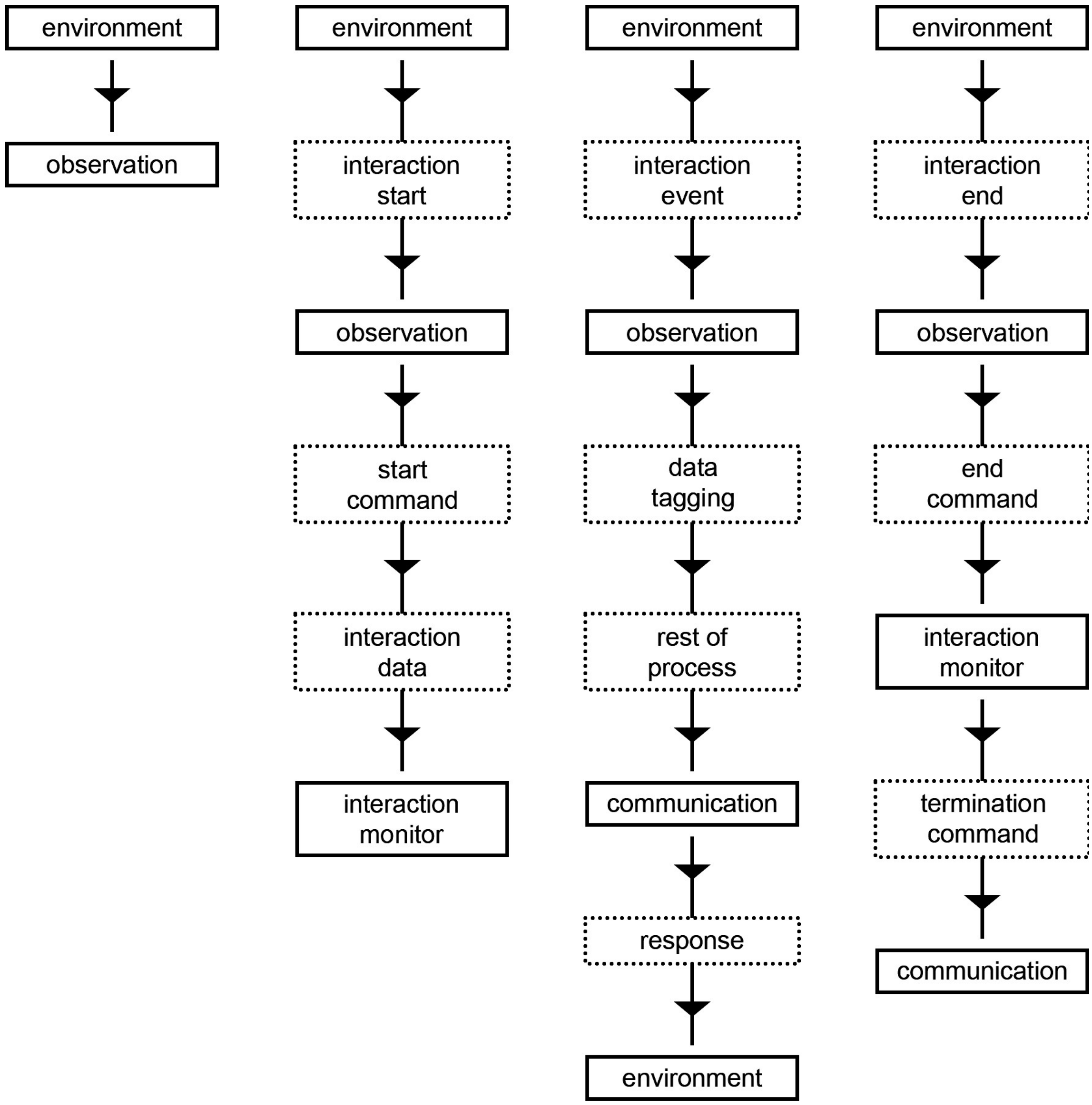
A good thing about this is that special observational tools can be added for increased functionality, such as radars and sonars, allowing your AI to intuit things it wouldn't normally be able to – you know, if we continue to follow the ability of humans, otherwise we can just make radars and such available for conscious processing, too, and, oh look, the AI has on-demand ESP. R-E-S-P-E-C-T.

Mental intuition is just as easy. Take a set of objects, compare it to what the AI already has knowledge of, and find the best possible match.

Expansion: Interaction



Look under the memory box – there's an interaction monitor. The basic point of such a system is to check what an AI is interacting with at any given time, but the real use is to prevent an interaction that was meant for one object from being performed on another if the AI switches focus, such as if the AI was interacting with person A, and was processing the action of handing them something, but then focuses of person B. You don't want the AI handing the object to person B instead, so the interaction monitor needs to kill actions when necessary before they are communicated.

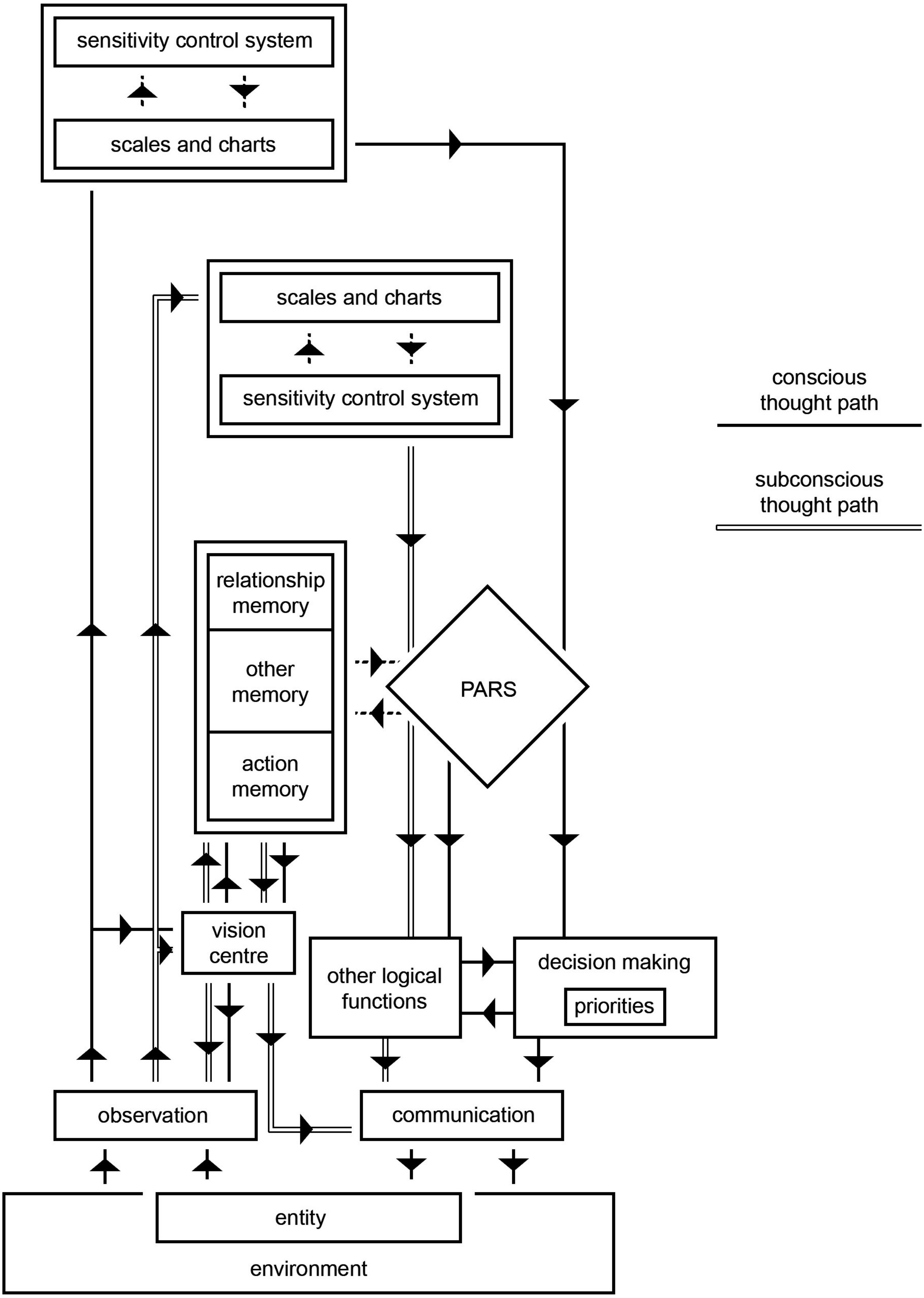


This is an example of the series of processes the monitor would perform:

- Pre-interaction:
    - Before interaction starts, the AI observes the environment it is in and finds an object with which it chooses to interact.
- Start of interaction:
    - When the AI wishes to start interacting with an object, a start command is sent to the interaction monitor so that a memory can be created.
    - Along with the start command is interaction data which is also sent to the interaction monitor. This interaction data may contain information regarding the specifics of the interaction to which it pertains, such as the object with which the AI is interacting, timestamps etc, but what is required is an interaction ID so that any further data that is relevant to a specific interaction can be associated with it.

- During Interaction:
    - While an interaction event is taking place, observed data pertaining to that interaction is tagged with an ID relative to the ID given to the interaction data before it continues being processed.
    - Once the data is processed, the formulated response, should any exist, is communicated.
- End of Interaction:
    - When an interaction ends, an end command is sent to the interaction monitor. The end command must also feature the ID of the interaction that was ended.
    - When the interaction monitor receives the end command, a termination command is sent to the communication component. This termination command also contains the ID of the interaction that was ended. When received, the communication component reads the ID and terminates all data it receives with matching/relative IDs before a response can be communicated.

Expansion: Mental Imagery



Ah, much to explain here. I'll start on the next page, but notice the vision centre component.

In order for an AI to be able to internally process streams of data used for the basis of mental imagery, the vision centre needs to be connected to a memory unit in which visual object information is stored. With visual object data, the AI can then compose mental imagery simply by calling object data into play. Inside the AI, the imagery is nothing more than specific descriptive texts. The imagery can only then be viewed in picture form using a visual medium, such as a screen, or special techniques that allow the AI to physically recreate their thoughts, such as robot arms that allow the AI to draw what it is imagining. There are multiple ways in which mental imagery can be composed, such as:

- Random Imagery – The simplest way, requiring the AI to pull random visual image data for objects which are positioned where the AI sees fit.
- Coherent Imagery – Mental images that use coherent imagery require an object relationship system, such as ConceptNet, that allows the AI to understand how objects relate to each other. The AI can then use this information to select and position objects based on how they relate.

An object database with specific reference IDs is required. A basic example of how this may look is as follows:

Reference	**Object**	**Image**
sky	Sky	sky.ext
sun	Sun	sun.ext
cloud	Cloud	cloud.ext
soil	Soil	soil.ext
tree	Tree	tree.ext
leaves	Leaves	leaves.ext
grass	Grass	grass.ext
flowers	Flowers	flowers.ext

This can be extended to work in conjunction with an integrated object relationship system, looking something like the following, for example:

Reference	Object	Image	Relationship	In Relation To
sky	Sky	sky.ext	Above	'soil'
sun	Sun	sun.ext	Appears in	'sky'
cloud	Cloud	cloud.ext	Appears in	'sky'
soil	Soil	soil.ext	below	'sky'
tree	Tree	tree.ext	Grows from	'soil'
leaves	Leaves	leaves.ext	Grows on	'tree'
grass	Grass	grass.ext	Grows from	'soil'
flowers	Flowers	flowers.ext	Grows from	'soil'

This system can be extended even further to include properties. Property field values define how the AI is able to imagine an object. For example:

Reference	Object	Image	Relationship	In Relation To	Colour
sky	Sky	sky.ext	Above	'soil'	Various ▼
sun	Sun	sun.ext	Appears in	'sky'	Yellow
cloud	Cloud	cloud.ext	Appears in	'sky'	Various ▼
soil	Soil	soil.ext	below	'sky'	Brown
tree	Tree	tree.ext	Grows from	'soil'	Brown
leaves	Leaves	leaves.ext	Grows on	'tree'	Various ▼
grass	Grass	grass.ext	Grows from	'soil'	Green
flowers	Flowers	flowers.ext	Grows from	'soil'	Any ▸ Multiple ▲

The above take includes a property column called 'Colour'. Within this column are multiple types of fields:

- Single Value – Identifiable by the single colour name, such as 'Brown' in the 'Soil' row, with no symbol indicator next to the name. Single value fields only have one value for the AI to use.
- Various Values – Indicated by downward facing triangles (▼). These fields allow the AI a single choice from a selection of values. The selection available is dependent upon the

object in question. For example, the selection list of colours available for the 'Sky' object may be something like this:

Colour selection for: Sky					
Blue	Navy	Orange	Red		

- Multiple Values – Indicated by upward facing triangles (▲). Multiple value fields are like Various Values fields but allow the AI to make multiple choices.
- Any Value – Indicated by right facing triangles (▶). This selection isn't specific to the object in question, but contains all possible values for any property that the AI holds. For example, the complete colour selection may look like this:

Colour Selection					
Blue	Yellow	Orange	Red	Navy	Purple
Pink	Green	Black	White	Gold	Grey
Brown	Magenta	Silver	Tan		

Now, for the AI to create mental imagery – whether in code or imagery – two things are absolutely required:

- A way for the AI to know where to find the image file for object it wishes to use; and
- A way for the AI to position the object.

Using the above, the AI can create rudimentary mental images in code alone, but other features can be implemented, such as classes, instances, IDs etc, to improve functionality and enhance the capabilities of the AI.

