
Is the Concept of Universal Mentality Credible?

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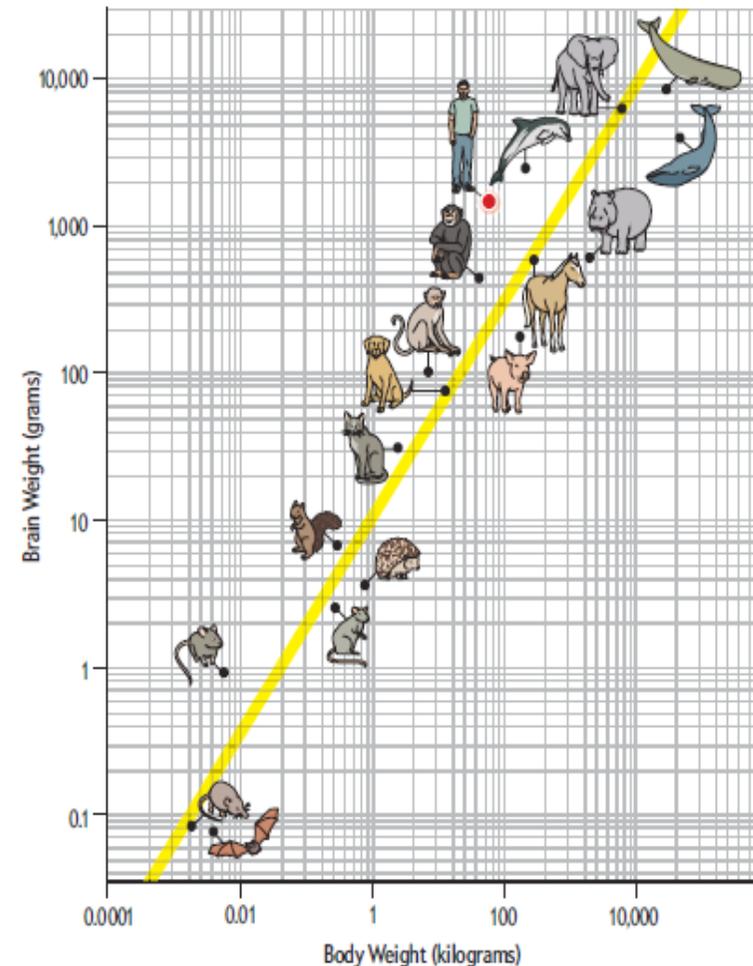
PART I

The Mentality of Minds

- One of the themes throughout Stapledon's books is the concept of 'mentality' or a 'union of minds'. This could be the coupling of minds from two individuals, a group, a civilization or even the entire inhabitants of the universe to each other.
- I consider this as the joining of conscious intelligent beings for the purpose of *knowledge sharing, efficiency of information processing, and the attainment of greater awareness* about the individual, group or the Universe.
- In 'Star Maker':
 - **Cosmical Mind** = the group mind of our Cosmos.
 - **Star Maker** = hyper-Cosmic being, outside all the possible cosmosi being created.
 - **Supreme Moment of the Cosmos** = in chapter 15 when the Cosmical Mind tries to ascend to the Star Maker but fails, having its vision of the Star Makers infinity.
 - **The Universe** = but one creation of the Star Makers experiments, as it looks on clinically and examines the outcome of its results.