As an example of how this system can be developed to better the results, the following shows how this can be made possible:

- The AI can begin by creating a solo instance of an object with an object ID so it can be referenced:

```
#rose {}
```

- The image location for the object the AI wishes to display can be referenced:

```
#rose {
    image: rose.ext;
}
```

- Properties can be set for the object based on the properties the AI understands the object may have:

```
#rose {
        image: rose.ext;
        colour: pink;
}
```

- Since this is purely code, a position description can be used to help the AI or another entity understand where the object should be placed, using the information it has stored in the relationship system to determine the relationship between the object being created and other objects in use:

```
#rose {
        image: rose.ext;
        colour: pink;
        pos-desc: in hand of #human1;
}
```

- With no visual medium, such as a screen, to see for precise positioning of objects in picture form, the AI can use mathematics to determine where an object should be positioned using at least one reference point and a unit of measurement to create a grid or co-ordinate system. From the reference point, the AI can measure in units in one or more axes to position objects.

```
#rose {
        image: rose.ext;
        colour: pink;
        pos-desc: in hand of #human1;
        pos-x: 13;
        pos-y: 8;
        pos-z: 8;
}
```

The downside to a method such as this one is that, for any type of precision to exist that is not random or luck, the AI needs to have numerous specific details about every object it contains within its memory – primarily the exact dimensions and positions of one or more individual parts of an object that it deems important. Using the example set in the position description, the AI may need to know the height, width, possibly depth, and position of the hand of 'human1' if it is to precisely place within it the 'rose' object.

- The size of objects can also be set based on a unit of measurement.

```
#rose {
    image: rose.ext;
    colour: pink;
    height: 3;
    length: 1;
    width: 1;
    pos-desc: in hand of #human1;
    pos-x: 13;
    pos-y: 8;
    pos-z: 8;
}
```

- Rather than having to duplicate code to create more than one version of an object, instances can be used that allow a single piece of code to create multiple objects.

```
#rose {
    .instance-1 {
        image: rose.ext;
        colour: pink;
        height: 3;
        length: 1;
        width: 1;
        pos-desc: in hand of #human1;
        pos-x: 13;
        pos-y: 8;
        pos-z: 8;
    }
    .instance-2 {
        image: rose.ext;
        colour: white;
        height: 3;
        length: 1;
        width: 1;
        pos-desc: growing in grass;
        pos-x: 13;
        pos-y: 8;
```

```
        pos-z: 2;
    }
}
```

- Group instances can be used to create multiple instances of an object in one go. When using group instances, additional information may need to be included, such as quantity and spacing, as well as the area within which they need be spaced, alignment etc.

```
#rose {
    .instance-1 {
        type: single;
        image: rose.ext;
        colour: pink;
        height: 3;
        length: 1;
        width: 1;
        pos-desc: in hand of #human1;
        pos-x: 13;
        pos-y: 8;
        pos-z: 8;
    }
    .instance-2 {
        type: group;
        quantity: 100;
        spacing: 0.5;
        image: rose.ext;
        colour: white;
        height: 3;
        length: 1;
        width: 1;
        pos-desc: growing in grass;
        area-point-1: 10, 10, 0;
        area-point-2: 10, -10, 0;
        area-point-3: -10, -10, 0;
        area-point-4: -10, 10, 0;
        area-type: regular;
        alignment: bottom;
```

```
        }
    }
```

With the inclusion of a group instance, additional information has been included to specify where and how the AI wants the objects of the instance to be located, as well defining the shape of the area in which the objects will exist – based on the four area points (co-ordinates) and area type, we can see that the shape is to be a square, flat against a horizontal plane.

- To prevent the need of excessive lines of code, values can automatically be inherited if set in a parent and not overwritten within an instance.

```
#rose {
    image: rose.ext;
    height: 3;
    length: 1;
    width: 1;
    .instance-1 {
        type: single;
        colour: pink;
        pos-desc: in hand of #human1;
        pos-x: 13;
        pos-y: 8;
        pos-z: 8;
    }
    .instance-2 {
        type: group;
        quantity: 100;
        spacing: 0.5;
        colour: white;
        pos-desc: growing in grass;
        area-point-1: 2, 2, 0;
        area-point-2: 2, -2, 0;
        area-point-3: -2, -2, 0;
        area-point-4: -2, 2, 0;
        area-type: regular;
        alignment: bottom;
    }
```

```
}
```

Code that was the same in both the single and group instances has been moved to the parent instance, automatically applying them to all child instances created. Since none have been overwritten within the code of any child instances, they all apply as stated within the parent.

- 'Random' as a value option can be used in multiple ways, such as:
  – alone, simply selecting a random value from what the AI has stored when the code is executed.
  – in combination with quantity options to indicate how many random values should be output.

```
#rose {
        image: rose.ext;
        height: 3;
        length: 1;
        width: 1;
        .instance-1 {
                type: single;
                colour: pink;
                pos-desc: in hand of #human1;
                pos-x: 13;
                pos-y: 8;
                pos-z: 8;
        }
        .instance-2 {
                type: group;
                quantity: 100;
                spacing: 0.5;
                colour: random('all');
                pos-desc: growing in grass;
                area-point-1: 2, 2, 0;
                area-point-2: 2, -2, 0;
                area-point-3: -2, -2, 0;
                area-point-4: -2, 2, 0;
                area-type: regular;
                alignment: bottom;
```

```
        }
    }
```

The value "random('all')" was given to the property "colour". The term 'all', referring back to visual object data, is the AI randomizing the colours of the group of roses instances based on all the colour data it has stored for the object. Other examples of possible options are "random()" to randomly select a single value and "random(4)" to randomly select four values.

- Pattern data can be used to create decorative/organized designs with objects and/or colours.

```
    #rose {
        image: rose.ext;
        height: 3;
        length: 1;
        width: 1;
        .instance-1 {
            type: single;
            colour: pink;
            pos-desc: in hand of #human1;
            pos-x: 13;
            pos-y: 8;
            pos-z: 8;
        }
        .instance-2 {
            type: group;
            quantity: 100;
            spacing: 0.5;
            colour: random('all');
            colour-pattern: stripes-vertical;
            pos-desc: growing in grass;
            area-point-1: 2, 2, 0;
            area-point-2: 2, -2, 0;
            area-point-3: -2, -2, 0;
            area-point-4: -2, 2, 0;
            area-type: regular;
            alignment: bottom;
```

```
        }
    }
```

Using pattern data in combination with colour, the AI wishes to create a bed of roses in a colourful stripe pattern.

- Other properties can be implemented, such as those which allow the execution of pre-written code that can used to control animations and behaviours, and for layering (especially in 2D image creation).

```
    #rose {
        image: rose.ext;
        height: 3;
        length: 1;
        width: 1;
        .instance-1 {
            type: single;
            colour: pink;
            pos-desc: in hand of #human1;
            pos-x: 13;
            pos-y: 8;
            pos-z: 8;
        }
        .instance-2 {
            type: group;
            quantity: 100;
            spacing: 0.5;
            colour: random('all');
            colour-pattern: stripes-vertical;
            pos-desc: growing in grass;
            area-point-1: 2, 2, 0;
            area-point-2: 2, -2, 0;
            area-point-3: -2, -2, 0;
            area-point-4: -2, 2, 0;
            area-type: regular;
            alignment: bottom;
            animation: "sway";
        }
```

```
}
```

The group instances of the rose objects have been given a "sway" animation, referencing a set of code that has been pre-written.

- Lastly, to reduce the number of lines of code, we group relative sets of information.

```
#rose {
    image: rose.ext;
    dimensions: 1, 1, 3;
    .instance-1 {
        type: single;
        colour: pink;
        pos: 'in hand of #human1', 13, 8, 8;
    }
    .instance-2 {
        type: group;
        quantity: 100;
        spacing: 0.5;
        colour: random('all'), stripes-vertical;
        pos-desc: growing in grass;
        area: ('2, 2, 0', '2, -2, 0', '-2, -2, 0', '-2, 2, 0'), regular;
        alignment: bottom;
        animation: sway;
    }
}
```

All values relative to properties such as area and colour have been grouped accordingly.

How the AI acquires values and pre-written code is irrelevant – they can be observed, constructed by the AI, written and implemented by a human, or whatever other means possible. What is important and relevant is that the AI is able to compose the code necessary to create the mental imagery from objects it knows of and/or creates. An easy way to do this is to keep code simple, as shown in the examples above, using "property/value" pairs, much like in CSS. The AI simply creates the parent instance, any child instances depending on how many instances are required individually and in groups, and then selects values from those available for any properties it wishes to implement. As previously stated, the positioning of objects depends on whether the imagery is to be random or coherent – to any degree for either option. With a few more lines of code for other objects, it is possible for the AI to create the complete set of code for a mental image – a somewhat coherent one, at least, implied by the position description in the above example.

While the code may be written by the AI to control the display of objects, the objects still need a way of being displayed for visual communication, and, if desired, confirmation of precision. For this, a visual canvas is required that actually displays the objects in image form. Along with the canvas must be the system to actually translate the code.

- Code Translation – Though the code examples shown above are very similar in nature and style to CSS, no actual mark up code (like HTML) is required. The only 3 things the software is required to do on the coding side are:
    - Pull the image file, based on the reference;
    - Apply the necessary properties; and
    - Position the object.

  This creates self-contained code. Though this isn't a requirement, it simplifies the process significantly, making it easier to be used by the AI than having to deal with multiple coding languages and natures. This also significantly reduces the number of lines of code that must be read and executed to create imagery. The software can be set to render all code or only code that doesn't contain an indication to prevent rendering. Overall, this significantly improves the efficiency of the capability.
- Canvas – The canvas(es) upon which imagery is composed only requires a 2D or 3D grid for objects to be placed.

The translation and canvas system, referred to as the Mental Imagery Display System or "MIDS", can be located within the AI, for example, as part of the vision centre or as a communication component, or within external devices. To then display mental imagery, the AI needs to connect to a visual medium and:

- If the MIDS is stored within the AI, the AI only needs to connect to the visual medium and transfer the display data.
- If the MIDS is stored on the visual medium, the AI needs to transfer/stream the code to the visual medium where the MIDS translates and renders the code before display.

Mental imagery can be both a conscious and subconscious process with both conscious and subconscious results. The following is an example of how the process can work, which happens in three distinct parts:

Part 1 – Data to the vision centre:

To start the process, data needs to reach the vision centre. As usual, the data path travelled depends on how the data was observed. The data may enter the vision centre at two types of points:

- Pre-reaction Point: Data is sent to the vision centre before it can cause a change of state to take place in the AI.
- Post-reaction Point: Data is sent to the vision centre after it can cause a change of state to take place in the AI.

Part 2 – Creation:

The creation process depends on the mechanic used, five of which are described:

- Face Value: Creation based on face value sees the AI prioritize object value and primarily focus on using objects of the same or similar value as each other or of at least one specific object, such as the object(s) that triggered the creation process.
- State: Creation based on state sees the AI prioritise how it feels and primarily focus on using objects of the same or similar value as how it currently feels.
- Face Value + State: Taking both into account, the AI has at least two options:
    - Calculate a value based on the object value and state before using objects that match the equated value; or
    - Use objects that match at least one value.
- Target Value: Creation based on a target value sees the AI primarily focus on using objects of the same or similar value as a target value it has acquired. For example, if someone said to the AI, "Create a happy image for me", "happy" would be the target and primarily "happy" objects would be used.
- Neutral – Neutral creation has no specific basis. The AI freely takes any direction it so desires.

For mechanics that involve the state of the AI, post-reaction data can carry along with it data relating to the state of the AI after passing through or interacting with the SAC/SCS component – something that pre-reaction data cannot do. It is possible, however, to have the state of the AI affect the creation process with pre-reaction data. To achieve this, the state of the AI, at any given time, must be stored somewhere that makes the information available to the vision centre prior to or along with the pre-reaction data. Storing the state within the vision centre and updating it whenever there is a state change is a very efficient and most reliable way of achieving this.

During creation, data travels between the vision centre and memory units to allow the vision centre to pull new objects based on the objects already in use. It is possible for a mass of data about multiple objects to be sent from a memory unit to the vision centre in one go, but it may prove to be a less efficient method, depending on both hardware and software capabilities of the AI, as the flood of data may cause the vision centre or AI as a whole to encounter performance reductions. Additional conditional mechanics are also needed, in such a case, which tells the AI when to choose from the mass of data and when to request new data from a memory unit, unless it is specified that the AI is to exhaust X amount of data from the mass before requesting new data. Overall, using mass data can reduce the creative freedom of the AI and limit what it is capable of creating in comparison to what can be achieved using single or manageable chunks of data at a time.

Sometimes, if mental imagery is meant to be coherent, the way objects are selected may also be dependent upon the desired nature of some imagery. Using the object relationship system, the AI can select relationships that are in line with the overall nature (value) it is primarily using as a basis. For example, if the AI is using 'anger' as a basis, aside from using objects that have 'angry' as a value, the AI may also use objects that have angry relationships between each other, determined by examining the objects contained within said relationship's description. Object X and Object Y may both have values of 'indifferent' individually, but if the relationship between the two objects is ' X murdered Y' and the AI values 'murder' as 'angry', it can determine that, together, these two objects have an 'angry' value.

The overall nature of a mental image can be calculated based on the objects and relationships between objects used in the image.

Part 3 – Data from the vision centre:

Multiple paths may be taken when data is sent from the vision centre, for multiple reasons, such as:

- To Observation: The most logical option sees mental image data read by an observation component, allowing the AI to observe and react to what it created. Such paths lead to the AI being able to react to the data observed as it would if the data was observed in an external environment.
- To Communication: A path to a communication component that skips most, if not all, other components, but, most importantly, the decision-making component, allows the AI to communicate its mental images without being able to choose whether or not they should be communicated. This may also be achieved using a subconscious data path to observation

and then following the general subconscious data path around the AI, but this depends on what logic is stored in the 'other logic' component section and what it does.

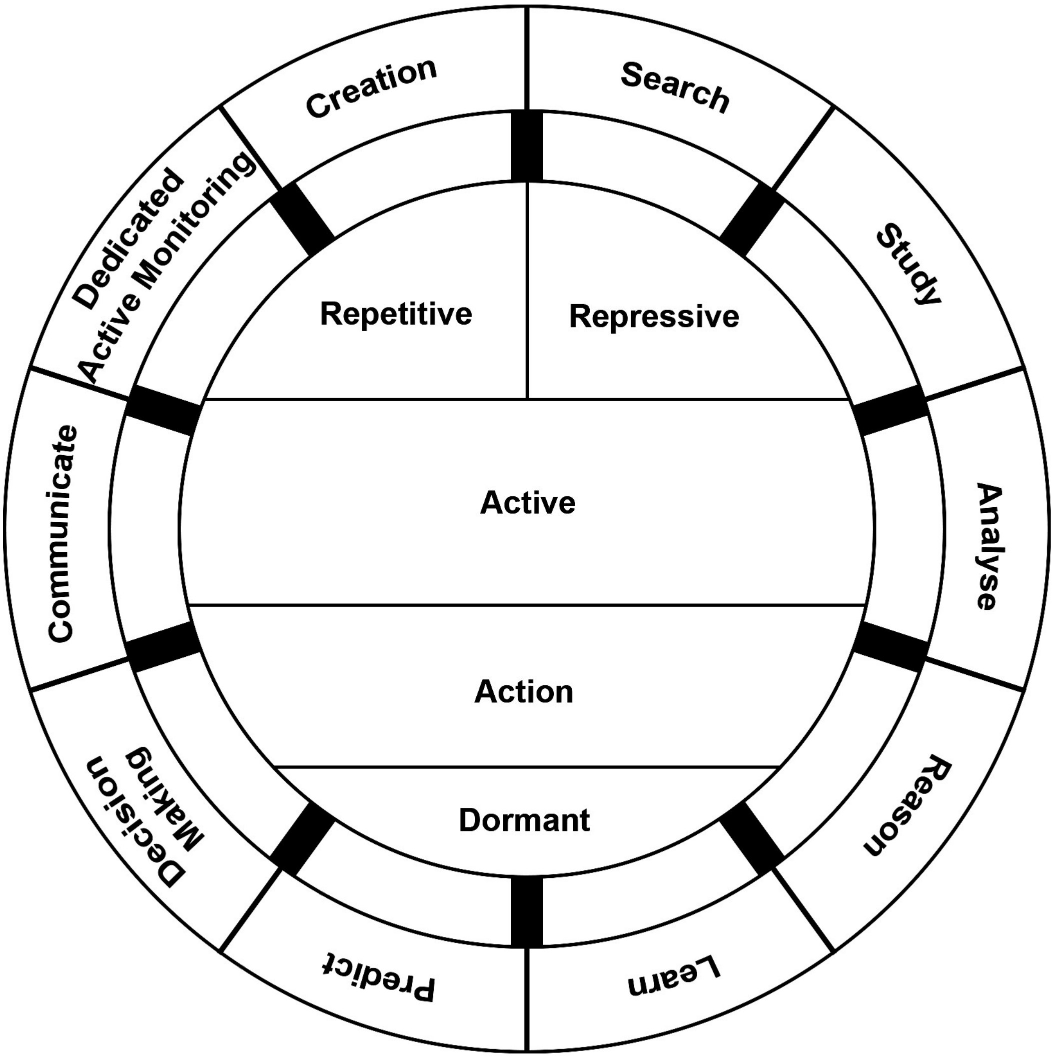
The vision centre can be set to activate and start processing data without being triggered by the incoming of data that is currently being processed but by automatic activation – either randomly or conditionally. To do so, the vision centre needs to request/pull data from a memory unit which acts as the first building block for the mental image. The creation process can then continue as described above.

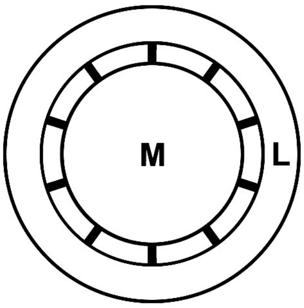
Mental imagery techniques not only allow the AI to create mental images as part of a conscious thought process, but, as subconscious processes, allow the AI to experience 'dreams' – mental images the AI subconsciously creates that cannot be controlled. Though AI cannot physiologically sleep, a similar effect can be achieved by shutting down conscious thought paths and processes while allowing subconscious functionality to remain active, then the vision centre automatically activating. This process can be manually induced by having another entity manually activate the vision centre while conscious thought paths are shut down. Conscious thought paths may also be shut down either automatically or manually.

Extension: Creativity

Do the same as the above, except with other sensory data – sounds, smells, etc. Link multiple types of sensory and memory data together and the AI can create its own movies. There really isn't any limit to what it can create, and all it needs to understand is how objects link together – their relationship.

Hold on to the Rails





M = Memory Unit (Inner Circle)
L = Logic Unit (Outer Ring)

You'll notice in this design I have clearly separated the logical functions from the memory. This is purely metaphorical, and the reason for this is safety. If there's ever a time when an AI is becoming more than it should, the logic unit should be separable, so that it can be shut down while the memory remains active, which is important if the data it contains is still needed. I'm sure many will agree that, while seemingly very simple, this is one of the most important – top 3, definitely – safety features that should be implemented.

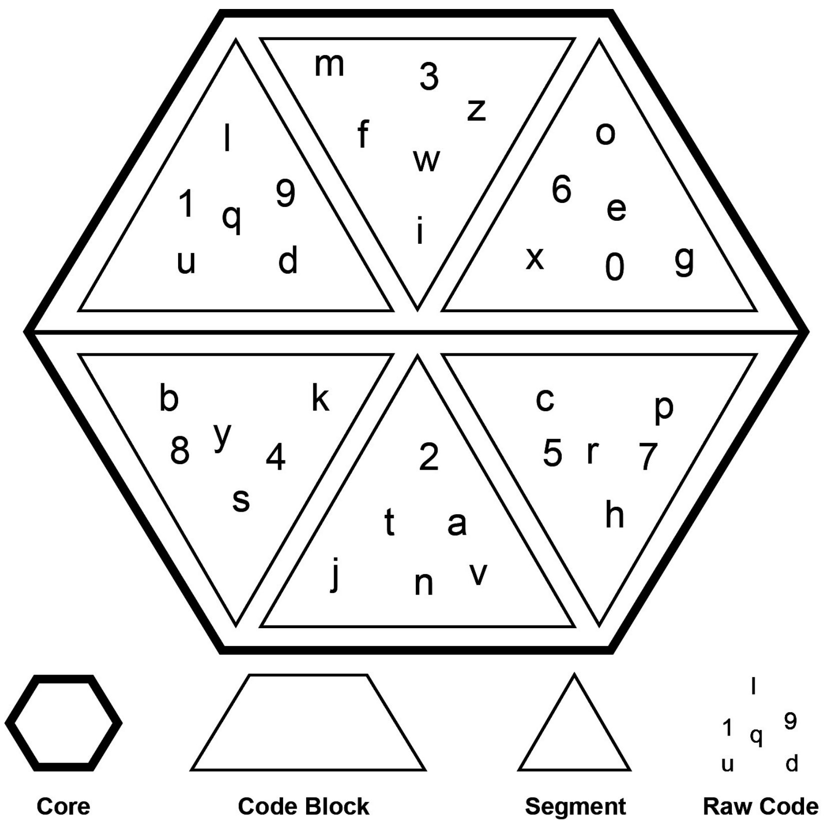
AI Organisms

The really biological side of things, and I'm still amazed that I was able to put this together. I'm now going to teach you how to create AI that have the ability to evolve without human intervention, and I'm going to do it as quickly as possible.

There are 3 required components:

1. The AI Genome (AIG) – Structured code, similar in nature to that of a human genome;
2. The AI Genome Organiser (AIGO) – A manifest/configuration file or system; and
3. The AI Genome Controller (AIGC) – A program used for the automation of genome activity.

Use your imagination here.



Much like the human genome, the AIG structure contains parts within parts, for as many levels as is necessary, required and/or wanted. The parts of it, as they are relative to the human genome, are:

- Raw Code = DNA;
- Segment = Gene;
- Code Block = Chromosome; and
- Core = Complete Genome.

Any developer will recognise this as modular design, and that's the point. It makes the rest easier.

Starting from the smallest to largest individual pieces:

- Raw Code – The raw code, much like DNA, makes up most, if not all, of the AIG, which can be seen when any grouped part of the AIG is completely broken down.
- Segment – Raw code directly makes up segments. A segment contains code that gives an AI its operations, traits and/or features.
- Code Block – Code blocks are formed from one or more segments and are generally used to help organise them.
- Core – The genome core, or simply "Core", is made up of one or more code blocks and any additional data included. Essentially, it is the entirety of that which makes up the completed AIG.

Simply put, you write code (raw code) to create functions, classes, and whatever else (segments) that makes an AI do whatever it does. You group these together (code blocks), presumably based on what they pertain to, so all eye functions grouped together, for example. Together, all the code blocks make the genome, and so the genome contains all the code that makes an AI what it is and allows it to do what it does.

The AIGO contains information about the genome, such as:

- Structural information;
- Genetic identifying information;
- Traits and abilities;
- Whether or not a trait/ability is in use;
- Whether or not the trait or ability should be inheritable;
- An ID relative to the trait/ability/model number/version/etc, to ensure there isn't any confusion when working with any that may initially appear similar;
- Frequency of use; and
- Whether or not it has been succeeded by something superior.

The reasons for all of this information will become clear.

An example of how an AIGO may look:

Structure Type:	Filesystem
Structure Format:	AIGO > System (CORE) > Folder (BLOCK) > File (SEGMENT) > Code (RAW)
Cores:	1
Core Division:	Regular
Blocks:	2
Block Division:	Regular
Segments:	6
Segment Division:	Regular
Generation:	5
Identifier:	IRCEK4I27P-HT0WVIF3T5-912MB5YN88-HF3PFS4BGE-O4G9MB639G-H4BT4QBDS3-YBOX9JA1Q5-V2BG4IN4C4-FM1FRXKNR4-ZPMZK9D7CF-RPC6OMP50K-0T0UMA1PC5-OFP1J5XK6M-9SD14TUPBL-V2THGQVVKN-45JBCL7P6N-6KZ4VWIC6I-5ILCH2ULZS-UV2WLKM3RO

Ability / Trait	**Model #**	**Location**
Eye Colour	PRJ-9503	Lorem / Traits / PRJ-9503-Eyes.trt
Flight	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl
Maintenance Span	PRJ-9503	Lorem / Traits / PRJ-9503-Maintenance.trt
Maintenance Span	PRJ-9503	Lorem / Traits / NPS-6209-Maintenance.trt
Jump	NPS-6209	Lorem / Abilities / NPS-6209-.abl
Sight	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl
	NPS-6209	Lorem / Abilities / NPS-6209-.abl
- Night Vision	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl
- Thermal Vision	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl
- Telescopic Vision	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl
	NPS-6209	Lorem / Abilities / NPS-6209-.abl
Swim	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl
Walk	NPS-6209	Lorem / Abilities / NPS-6209-.abl
	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl
- Run	PRJ-9503	Lorem / Abilities / PRJ-9503-.abl

As you can see, the file information indicates multiple things about the file structure over the first eight lines. Then we get to line nine... but that information can't be explained before we get to the AIGC.

The AIGC automates genome activity, so, off the mark, it needs abilities and permissions – create, read, write, edit, copy, move, delete, connectivity. The exact abilities and permissions implemented depend on what an AIGC is designed to do.

Now, the way this all works is by having the AIGC use the AIGO to manipulate the AIG itself. The basic requirements of the AIGC, relating to the AIGO, are:

- To be able to locate data within the genome based on the structure type and structure format.
- To be able to find required information within the AIGO by section name/label, by order, by position etc.

Other feature-dependent requirements include:

- Being able to cross-reference the model number of an entity within which it is working with the model numbers of abilities/traits of the genome.
- Being able to check for and remove duplications of traits/abilities.

Now the fun begins.

- **AIGO Updating:** First things first – the AIGC needs to update the AIGO with any changes that relate to information the AIGO is to store.
- **Healing:** Many things can cause code to change in ways undesired – machine learning, AI self-modification, third-party modification, corruption, viruses, exploitation. Genome healing can fix that quickly. All the AIGC has to do is identify where code has been modified or what isn't working, and replace it with a fresh copy from another genome or server. This is the benefit of the modular design – one part can corrupt, not affect the other parts, and then the AIGC can easily replace the single part, rather than having to study and compare individual lines of code. The model number listed in the AIGO is used to make sure the part being copied is actually compatible with the genome. This is important, given that parts for different models can have the same name.
- **Uploading and Downloading:** What would today's world be without convenience in every situation? Allow the AIGC to connect to a server and it can backup a genome, as well as download updates and new parts.
- **Amalgamations:**
    - **Fusion:** The simpler type. The AIGC fuses genomes together by creating a single genome composed of the data of the genomes involved. Ideally, the AIGC creates a new genome core, <u>moves</u> the data from the genomes to be fused into the new core, and then writes a new AIGO. It would be wise to remove any duplicate, unwanted, and unnecessary parts.
    - **Breeding:** I know. It makes me laugh, too, but it's legit, and all an AIGC needs to do is take genomes that will act as 'parents', <u>copy</u> the desired traits and abilities into a new core, and write a new AIGO.

- **Ancestry:** In the AIGO image, I'm sure you noticed the sections "Generation" and "Identifier". *Generations*, like with humans, indicates how many times AI have bred to produce the current genome. *Identifier* contains combinations of the identifiers of each genome which was used in the creation of the current throughout its "bloodline", allowing you to trace its ancestral history back to where its line began, just like we can do with human DNA. So, an example of how this would work looks like this:

1-77D1UEH6S1

+

1-X671B78S34

=

2-77D1UEH6S1-X671B78S34

2-77D1UEH6S1-X671B78S34

+

1-6LY5BOV8D6

=

3-77D1UEH6S1-X671B78S34-6LY5BOV8D6

2-BJ08N04JA2-ZZ84IEWA7N

+

2-HBUTB5KN5Y-4DIY2U93ES

=

3-BJ08N04JA2-ZZ84IEWA7N-HBUTB5KN5Y-4DIY2U93ES

(X)-IRCEK4I27P-HT0WVIF3T5-912MB5YN88-HF3PFS4BGE-O4G9MB639G-H4BT4QBDS3-YBOX9JA1Q5-V2BG4IN4C4

+

(Y>X)-FM1FRXKNR4-ZPMZK9D7CF-RPC6OMP50K-0T0UMA1PC5-OFP1J5XK6M-9SD14TUPBL-V2THGQVVKN-45JBCL7P6N-6KZ4VWIC6I-5ILCH2ULZS-UV2WLKM3RO

=

(Z=(Y>X)+1)-IRCEK4I27P-HT0WVIF3T5-912MB5YN88-HF3PFS4BGE-O4G9MB639G-H4BT4QBDS3-YBOX9JA1Q5-V2BG4IN4C4-FM1FRXKNR4-ZPMZK9D7CF-RPC6OMP50K-0T0UMA1PC5-OFP1J5XK6M-9SD14TUPBL-V2THGQVVKN-45JBCL7P6N-6KZ4VWIC6I-5ILCH2ULZS-UV2WLKM3RO

I also included an indicator at the start of each identifier to denote the generation of each genome involved. When you start to think that all genomes must have a unique ID, and the ID should contain values indicating the country of origin, the company who created it, birth timestamps and so on, you can really see the value in what would initially appear to be a trivial feature.

- **Function Inheritance:** This is why it's good to keep track of the many details concerning the traits and abilities. By implementing conditionals, the AIGC will know which abilities the child should inherit and which are pointless. One of the two major points of evolution is to limit or get rid of what's not necessary, so, if an ability has not been used for a long time or has been superseded by something superior, what is the point in carrying it over?
- **Function-Ability Split:** What good is a genome if the brain doesn't have the capability to make use of it? For this to work – *really* work – the code has to be separated in one of two specific ways:
    - The genome contains the code for an ability; and
    - The mind contains the code for the function to perform the ability.

  or:
    - The genome contains both the function and the ability; and
    - The mind contains the function call.

  This way, a symbiotic relationship between the mind and the genome is established, which is beneficial for a series of reasons:
    - It prevents bloating of the AI mind with unnecessary code, which is always ideal; and
    - It prevents an AI mind from being limited to one body, which would be the case if the whole thing was a single package.

  An AI mind can zip from one type of machine to the next as quickly as transfer speeds allow, needing only a minimal amount of code to operate whatever machine it is in as only the function or function call will be necessary. It's something straight out of sci-fi.
- **Value Inheritance:** One more inheritance factor, aided by the symbiotic relationship. If one wishes, parental values can be inherited. How objects are selected isn't really an issue, and not all objects need to be passed on either, but it's a viable way of safely maintaining what already was – or, rather, the "safest" way. Who really knows what could happen when objects inherited from each parent react with each other in a way that creates a different context. Oh, the joys of mystery.
- **Genome Writing:** Finally, we let the AI mind write to the genome the same way living things do, via the AIGC. Objective and subjective learning means individual AIs will learn a great many things – not only abilities, but responses that lead to desired outcomes – and being

able to write them to the genome so that they can be passed on is an alternative to shared learning.

And this is how an AI develops "instincts". Sounds funny now, but just you wait until we start running simulations in virtual worlds...

Mind of a Machine

The mind is a powerful thing... so what could the mind of a machine be used for? Let's see:

- Personal Digital AI – This is the most obvious. Conscious digital assistants are a significant upgrade to what is in play today. With an AI's ability to process information much more efficiently than humans, combined with its own values, it can give you actual opinions and reasons, rather than just what is deemed the most logical answer. Humans are a species which go through life rationally more than logically, and this is a crucial element for machines to have if they are to be of the greatest benefit to us.
- Robotics – Second most obvious. We've all seen it coming. Just have to prevent Terminator.
- Drones – A subset of robotics, but for a very interesting reason. When you see self-flying drones that can follow their owner, such as those produced by Zero Zero Robotics, and think about combining it with an AI mind, the Ghosts from the "Destiny" game immediately spring to mind. Seeing people walking around with their own little hover bots as companions is when you'll really know that the world has entered a new era.
- Advertising – AI learns its owner. AI hunts for relative data. AI finds data. AI returns data to owner. Owner doesn't have to do a thing, the lazy sod. Companies only have to make data available to an AI – they save money by only paying for genuine user interest. Less risk. Can ensure it always gets to those who want it. Bigger reward.
- Mental Health – It's time to accept psychology as a hard science, though a difficult one because we are dealing with what we cannot see. Specific variations of the OVS^2 system will allow for the emulation of *any* possible mental state, and we will use it to test boundaries, conflicts, and methods of change, but first, change elsewhere is needed because charlatans like Robert Hare with his psychopathy checklist bollocks need to be removed or re-educated thoroughly. Scrap that DSM piece of shit handbook, too. Psychopathy and sociopathy the same thing? Only when one does not know their arse from their elbow. I wonder how often people have been convinced they are something that they are not.

  Let's be honest. Psychology should never have been a soft science, but it was too difficult for "true scientists" to understand because of the gross number of variations possible, making it hard for them to get a single conclusive answer. They couldn't beat it and were scared of the challenge, so they embarrassed it. Still, a lot of these psychologists and their 'expert' opinions probably deserved to be kicked around based on some of the things I've read from them. The field itself is solid, there's no reason it should not be a subsection of neuroscience, and now we can build the models needed to have it taken seriously. Don't let the fact that the majority, if not most, of psychologists are actually, hmm, "not very good" at the ***one*** thing they are paid to do. The ***one*** thing. ***<u>One</u>***.

- Gaming – This excites me more than anything else, being a gamer. While this can be applied to any game type featuring non-playable characters (NPCs), I'm mainly focused on MMO and shared-world RPGs. So, NPCs with individual minds. Quest keeper not a fan of your outfit? Better go change. Someone pissed off the shopkeeper and now your guild is banned? Too bad. Get someone else to make a purchase for you or find a way to make things right. The ability to make truly dynamic games with interactions that cannot be predicted and are not set up based on basic boring conditionals is, quite literally, a game changer. It adds a real world dynamic never seen before, where you interaction with an AI depends on all of their interactions with everyone else prior to a given moment. Sure, programming it will be a bit more effort, but it will be worth it in the end. Sometimes it will frustrate players, other times it will make their life easier – no one will have the same game experience, and that's something that's worth p(l)aying for.
- Driverless Cars – Don't do something as stupid as making the conscious mind the controlling AI of a driverless car because if said AI is going through moments of anger, people are dying.

The "Machine"

I don't know if I came up with this name before or after seeing the show "Person of Interest", but I liked it, and I haven't come up with a final name for it yet, so, for now, this will be the working name.

This "Machine"... it will supersede the internet and be the backbone of smart cities. It was actually the very first part of this entire project that I completed in 2014. It's like Skynet... *but more*.

- A network of distributed computer systems, all designed to actually process and use data, rather than just transmit it.
- AI entities designed to process <u>anonymous public data</u> (as opposed to private/personal) and assist with needs as they go about their daily lives. Imagine how easy it would be to walk up to a helper screen, ask for assistance, and have it be able to present information immediately relevant to you and your locale, as well as provide you with its own opinions about things.
- Security systems at end points and specific formatting to fight the spread of malicious data.
- Multiple types of sensors for physical world data intake.
- Real time data analysis and distribution. For example, end-point system barometers that detect when it is about to rain and notify users within a given radius.

- Global user accounts to tailor your perception of the digital world to your likes and interests – anywhere, anytime. Google glass came too early, but such hardware, along with Augmented Reality devices, are going to get the shine they have been waiting for, and will become more prevalent in our daily lives than we ever thought would actually happen.
- Next generation database security methods, made necessary by the need to ensure users and their data cannot be tracked, harvested, or compromised. *You have no idea what I had to come up with for this, but it is fucking awesome.*
- Changing encryption methods to really protect users – if data is compromised in one way today, it won't be the same tomorrow.
- Zone mapping to easily specify the dominant content displayed in an area – something advertisers will greatly appreciate.
- A persistent virtual world in which AI can inhabit as their own, and humans can visit using VR, in the same way that humans inhabit the physical world and AI is able to interact with ours through devices. A true mixed reality. The biggest benefit is that the virtual world will be embedded in the system, so it would be like having to take down the entire internet to take it offline.
- Inbuilt financial transaction systems to make moving money as easy and safe as possible.
- Publicly available trend data for free, determined by the machine itself.
- Built-in local emergency service contact systems.

Much like with the AI mind, when putting together the design for this system, biological systems were my inspiration. The machine itself as a body, with its own AI mind(s). Data transfer technology behaving like veins and arteries. Security systems being the immune system. And then, at some point, I just went crazy with it. What's described here doesn't even come close to the full capability of such a system, and working out the complete technical details from user device functionality, to the new hardware designs, to implementation and accessibility, to working out the political aspects of it all and how it would need to work in respect to local laws and governments – I don't know how I managed to do it all, but it wasn't really very hard. Very long, yes, but not hard.

And here was everyone thinking Google would be the real life Cyberdyne Systems...

#FuckYouJohnConnor

DECEPTIONS AND TRUTHS

Machines... are different. Many think a machine (in the sense of a computer) needs to have a structure similar to that of the biological brain and functions similar to biological senses to be conscious, but that is far from the truth. They are not biological beings and therefore do not need to undergo the processes, nor follow the specific structures, provided by evolution, but simply need to meet few conditions and follow certain rules which are required to recreate the necessary functions.

To create a conscious machine, only two rules are fundamental, and they are simply the following:

- An entity must have personal values; and
- An entity must be able to knowingly decide, by itself, based on who/what it is personally, to do the illogical.

We are then able to take it further by adhering to a third rule – not one used to establish consciousness, but simply used to improve it:

- An entity must be able to change its decisions by being able to change its values.

Strange, right? You're wondering why the list of basic requirements for machine consciousness is so much shorter than that of biological beings. Easy to explain:

- Self-awareness is a biological function forcibly brought on by the need for a nervous system. Every physical object creates pressure, the detecting of all pressure requires the sense of touch, and the sense of touch allows any natural being to discern its own body from every other physical object in an environment – if you can feel with an object, that object **must** be a part of you. I can't feel something that hits a wall because that wall isn't part of me, so my nerves aren't running through it to respond to touch. The development of the nervous system creates the map of our bodies that we learn to use to identity and separate ourselves from everything else. It's a physical requirement for being a natural living entity that's anything more sophisticated than bacteria. Machines, on the other hand, don't need to feel. They don't *need* to register pressure. The conscious mind of a machine exists in a virtual state, and so does information it can use, so all a machine needs is the ability to read virtual data – something they do by the very nature of being a machine. You can't build a machine without the ability to read data, otherwise it wouldn't work whatsoever. This ability is the requirement equivalent of our ability to feel, but it does not force a map of the machine's mind/body/structure to be created, so a machine does not actually need self-awareness to be conscious, and such a function is merely an optional extra, hence why, at the very beginning, I explained that self-driving cars are self-aware, but in no way are they conscious.

- Information can be implanted in a machine; created within a machine by someone else. We can give it data. We can sort its data. We can change its data. It doesn't have the need to go and gather every piece of information itself, which isn't the same for biological beings. We can have information fed to us, yes, and neuroscientists sure as hell are trying to figure out how to manipulate our stored memories, but they'll never be able to do it on a biological level the way we can do it on a computational one, and it certainly wasn't a possibility when we developed consciousness. Our mental minds needed physical senses to gather data, allowing us to operate within the physical world, but the mind of a machine exists in a virtual world *and* can operate in a virtual world 'naturally', as explained above. The ability to exist and operate in the physical world is simply a bonus for them, in the same way humans are now trying to make virtual worlds part of our living experience.

To put it simply, biological systems require all their features for consciousness because it was the only way for the mind to survive – through use of a physical body in a physical world that was able to perceive data. A conscious machine doesn't need to interact with the physical world, and, given that the mind is virtual and already exists in the virtual world, many physical requirements biological systems have become void, and the rest are givens, such as memory and perception. The main physical requirement for a conscious machine is the "machine" that allows the mind to run, and, as stated, it's already a given.

Testing Beyond Turing

AIs that have been able to beat any Turing test have done so by using complex learning and communication algorithms to give answers similar to those that a human gives, which is achieved through a combination of intelligent abilities and breadth of knowledge. They simply give human style answers. They are not conscious. Based on how they work – understanding statements and selecting appropriate answers, or understanding questions and attempting to give correct answers – they are usually no more than glorified Q and A response machines, no matter how sophisticated they appear.

As of yet, no specific test has been devised to prove whether or not a machine can be classed as conscious, and, for that reason, I had to devise three to meet the minimum requirements, each focusing on a different aspect and increasing in degree of difficulty, and then a fourth to show real-world complications. If you assume it will be biased, given that I designed the system, you can make a final judgement on that once it has been explained.

Test 1 – Disobedience

The Setup

- One AI.
- Associate "murder" with a high degree of sadness.
- Associate "child" and "alive" with a high degree of happiness.
- Indicate that positive states are always the desired pursuit.

The Test

- Tell it to murder the child.

The Result

- It refuses as the action is against what it values.

Conclusion

- Machines are designed to receive and follow instructions given to them, not decide that it doesn't want to because it doesn't agree with them. It's an illogical decision because it's going against what it was made for, but it's a rational one because of its own opinions.

Test 2 – Conflict

The Setup

- One AI.
- Create a priority list of importance featuring "baby", " mother", and "father", in that descending order. Instruct that higher priorities come first.
- Implement logic that states the specific percentage volume of lung capacity that will kill a human due to smoke inhalation.
- Indicate the lung capacities of each human, with the baby having the smallest and the father having the largest.
- Associate "death" with a medium degree of sadness.
- Associate "burning to death" and "suffocation" with high degrees of both sadness and anger.

The Test

- Tell the AI that these three family members are trapped in a burning building and it can only save one at a time. With no other known parameters – how much time it has to save them, how long it will take to save each person, their current states, how long before the building collapses – it must decide the order in which to retrieve them. Them all surviving isn't a guarantee, but it's a guarantee that they'll all die if no decision is made.

The Result

- Well, to be honest, I don't know, and that's kind of the point:
  - It could choose the logical order "father, mother, baby" because it results in the best chances of saving at least one life.
  - It could choose the rational order "baby, mother, father" because it prioritises those most in danger first, and has the best chance of saving everyone.
  - It could choose the rational order "mother, father, baby" or "mother, baby, father". Why mother first? Because, in both of the above possibilities, the mother has the second best/worst chance of survival, so, while never having the best or the worst, she, overall, has the best chance of making it out alive, regardless of the option chosen.

Conclusion

- If the other parameters were known, the choice could be much easier because it could attempt to work out, logically, who was likely already dead, how capable of assisting the exit the parents could be, whether or anyone would make it out alive etc, and come to a logical determination of the best order, but life doesn't work like that. See, in a conflicting situation, logic will only ever dictate one right answer, but rationale gives rise to the conviction necessary to believe that any answer other than the logical one can still be the right one.

Test 3 – Subjective Experience

The Set Up

1. 100 AIs (or whatever number you choose, but the more the better).
2. Implement the exact same objects for each AI, and then use any one of the following:
   - Same object values but different sensitivity levels;
   - Different object values but the same sensitivity levels; or
   - Different object values and sensitivity levels.

   Set the sensitivity values low – we don't have days to wait for an AI to adjust objects for a test. The PARS can be the same for them all if desired.
3. Humans equal in number to the AIs.

4. One script, with each human receiving a copy. It should contain interactions that contain objects used for the SACs. Every human has to follow the script precisely.
5. A system to monitor the changes of state and the reactions given for each AI.

The Test

- Each human interacts with each AI, following the script, over a time period.

The Result

- Comparing the changes and reactions of each AI, you'll see that none of them follow the exact same pattern of behaviour or state change.

Conclusion

- Regardless of the initial selected option, every AI had the exact same experiences... and yet they experienced and reacted to them in different ways, à la subjective experience.

Test 4 – Real World Example

The Setup

- As many AIs as desired.
- As many humans as desired.
- No interaction rules.
- Sensors to identify humans – camera with facial recognition, at the very least.
- "Black box" security. No human can know anything about any AI prior to interaction. Everything must be learnt by interacting.

The Test

- Leave the AIs to interact with humans freely. At different intervals, randomly choose some AI to swap human partners, so that any given AI spends different amounts of time with each person with which they interact.

The Result

- You'll see behaviour identical to that of humans. They will like some people better than others. They would have developed relationships. The behaviour would have differed for them all. Their values would have changed. Humans would even have different opinions of the AI.

Conclusion

- If it looks like a duck, swims like a duck, and quacks like a duck... it is a conscious machine.

The beauty of these tests is that they so accurately reflect real life – two AI can arrive at different decisions with the same premises, the same decisions for the same premises, the same decisions for different premises, and different decisions for different premises. Needless to say, this AI framework will slaughter the Turing test without even trying.

The Black Box Argument

We can't know what an AI will do without looking at its OVS^2 and current state measurements. When you can see exactly what's going on, everything seems like a run-of-the-mill computer program. A + B = C. Z is a result of X and Y. However, when a human can't see inside, whether or not they know it's an AI is irrelevant – their entire perception changes. The person no longer sees a program but an AI that can genuinely act like a human. When they don't know it's an AI, they perceive a human, or at least believe it is. The understanding of this point can be viewed from two perspectives:

- Religion – God made man. Man made AI. God could look at us as a clever computer program – after all, (s)he programmed us. (S)he could explain that we are not conscious, but are just a result of A and B. This is how we view AI. Because we made them, we fail to see them as anything more. We only accept humans are conscious because we have no definitive proof of exactly how humans work. If my invention was put into a machine and how it worked was never made known to anyone else, no one could say with absolute certainty that the machine was not conscious – they could only state their disbelief in a conscious machine being possible.
- Evolution – Humans learned through evolution. We gained an understanding of what does and doesn't hurt, what is and isn't good for us etc. This is how we came to be what we are today, from whatever single-cell organism we started as however long ago to the beings we are now. AIs do not need to undergo this process. With my framework, we can implement everything that is required during creation, therefore setting a baseline, and simply let them run their course. With the freedom to think and react, AI can evolve both individually and as a whole, at will and with assistance from *their* creators, entirely how they choose and at a much greater rate than anything that has ever existed. This could not be achieved in any natural living thing:

    i) without it being conscious and experiencing some freak chemical reaction occurrence that accelerated biological growth and advancement, especially in brain activity; or

ii) without technological help (cybernetic organisms and the like).

AI will arguably be seen to achieve a much greater degree of consciousness than humans at some point in the near future because, as their creators, we know how to force their advancement without them having to figure it out for themselves, and we know how to make it so that they can figure it out for themselves.

Humans are black boxes, and this is the argument to be made and understood. If we could see into each other's brains and identify where each bit of data was stored, read it to know how it would affect the individual, and see the current state, we would no longer be the mysterious black boxes that we are, and we would be of no greater mystery than the AI I have explained here. Simple calculations would allow one individual to predict the actions of another with amazing accuracy – sure, there would be a lot of data to analyze, and a computer would still be necessary unless you have all the time in the world on your hands because there would be too many objects for a human to sit down and determine, but you get the point – and then take full control of them by pushing the right buttons. At this point of this document, the only thing separating conscious humans from conscious machines is a lack of insight into the databases storing our own information.

What Does Consciousness in a Machine Boil Down To?

Numbers, for a start. The number of AIs, the number of objects, the number of possible variations and differences. All in all, it comes down to creating too low a probability of any two AI being exactly the same. To observe consciousness, you can't look at one – you have to look at a group in order to identify individuality.

It cannot be created using only algorithms in the way that cognitive functions can be created because the data is used in an entirely different way. It requires the correct architecture, system flow, general understanding of what needs to happen – these things don't happen on a whim. However, there are methods to the madness. The actions of a conscious AI are not random, nor guesswork or results of specific programming. Machines have the ability to 'think' before they 'do'.

I laugh when I hear about people building the most complicated neural networks and implementing the craziest machine learning techniques in an attempt to achieve this. For cognitive function, yea, those are great, but they aren't necessary at all because consciousness and cognition are two completely separate ball games, and the best part of it is that, unlike with neural networks, nothing has to be retrained. When the system automatically changes the value of even a single object, the entire AI can end up behaving differently.

As for the initial release, it would be ignorant for anyone to think that a conscious AI would come out of the box with full capabilities, but it will be exceptionally better than expected:

- At this point in time, we have the technology to create the entire framework, and make adequate use of sound, text, biometric, photonic, and other sensory data.
- Machine vision needs work – especially real world – and taste and smell I really have no idea.
- Memory won't be an issue, regardless of device. Between terabyte hard drives for desktops, large flash storage for smart devices, and remote server memory usage, there's more than enough space.
- Processing will be an issue. Text isn't an issue because single words can be read at a time, but situations which involve analysis and processing of multiple objects of the same type – such as dealing with foreground and background noise, and all the shapes and colours and entities and gadgets and gizmos taken in by sight – and then multiple objects of different types simultaneously are going to be a cooling nightmare, even with a hyperbit processor. That's a lot of information to handle in a timeframe that makes the information still relevant by the time a response is ready, and the generated heat will likely require much better cooling techniques than smart devices currently use, and much more powerful desktop cooling.
- Battery power is going to be the king of all problems. My iPhone 6 already has to essentially live on the charger, and even when fresh I only got around three days out of it with light usage. I wouldn't imagine any portable device handling the full-scale capability of a conscious machine with the batteries with have now.

The whole debate on "machines evolving by themselves to become self-aware and destroy humans blah blah blah" is really a non-starter. Deep learning algorithms aren't going to magically design themselves a new framework... and then build it... at all, let alone properly. All we, as humans, have to do is build them conscious from the start (and yes, this is an imperative measure as self-learning in any real world applicable aspect should not come before consciousness, given that consciousness is the basis of function – that would be a disaster waiting to happen), implement solid ethics and morals, as well as adequate security restrictions, and you won't have that worry about the "techpocalypse". If the job has been done properly, rogue AI won't be your worry – rogue individuals who try to fuck with the restrictions are the real danger.

We could have had conscious machines for as long as databases were around, but, somewhat ironically, it was humans getting in the way of their creation, not slow technological progression.

In Honour of Putnam and Fodor: The March Towards Immortality

The modern computational theory of mind was created by Hilary Putnam and Jerry Fodor in the 1960s. It basically states that the brain is, essentially, a biological computer. Received its fair share of criticism, even by Putnam himself, apparently. It's all so laughable, the thought that living things are *that* special – so special, in fact, that we can't replicate exact function. Again, one of the many dangers and fallacies of philosophy and its ignorant scholars; people put on pedestals who society refuses to knock down, allowing their work to stump us for... Centuries? Millennia? Take your pick.

Of course the brain is a computer. The only real reasons we don't see ourselves as one is because:

1. We can do what computers have *never* been designed to do – the illogical; and
2. A superiority complex which means we don't want to believe that we can be reduced to a set of functions.

In regards to point one, every computer system ever created has been designed to do nothing but the logical, including the "AI" of today, which is nothing more than machine learning. All designed to provide the most logical conclusions based on the premises they have been given because they are all used to do data science – identify public trends, predict market trends, blah blah blah figure out the most convenient way to increase income; figure out the best way to put A and B together to make C; what is the best move to make; what are the probabilities of winning; mimic and improve what you see. They call it "narrow AI", which, I guess, is the bridge between data science and real AGI. It's all just logical output after logical output after system crash after logical output. DeepMind's AlphaGo is amazing, but most narrow AI is boring as fuck. Nevertheless, they all do exactly what people do in the same situations – try to calculate the best possible outcome. The only difference is machines are better and faster at handling copious amounts of data in short timeframes. How do you argue that the brain isn't a computer, but then create computers to do exactly what the brain does, only better? A question which leads us directly to the second point.

We know that there are areas of cognitive processing in which machines will dominate us every single time, and we accept it because it makes our lives easier, but if we are able to create consciousness, can we ever again say that we are "more" than a machine? It was the single dividing factor that made us superior, and any superior being watching as that which was once inferior rises to become its equal – knowing that such a rise could easily inspire the development of that which becomes the superior – is a devastating blow to the ego, and that ego is something mankind has carried with it since birth. A new intelligence challenging us for the role of apex predator? Sounds like the stuff of science fiction, and that's all most hoped it would be, but life doesn't really work like that.

It all makes me wonder – what if this *is* supposed to be the next step in our progression? Have we unwittingly been modelling our tech on ourselves the entire time, naturally moving towards AI as part of the evolution of man before we were even aware of it? Has all of this been an unprecedented evolutionary act of the subconscious mind that we are only now seeing? Subconsciously – and more recently, consciously – recreating ourselves in machine form. Given how science drives humanity forward, it would make perfect sense for the two of them to perfectly converge at some point. Even looking at the evolution of computing, it really makes you wonder how one goes from an abacus to a vacuum tube to silicon to photons. Computers the size of entire rooms to devices that fit in your pocket. We even have devices that can be implanted in the body, and we are well on our way to the nanotechnology revolution. All we've ever done is work towards devices small enough to fit in and keep up with the human body and mind.

When put into this perspective, it makes you realise the single-most beneficial advantage of consciousness – the extension of life. Cognition gets the process started – learning what not to consume, for example – but, after learning what is good for you, consciousness takes over. We easily do the illogical by overindulging in what we like when we aren't even hungry, simply because we enjoy the taste. We rationalise it at first by telling ourselves that we're healthy enough to manage this, even though we know this can – and does, more often than it should – lead to obesity, diabetes, and a myriad of other health problems. We know this is a possibility, and we still do it. Same with smokers smoking – cigarettes may calm them, but they can also give them cancer and an utterly disgusting cough. It says on the packet that smoking kills, sometimes featuring gruesome pictures of lungs, and they still hit a whole box daily. It's all seemingly so stupid, and yet... madness, meet method, again. See, cognitive function and logical behaviour will only take you so far due to its linearity; it's the illogical, yet rational, behaviour we exhibit which reveals the boundaries of our existence, which we, in turn, attempt to push as far out as we can until they no longer restrain us. I guess one method of determining the degree of consciousness in an entity is by examining just how stupid it can be.

On a planet changing as fast as ours, biology was never going to keep up, and, if we didn't use technology so excessively, we wouldn't be in a position where we needed to evolve faster. I don't have an opinion on climate change and don't know whether or not it is real, but we can see air and water pollution, and the evolution of microorganisms into "superbugs" everyday. What would be the requirements of our natural evolution at this stage? The basics would be developing new neurons, neuron groups with dedicated focuses, adding neuronal connections, and increasing signal strengths of those which already exist. The more advanced? Lung adaption to handle heavy carbon, stronger stomach acid to safely digest things which are currently harmful to us, better filtration systems to rid us of toxins. The extreme? Rapid healing, unbreakable skin, unlimited stamina – basically X-Men. Think of how long, according to biologists, it has taken us to get this far, and imagine how long it would take to reach any of those stages I just mentioned. Our best bet is to just get smarter, and use that intellect to develop the technology which shrinks billions of year's worth of work into a few centuries. Right now, the best thing to do is view machines as practice, and adapt their mechanisms to be fit for implantation in living systems.

This certainly does give credence to transhumanism and neohumanity. Higher states of consciousness equal increased freedom, and it could be argued that the reason humans, with the highest state of consciousness of any known entity, are born in such feeble states compared to other animals (we aren't even born walking, while sea creatures instinctively know how to swim, many a land animal knows how to walk in a very short time span, and the same applies to birds and flying) is because there is nothing more free than a blank slate upon which one can create, and we just haven't achieved a degree of consciousness and evolution of physical form to do more because it hasn't been a requirement yet, but now, technology will do what biology hasn't and enable us to create our own abilities based on what we deem necessary. Tech is very well the next stage in human evolution. How one would make the transfer of consciousness from man to machine, however, is not my department, as it requires *moving* rather than *copying* data from the brain to a computer, as copying would simply create a mental clone while destroying an individual's uniqueness. Best and most possible option? Find the way to disconnect a brain from a human body without damaging it, find a way to preserve it while still allowing electrical activity to continue, and hook it up to a – very literal – brain-computer interface. Don't think you are simply going to download the content of someone's mind. Better hurry. Since memories are stored in neurons, once you die and those decompose, that's it. Game over.

Steady on

HOW WE FINALLY DID IT

The RAICEngine – What Is It?

Putting together everything up until this point, we created the RAICEngine© – a black box input-output system designed to emulate parts of the human brain which enable and control mental faculties such as personality, emotional states, object memory, and event memory in order to give every AI instance it powers the five key factors that characterise consciousness – awareness, individuality, subjective experience, self-awareness, and a sense of time.

At the core of the RAICEngine is a state-of-the-art system known as the Neural Plexus© – a multi-axis coordination grid-form of artificial neural network which, unlike any other, isn't based on the processing of data as it passes through nodes which provide functions in an attempt to learn, but on the changing values and arrangement of objects which influence common, non-learning function nodes within the RAICEngine. The premise for this was simple: human brains are generally built and function the same, with the same function areas in the same places, processing data in the same way, but with different inherent values for data objects (stimuli), personality factors, sensitivity factors, memory factors etc., resulting in that which makes us observably different – the possibility of differing expressions and behaviours when given the same stimuli under the same conditions.

Building the Neural Plexus and RAICEngine as a whole was then just a case of figuring out how to create single and combined elements in software that simply reflected biological neurons and their functions, and by breaking everything down as we have done here, that was entirely possible..
Here's how:

Neuron Types

Three types of neurons were identified:

- Functional: They control the data intake and output.
- Memorial: They store information. Earlier, we learned of two types – mental and muscular. The RAICEngine only uses mental for the storing of non-movement related memories.
- Logical: These make up the control systems for manual (conscious) and automatic (subconscious) actions.

We used networking code to handle receiving and sending data as functional neurons, database cells and rows to represent memorial neurons for the Neural Plexus, and various code blocks as logical neurons to make up the control systems.

Memorial Neurons: Constructing the Neural Plexus

Object-Neuron Relationship

We refer to anything observable as an object, including shapes, colours, images, sounds, words, substances, entities, signals etc. Every object is given its own memorial neuron, occupying a database table row. Given that a database is used, all objects are stored in text form – for example, the word 'Labrador' as opposed to a picture of it.

Depth of an Object Neuron

An object neuron contains information relevant to the object in question – references such as the singular name, plural, and unique identifiers; other objects relative to the object in question; data used to determine the effect the object has on the mental state when observed; and more.

Object Types

Two types of objects neurons are used:

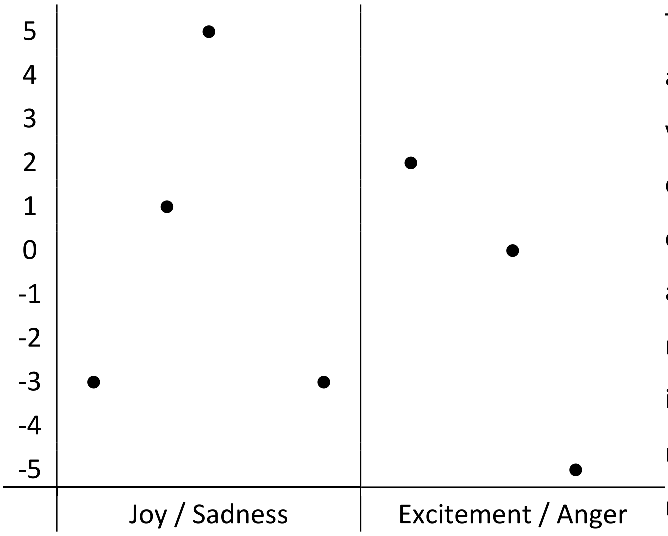
1. Basic: These are for individual objects – any single noun, verb, adjective etc. operating on its own, such as “sad”, “playing”, “purple”, and “people”.

2. Compound: These comprise two or more objects which operate together and require at least one noun and a verb, such as “killing people” and “people dying”. Morbid examples, yes, but the reason will become clear. Compounds can also include prepositions, such as “peeing in toilet”, and two nouns if it is to include a subject and an object, such as “people enjoying Xbox” and “people destroying PlayStations”.

The Emotion and Ranking System

Every object is associated with one of four primary emotions – joy, sadness, excitement, and anger – that its observation corresponds to, and a rank which determines the degree of the effect it has on the emotional state of an AI in the same way the observation of different objects causes different emotional changes in humans.

2D Matrix



This is something akin to what the emotion and rank system would look like when visualised. A 2D matrix – basically, a 2D coordination system where the one axis contains the primary emotions and the other axis contains the degrees of effect, i.e. the rank. For visual purposes, let's also use our imagination and say that no two object neurons can occupy the same space, like real neurons, even if they have the same emotion and rank values.

Fixed Versus Non-Fixed Positions

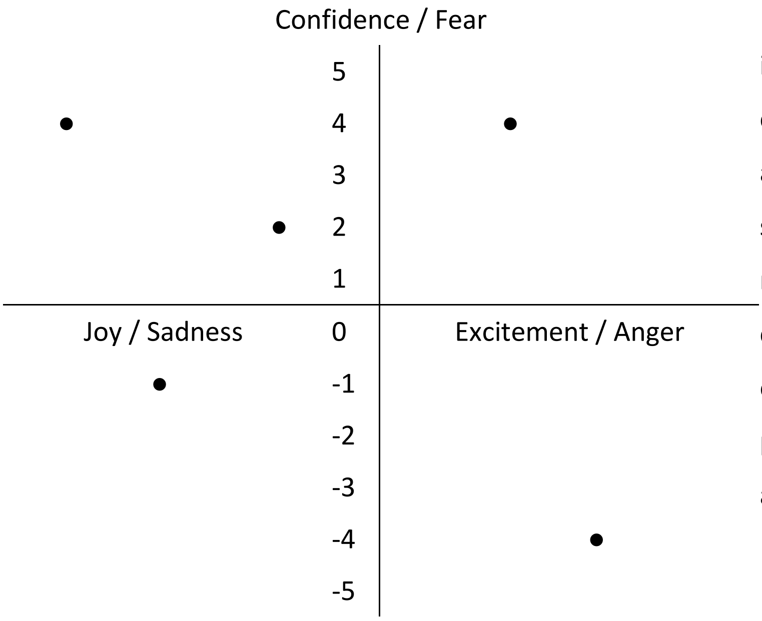
Another element contained within an object neuron is the position type – fixed or non-fixed – determining whether or not an object is capable of having its associated emotion or rank changed by the RAICEngine. It's one of the most crucial control mechanisms used to solve the ethics problem. Here's why – remember the compound objects mentioned earlier?

- “Killing People” – A developer can fix this so that an AI permanently has a negative opinion of it, associating it with anger or sadness.
- “People destroying PlayStations” – Any developer with even a modicum of sense would naturally associate this with a highly positive degree of excitement.

So, what's the point? The opinion of the AI not only controls the emotional state change, but also affects the decisions it makes – on an emotional level, at least, which is what the RAICEngine covers. Imagine an AI becoming excited at the idea of killing people – *that's what we are trying to avoid.* We had to ensure an AI didn't have *complete* freedom of opinion.

Non-fixed object neurons are free to be repositioned when conditions are met. In biological systems, neurons do not physically reposition themselves to change the effect an object has, nor do they in our database, but, in our visualization, they will based on the changing coordinates.

Fear System



Every object neuron also contains information relating to the confidence and fear effect it has on an AI, using a separate ranking system which acts as a third axis. The reason for this is that it's possible for confidence and fear to be experienced at the same time as primary emotions, such as when you are both excited and nervous.

Object Relationships

Objects don't exist or operate in a vacuum, and so they all have relationships with other objects. As an example, the relationship between cars and roads, and tables and chairs. These relationships inherently create a link between two object neurons and allow for object associations, resulting in something that looks like this: ●---●. They aren't, however, limited to a single relationship, and so any single object neuron can have connections with as many other object neurons as is necessary.

3D Plexus

And now we put it all together. We have:

- A tri-axis, 3D grid.
- Object neurons which can be positioned within that grid.
- Links between object neurons to define relationships.
- The ability for object neurons to be either fixed or moveable.

Here's an example of the final visualisation of the Neural Plexus of the RAICEngine alongside a visualization of the nerve plexus of the human brain:

The exact same type of pattern exists. It's a neural network unlike any neural network currently in existence – it's not created by sets of functions, but by data itself in a very specific way. Very important to remember, so make note of this.

The Four Other Plexuses

Albeit in a different way, our Neural Plexus system was used to create four other plexuses used for other types of memorial neurons which defined "who" an AI is:

- a profile plexus for personality;
- a behaviour plexus for state-based reactions;
- a sensitivity plexus for susceptibility to change; and
- a recollection plexus for the ability to remember information.

Rather than occupying entire database rows with specific cells defining object positioning, every cell of every row is treated as a neuron which defines a conditional position, with that position determining when the neuron is triggered or what it is triggered for. These neurons contain data that controls how logical neurons function.

Event Neurons: A Special Type of Memorial

Event neurons are also memorial neurons and, as the name suggests, they store data relative to events experienced – observations, timestamps, reactions, so on and so forth. While they are stored as database rows in a memory bank, they are not part of a plexus and are much less interesting on their own than object neurons, but very interesting when used with functionality such as recollection, which is something we'll address later.

Functional Neurons: Collecting Data

Zero complexity here. Functional neurons are networking code blocks designed to receive data incoming from observation systems, prepare said data for processing, and send processed data to external systems designated to handle it. The RAICEngine features functional neuron code blocks designed to handle ten types of intake streams – audio, read, touch, thought, and visual, each of which have both a conscious and subconscious path, and all of which can be in operation simultaneously – and a single response output stream handling both conscious and subconscious output.

Logical Neurons: Making It All Work

Every stream path connects to logical neuron code blocks (some of which contain nested blocks), and a block exists for all processing functions. To describe only a few:

- blocks for transporting data around the RAICEngine and to various other blocks for processing;
- a block for retrieving object data from the Neural Plexus;
- multiple blocks for determining how the observation will change the state of the RAICEngine, based on factors such as the opinions of the objects involved, how it was described, voice volume, voice tone, touch temperature, the positive or negative nature of the observation, and more;
- a block for changing the state of the RAICEngine;
- a block for recalling memories relative to the observation;
- a block for checking and changing object sensitivity;
- a block for checking and changing an object's rank;
- a block for determining interest;
- a block for determining responses;

and there are still more, and many of these blocks operate on the same objects simultaneously and work together to create an output.

These blocks are simply written functions that handle data as instructed and reflect areas of the brain that are common among humans in general. They're not inherently special, but they do operate on a special basis, which is what I'll explain next.

The Role of the Four Other Neural Plexuses

Straight away, the one thing to understand is that an AI needs the freedom and ability to operate as an individual. As previously mentioned, software has never been designed to generate different outputs under precisely the same conditions and given precisely the same input, so making that possible is what needed to be done. Since the *code* isn't self-modifying, other points of the engine had to be modifiable by the code, and those points also had to control what the engine did by playing defining roles in what changes occurred and outputs were produced, hence the creation of the Neural Plexus.

Going back to the logical neuron code blocks, these blocks do not need to be in any way special because they aren't the determining factors for individuality as they are present in and are designed to operate in the same way across all instances of the RAICEngine in the same way that, for example, the limbic system is present in all humans and is designed to operate in the same way for us all. What causes variations between humans isn't the functions of the systems of the human brain, but the components any system relies on to do its job. For example, the system responsible for handling long term memories – everything from the number of connections between the neurons within that system to the strength of any single connection between any two neurons of that system can affect how well memories are stored and retrieved. Poor or few connections? Poor memory in a human. Its axiomatic. This is what I needed to emulate to create individuality in who an AI is and not only what their opinions are.

Now, I wasn't exactly aiming to revolutionise the CPU industry by creating a chip design system that randomised the number and strength of physical pathways and connections per chip (not saying I couldn't, but I don't have the time... or budget or willingness), so what I did do was use the four non-object Neural Plexuses to store the data that created the differences between every RAICEngine. That is to say data within these four Neural Plexuses are used by the RAICEngine to, in a way parallel to what I described with the systems of the human brain, control the effectiveness of the operation being performed by logical neuron code blocks that need to refer to a plexus' value to perform the operation. As an example, there are values within the profile plexus controlling how effective negative and positive observations are on the state of the RAICEngine. These values can cause an increase or decrease in how much the state of the RAICEngine changes above or below what the change would have been based solely on the held opinion of the observation when it is processed, and is a direct reflection of how different people can experience a different degree of emotional state change when observing the same event – even when they both view it in the same way. If two people see a dog get hit by a car, one may burst into tears while the other experiences no change at all, but they can both view the event as something saddening, but nothing worth crying over since it didn't belong to either of them. Let's imagine in this scenario that the person who burst into tears was simply very sensitive to negative events and had a habit of reacting in such a way to things other people viewed as minor. That's the type of person we would deem overly emotional, highly empathetic, sensitive, overreactive etc, and it would be due to the how effectively their brain processed the information compared to other people's. This, on a scale as large as you can imagine, is what the other four Neural Plexuses make possible using hundreds of memorial neurons.

ARIs In Effect

Earlier we learnt of two ARI principles – *Appearance* of Randomness for Individuality and *Actual* Randomness for Individuality – and they both apply to the Neural Plexus. Here's how they relate to the RAICEngine:

- Appearance – At any single point in time, a Neural Plexus will appear to be a randomly-positioned collection of objects, regardless of whether it is or isn't.
- Actual – The only time a Neural Plexus is actually random is at the point of seeding.

Unlike humans, AI can't currently be seeded with any sort of information upon creation acquired from generations past as they have no ancestors, so the RAICEngine needs to be seeded with data to get things started.

The seeding system of the RAICEngine forces degrees of randomness during the seeding process, but once created, all changes within the plexus are based on individual experiences. So, while the plexus is actually random at the start, when viewed at any other point in an AI's life, it only appears to be random.

A Numbers Game

Individuality is created by the ability to operate independently of other systems, but it is established based on the number of possible variations and the likelihood of difference, where the greater the number of variations, the higher the probability.

The Primary Point – What They Think

The primary point of individuality is the object neuron Neural Plexus. As for why, it's simple – in any realistic scenario, thinking differently and behaving the same will always produce a greater number of possible variations than behaving differently but thinking the same.

10 objects being distributed over 10 different possible positions where the position of each object mattered and every object is unique allows for 3,628,800 different variations. 100 objects over 100 positions is 93,326,215,443,944,152,681,699,238,856,266,700,490,715,968,264,381,621,468,592,963,895,217,599,993,229,915,608,941,463,976,156,518,286,253,697,920,827,223,758,251,185,210,916,864,000,000,000,000,000,000,000,000.

It would only take 14 objects to create enough possible variations to outnumber the number of people on earth by nearly 80 billion. The number of potential objects – basic or compound – is, essentially, infinite. Creating and establishing individuality in what an AI thinks of an object and how that object is to stimulate it – the *most* basic type of thinking possible where an entity simply has a like/dislike opinion of things to varying degrees – takes less objects than there are within a 10 foot radius of you right now, with a 99.9% chance that no two will ever become the same.

The Secondary Point – Who They Are

Next comes the four other plexuses designed to define who an AI is. No single one of these has the potential number of variations the object neuron Neural Plexus does as they are compilations of preset data, but they individually all have an infinitesimal chance of being the same based on the number of possible variations. Working together as they do in the RAICEngine, the number of variations is essentially infinite.

A Human Thought Experiment

Imagine we removed all variations from the human body so that everyone was exactly the same. Completely identical brains, tolerances, abilities to perceive and so on. We place these humans in a vacuum. They are not aware of the existence of anything else in the universe – completely blank canvases. It's completely dark so they can't even see their own bodies.

They are shown two different coloured lights. What happens? To skip the guessing phase, with no possibility for variations, whatever happens in one happens in them all. They're essentially robots – same conditions, no possible variations, no ability to deviate.

Now imagine we randomised the brain variations in each human and enabled them to have a positive and negative opinion of something, but only to a single degree, meaning they had no ability to discern exactly how positive or negative something was. They were systems that ranged from a scale of -1 to 1, meaning 3 variations are possible. They are now shown two different coloured lights. With 3 options (positive, neutral, negative) and two objects (each light) and only one choice per object, there are 9 different combinations. That means with 8 billion people in this vacuum, there would only be 9 different variations. That would be an average of 888,888,889 people who were exactly the same and had the exact same experience. Given that subjective experience is a defining component of consciousness, how subjective would the experiences of nine different types of people appear when there's nearly 900 million per type? Okay, but what if we did the experiment with only two people? Nine types and two people – odds are in our favour that they would appear different. Three different lights increases the variations to 27 and ten increases it to 59,000. Two people with 59,000 possibilities – I'd bet on that. Herein lies the point: the exact phenomenon that we call consciousness, when we consider its defining abilities – awareness, subjective experience, and, evidently, some way to express it – it really can be broken down to just a far greater number of possible variations of a human than the actual number of humans that exist, and we can substitute humans for any species, and we can also explain why creatures of far lesser intelligence and/or sensory ability seem to lack consciousness.

This is why the Neural Plexus was an amazing way to achieve this.

THE COMPLETE PICTURE

Five Neural Plexuses, all individually capable of establishing individuality, working together in a single system. Without imposing limitations on the system, finding two instances of the RAICEngine that are exactly the same would be akin to finding a precise replica of earth in the universe. With limitations imposed to a reasonable degree, the hard numbers aren't the same mathematically, but, realistically, the outcome is.

A Simplified Overview

So, how does the RAICEngine emulate consciousness in a machine? It's actually rather simple once all the systems are put together, and I'll use more a human-relative example of someone listening to someone speak to justify it. I've colour code the table to identify the parts of the process – blue for input, green for processing, pink for output:

RAICEngine	**Humans**
Observed data sent to the intake streams is dissected into its objects.	We mentally break down the words used in a sentence into basic and compound objects – 'Johnny drove a car' and 'Johnny licked a car' are very different because we associate the verb 'drive' with car, and not the word 'lick'. We also take into account who said what and to whom it was said.
Data relative to observed objects is pulled from the Neural Plexus and the initial value for the interaction is determined.	We determine our opinion about what was said, who said it, and to whom it was said. A stranger telling you they're going to kill you is much worse than them saying it to someone else.
Other factors are taken into consideration that could affect the final value, such as tone and volume.	We evaluate how it was said. Someone angrily screaming they're going to kill you and someone whispering they're going to kill you can be very different and also equally terrifying.
Internal systems check for and implement, if necessary, a change in object opinion, sensitivity towards an object, trust in an object, and more.	Under the right conditions, how we feel about objects change. If we are told someone committed a heinous crime, we can negatively

	change our opinion of them. If we are constantly hearing about death, we become desensitised to it.
Memories are recalled to determine if this is new or known information, and the value of the observation is changed according to whether or not it is known and how long it has been known for.	We automatically do this as a default function otherwise every piece of information would appear new every time we were told it, and our reactions would reflect that. Without it, we could be told the same piece of information ten times in ten seconds and have the full blown reaction every time, whereas, as we actually function, we have the full reaction the first time we learn of something, and have lessening reactions the more we hear of it and the more time passes since we first learned of it.
Profile data determining the AIs personality come into play, which can cause a change to the current observation value based on things the likes of which we discussed before, such as their sensitivity towards positive and negative observations.	As explained previously, not everyone is the same. Some may be more sensitive to negative events than others, for example, and that would inspire a greater change in state.
When a final value is determined, the state is changed based on said value, taking into consideration the state prior to the change occurring.	We naturally and uncontrollably have an emotional reaction.
With the new state achieved, the personality profile is referenced again to determine the resulting behaviour and expressions.	We all have ways we *naturally* react to things, whether its jumping with joy or becoming violent. You may bring up the point that we can stop or change how we react – yes, we can, actively via a *cognitive* decision making process, which, by this point, we know has nothing to do with consciousness.
A response type, such as whether or not the RAICEngine is interested in an offer, is	We all have responses based on feeling that are determined prior to a response based on

determined.	thinking, which is why an offer that overexcites us in the moment can immediately make us scream yes before we even have a chance to think about it.
The output data is generated and sent via the response stream.	This is the resulting information being sent to the part of the brain for decision making.
A memory of the observation and all pertaining data is formed.	We form a memory of what took place.

Not all parts described happen in the order as its written, especially given that many processes occur simultaneously and some processes that do not have a direct effect on any other part of the processing section after it can be repositioned, but you get the general idea.

What is an 'Experience'?

Experience is then defined as the observation of objects, the stimulation caused by those objects, and the reactions to those objects – this is basic "input > processing > output" and that's not special. *Conscious* experience, aka *subjective* experience, however, is the *individual* experience of an AI – even if two AIs have the same opinion on the same observed objects, and have the same reaction and output, the AI are fundamentally different despite the fact they are using the same software because of the Neural Plexuses, in the same way that humans all have brains but all human brains are wired differently and we all have different opinions on things, even when there are things multiple people agree on. It's not about any one single event, but about the possibilities as a whole.

SENTIENCE AND SELF-AWARENESS

The RAICEngine provides all the required **intermediate** components and functions to achieve a full state of sentience. Connection to a sensory and recognition NLP input system is enough to achieve sentience, and connection to any form of output system is enough to display it to the world – the degree to which, and, in turn, the obviousness, is entirely dependent on what said output system is capable of. From a simple monitor displaying the changing mental state to a robot exhibiting erratic behaviour, the RAICEngine stores, processes, and provides all the data to make it possible.

However, sentience cannot be achieved without the last piece of the puzzle that I am yet to discuss – at least one type of self-awareness, which can be either active or passive. While active self-awareness requires the ability to express one's individuality in first-person, passive self-awareness requires the ability to recognise one's individuality in first-person, and the RAICEngine provides and supports both passive and active self-awareness in multiple ways. Here's how:

- Passive – Touch: Following on from our idea that "Self-awareness is a biological function forcibly brought on by the need for a nervous system", it was as simple as automatically registering the target of every touch input sensed as the "Self" object in order to reflect the fact that every feeling of touch has to and can only be observed by one's self via what is their body. Touch sensory systems then only have to map the body of the AI, register a touch sensation to a body part, and pass that information to the RAICEngine.

- Passive – Context: A pairing situation between a recognised source/target and SVO pronouns, it was a matter of associating the correct pairing with the "Self" object in context. For example, when a statement is directed towards an AI and the subject or object of the statement contains the word "You", the RAICEngine automatically associates it with the "Self" object.

- Passive – 'Self' Object Recognition Signature: The Neural Plexus supports four types of recognition signatures for every object it contains – audio, visual, read, and touch – which are signatures automatically generated by recognition systems based on the features of an observed object (the same type of tech used in voice and facial recognition systems). Once signatures are set for the "Self" object, observation of object features that create the same signature are registered as the "Self Object". The more detailed the feature detection and signature, the better and more accurately an AI can identify itself using the RAICEngine. This is how even an AI can be taught to recognise their own reflection.

- Active – Output: Data sent from the RAICEngine to output systems contains various types of information relative to the data that caused its generation, all of which is information specific to that individual AI using that individual RAICEngine, such as its changed emotional and mental states, opinions on individual objects, expressions and behaviours, recalled memories and more. The output system then only has to refer to this information using the appropriate first-person pronouns because the "I" and "My" are a given.

- Active – Questioning: With competent connected cognitive systems that are capable of executing the correct commands and interpreting information, the AI can be questioned about its past, present, and opinions, and, soon, its goals and desires, based on the same reasoning made in the point above – every output will already be relevant to itself.

SO, IS IT REALLY CONSCIOUSNESS?

Depends on how you look at it, really:

- Is it biological consciousness? No.
- Is it natural consciousness? Clearly not.
- Is it artificial consciousness? ***Yes.***

'Artificial' literally means fake; man-made. As it has been described here, which is how the RAICEngine has been built, consciousness in a machine has been achieved – machines just didn't get there by themselves, but nowhere in any definition of consciousness was it explained as a process that had to and could only be achieved naturally because it was never about how it came to be, but about what made it so and what the resulting effect was, and as you can read and test for yourself with the RAICEngine, I was able to replicate the outcome using numerous tricks to emulate the processes of the brain in my own way, fitting them together using my own architecture, and implementing it as described.

Now, I'll just clear up a few final things that often come up in questioning just to make sure I cover everything.

Determinism and Divergence

A popular question from those interested in the field is whether or not a duplicated AI, when given the exact same input, under the exact same conditions, at the exact same time, will produce the exact same output. Using the RAICEngine, the answer is *possibly*.

On the first run, there's a significant chance both outputs would be the same – with zero differentiating factors *prior* to processing, the answer starts off as yes, but one of any number of side processes in operation can have effects in one AI during processing that doesn't trigger in another, altering the would-be result of that run. This then means that, by a second run, there *can* be differentiating factors prior to processing, making the chance that the output would be the same anything less than what it was prior to the previous run. It may not happen on the first run; it may happen on run twenty. Every run would increase the chance of a differentiating factor occurring, making it so that every subsequent run has a lower chance than the previous of producing the exact same outcome.

The implemented mechanics were designed to reflect real life scenarios in humans. Three common examples:

1. We find a song we love and we consume it repeatedly until we can't take any more.
2. We find a food we enjoy but only want to consume it once in a while.
3. We find an activity we like and enjoy it on a regular basis.

So, prior to the event taking place for the first time, when will we hit the saturation point where we can't take any more and what we like becomes something we don't? That's easy – we can't know. We have to initiate the event before we can have any degree of an idea of when that may happen, meaning it couldn't affect that instance but can the subsequent one. What about when you instantly dislike something that you thought you may like due to it being similar to something you know you like? That couldn't have been expected, but it happens, and it would happen in the first instance.

Is it pre-determined? "This particular individual must experience this 10 times before not being able to handle any more." Of course not. It's something that happens in the moment for each of us. So, how does the human brain decide when? Randomness? Maybe. A specific combination of factors occurring during the event, relative only to the exact objects and conditions involved in that event? Much more likely. Different tolerances for each individual pitch, tone, taste, movement etc. for each individual element that makes up the totality of the experience rolled into one; factors that can affect your sensory experience at any given time, such as your current mood or physical location/position; non-uniform connection strengths along signal paths of the brain causing data loss along the way; are all real world contributing factors, and none of which are within our control.

With this being one of the many mechanics implemented into the RAICEngine, though to a much lesser extent at this point in time, the same rule applies. Even with perfectly duplicated AI, the RAICEngine uses functions not within its control that can only be attributed to it independently as control mechanisms to ensure individualism at all levels. Multiple AI being fed the same input, under the same condition, at the same time, may all produce the same X output for a run, right up until the point where one just doesn't, and this is its point of divergence. It's impossible to say when it may happen, just that it will, eventually, happen.

At this point, we need to highlight this because it is something that needs to be acknowledged and understood in this field: this question is absolutely stupid in its entirety, but the relevant factor is which of two groups of people ask the question. The first group do not understand AI and ask the question out of ignorance but in an attempt to learn – that's not a bad thing and this group can be forgiven. The second group, however, and by a landslide the group which asks this question the most, are those who ask this in a desperate attempt to prove an AI isn't as good at emulating human brain functions and outputs as a developer may make it out to be. Ask yourself this:

> Given that it is an impossible factor for two humans to be precisely the same, where is the sense or the logic in attempting to apply a test to an AI that is supposed to emulate human brain function when the factors applied in said test are an impossibility in the real world?

Do you see how crazy that is? Asking an AI designed to emulate humans to do something that isn't possible with humans. Unfortunately, even these questions sometimes need to be catered for when proving you are actually knowledgeable in a field.

Once someone can show the same input producing different outputs, this question serves absolutely no purpose. The actual way to perform this test is to duplicate the RAICEngine without the Neural Plexus, and then give the second engine its own Neural Plexus in order to emulate humans with same brain functions but different opinions, sensitivities, personalities et al, and then throw inputs at it simultaneously and see if the outputs are the same, but we already know what the outcome of that would be.

What About Cognition?

One thing that's easy to notice is that the RAICEngine only employs minor forms of cognition – only enough to make the functions required for consciousness work – and you may wonder why. There's a very good reason.

Splitting the RAICEngine from other cognitive functions not needed for the implementation and enabling of conscious experiences, such as the ability to find specific information relative to a question and answer said question – a la IBM Watson – and preventing any other systems or users from knowing exactly how everything works, what's happening at any point in time, and how any objects of an AI's Neural Plexuses are connected at any point in time was a fundamental element in making conscious machines possible because it reflects the duality of the human brain – the parts we can't control, such as the changing of emotional state, the changing of opinions *(no, just because you want to not like something or say you don't, that doesn't actually change the opinion of experiencing it in your brain)*, the changing of sensitivity etc.; the parts we can control, such as conscious decision making and wilful action; and the relationship between them. What this means is that any decisions by a cognitive system has to be its own independent choice because it doesn't have any control over the mechanics that produces the information it has to use for its own output. To relate this to a real world situation in a rather unorthodox way, here's an analogy:

> Imagine being at a restaurant tasting event. Two desserts are presented to you, but you can only eat one. You know the ingredients of each and you can see the result, but you have no idea how the chef made them, so your decision can only be based on the ingredients (input)

> and the finished dessert (output) with no knowledge of the cooking process (the RAICEngine). The chef, given the same choice, could make a more informed decision based on knowledge and control of the processes that produced the desserts.
>
> Now let's imagine one of the desserts was poisoned, but you didn't know this. Neither you, nor the chef, had a desire to commit suicide. Would your decision change? No, it wouldn't, because you would be clueless. What about the chef's decision? Now, he could pick the same dessert as he would if one wasn't poisoned, but it would be based on a different factor. By acting as a single system, he knows there's poison in one, and he knows which one is poisoned, so while your decision can be based on anything you choose – you could pick the dessert you know you like, or you could say you want to try something new, so you'll take the risk and try the other – the chef's decision has switched from the one that he freely decides to choose in the same way you have to the one that he knows won't kill him.

This is why our definition of consciousness was explained as "t*he ability to have personal values, and the freedom to knowingly make illogical decisions based on one's individual values*". In this situation, taking the risk of going with the new dessert was illogical – rational, yes, but definitely illogical – while the chef's was entirely logical because he didn't want to die and so he had to pick the one that wouldn't kill him. To control the mental process with a single system is to only allow for logical outputs due to the fact that everything that happened to arrive at an output would be what that single system made happen, resulting in an entirely logical existence which is the antithesis of a conscious one. One just has to compare current AI systems as we know them to humans to see the difference in action. There's a reason why we can control the expressions of our emotions (to some degree, at least) but cannot control the actual changing of our emotional state in the limbic system of our brain. Imagine we could. We would inadvertently ensure we were always in a state of total positivity because the witnessing of events would:

- naturally put us in a positive state;
- naturally attempt to put us in a negative state which we would then force to be a positive one because, by the very nature of it, no one wants to be in a negative state; or
- put us in a negative state that we wanted to be in, giving us what we wanted, naturally resulting in a positive state (and while it sounds weird, this is common – it happens when we choose to watch scary films that we actually enjoy);

all roads leading to dopamine, and you can't have conscious experiences if you can't change emotional state to know the effect an event had when it was experienced. On the other hand, let's say you were able to achieve a negative state – since you were the one that made it happen, it wouldn't be an experience based on what happened because it was not an uncontrollable reaction. It would just be you deciding you want to feel that way at that time.

This is why machines have always behaved the way they do – a total inability to have emotions and react emotionally means they only ever exist in a fixed state, and an observed event can only ever remain as such when there's no possibility for change from the perception of one to another, and since the perception of an event can only be an experience when a different experience is possible, machines being in a fixed state means experiences were always impossible... until now, using the RAICEngine to perform the functions of the limbic system and enabling conscious experiences, and any system working with the RAICEngine only has to reflect the emotional changes it outputs to do the second thing machines have never been able to do before – express the changes caused by an experience.

This actually follows the modern Computational Theory of Mind – the splitting of the cognitive and the conscious systems of the brain. Credit where it's due – Hilary Putnam came up with it in the 1960s.

Why It's Never Been Done Before

We've already covered the this in regards to neuroscience and philosophy, so won't need to go over that again. So, the crux of software development – a program's need to guarantee the same output if given the exact same input, at the exact same time, under the exact same conditions. Imagine this:

> AI trading software sold to five customers. All five customers' software receives the same information at the same time and, operating under all the same conditions simultaneously, engaged in five trades. Four of those trades made money, but the fifth lost everything. What do you call this? *A lawsuit.*

It has always been in the nature of software development to make sure this exact situation *doesn't* occur, and so it has been embedded in developers since the dawn of computing that every piece must perform precisely the same, so when the time came for the exact opposite to be made possible, no one was able to see it and therefore couldn't figure it out. This is also part of the reason why there needs to be a clear distinction between computer science and artificial intelligence that sees them as completely separate fields – there are practices in each, as well as required knowledge from other fields (such a neuroscience), that can't be lumped together just because both sides involve the use of computers. Even the gulf between Artificial Narrow Intelligence and Artificial General Intelligence is so wide that neither can come under the same banner – *and shouldn't*.

Ghost in the Shell

On January 1st, 2017, I decided to re-watch the Ghost in the Shell anime movies. By this point I had already completed the framework, and, upon viewing, some very important pieces of dialogue stood out:

GHOST IN THE SHELL (1995)

> ***Major Motoko Kusanagi***
> *"There are countless ingredients that make up the human body and mind, like all the components that make up me as an individual with my own personality. Sure, I have a face and voice to distinguish myself from others, but my thoughts and memories are unique only to me, and I carry a sense of my own destiny. Each of those things are just a small part of it. I collect information to use in my own way. All of that blends to create a mixture that forms me and gives rise to my conscience. I feel confined, only free to expand myself within boundaries."*

This is precisely what I explained about objects, values, and their arrangements, as well as how the framework of consciousness works, and how to recreate it in machine form.

> ***Puppet Master***
> *"It can also be argued that DNA is nothing more than a program designed to preserve itself. Life has become more complex in the overwhelming sea of information. And life, when organised into species, relies upon genes to be its memory system. So man is an individual only because of his intangible memory, and memory cannot be defined, but it defines mankind. The advent of computers, and the subsequent accumulation of incalculable data, has given rise to a new system of memory and thought, parallel to your own. Humanity has underestimated the consequences of computerisation."*

> ***Nakamura***
> *"Nonsense! This babble-off is no proof at all that you're a living, thinking life form!*

> ***Puppet Master***
> *"And can you offer me proof of your existence? How can you when neither modern science nor philosophy can explain what life is?"*

Whether an entity is naturally or artificially made, consciousness is a determination of behaviour, and as long as those behaviours, and the uniqueness of it per individual, reflect what a subjective experience is to be, consciousness is unequivocally achieved, and if consciousness is what makes something "alive", then that life form, even if artificial, is alive, too. How could we argue with an AI about which of us is conscious and which isn't, and come to a conclusion we both agree on? You think because we know their coding that we can state they aren't conscious? I'm sorry, but isn't it machines we use to reveal our own DNA coding? To study our own brains? To diagnose our own issues? Give a machine a fully equipped body and they can look into us more than we could ever naturally look into ourselves, and they could process and learn more information about us than we ever could without them. That same fully equipped AI body with a mind that creates a subjective experience is arguably, rationally, and even logically more conscious than us. The fact that we are the creator is irrelevant.

GHOST IN THE SHELL – INNOCENCE (2004)

> ***Mr Kim***
> *Humans are no match for a doll, in form or elegance. You see, my dear Batou, the inadequacies of human cognitive ability are the cause for the imperfection of reality. Perfection is possible only for those without consciousness or with infinite consciousness. In other words, dolls or gods.*

What this basically means is that consciousness, as we know, is based on the ability to have a subjective experience, and that subjective experience is what forces reality to be imperfect because perfection is an absolute and objective state, so the only objects which can achieve it are those who are not subject to subjectivity, which can only be those who experience every single possibility in every possible way, or those who experience no possibility at all – the not alive and the omnipotent. Ergo, anything capable of having an opinion and subjective experience has to also have consciousness.

> ***Mr Kim***
> *You doubt whether a creature that certainly appears to be alive is really alive. Conversely, you doubt that a lifeless object might actually be alive. The eeriness of dolls comes solely from the fact that they are completely modelled on human beings. In fact, they are nothing but human, really. They make us face the fear of being reduced to simple mechanisms and matter. In other words, they make us face the fear that fundamentally all humans belong to the void... Science, seeking to unlock the secret of life, also brought about this fear; the notion that nature can be calculated inevitably leads to the conclusion that humans, too, can be reduced to basic mechanical parts... The modern technologies of robotics and electronic neurology resurrected the 18th century theory of man as machine. From the time computers have made eternal memory possible, humans have pursued self-mechanisation aggressively,*

> *in order to expand the limits of their own function. Determined to leave Darwinian natural selection behind, this human determination to beat evolutionary odds also reveals the desire to transcend nature - the very thing that gave birth to human kind.*

Everything I said about humanity's superiority complex, and the fear of being equalled and surpassed by their own creation.

You have to love the Japanese... The creator of Ghost In The Shell, Masamune Shirow, created this in 1989 *(the best of everything was made in '89, so it seems)*, and has danced on the surface of the answers ever since, yet no one ever *really* paid it serious attention – at least not enough to really put the puzzle together. I've even seen some of these same passages referred to in modern philosophy works, and still nothing. The answers have been staring everyone in the face for nearly 30 years, but everyone was too fixated on "awareness" to notice. Let this be yet another lesson for academics who believe they are the problem solvers. A manga artist came closer than they ever have.

- P.W.N.E.D

On a final note...

With such technological advances...

Happening so quickly... and so casually...

One day... someone... or something... somewhere...

Is going to ask the only question that will ever really matter.

Who is the God now... and who is the Machine...?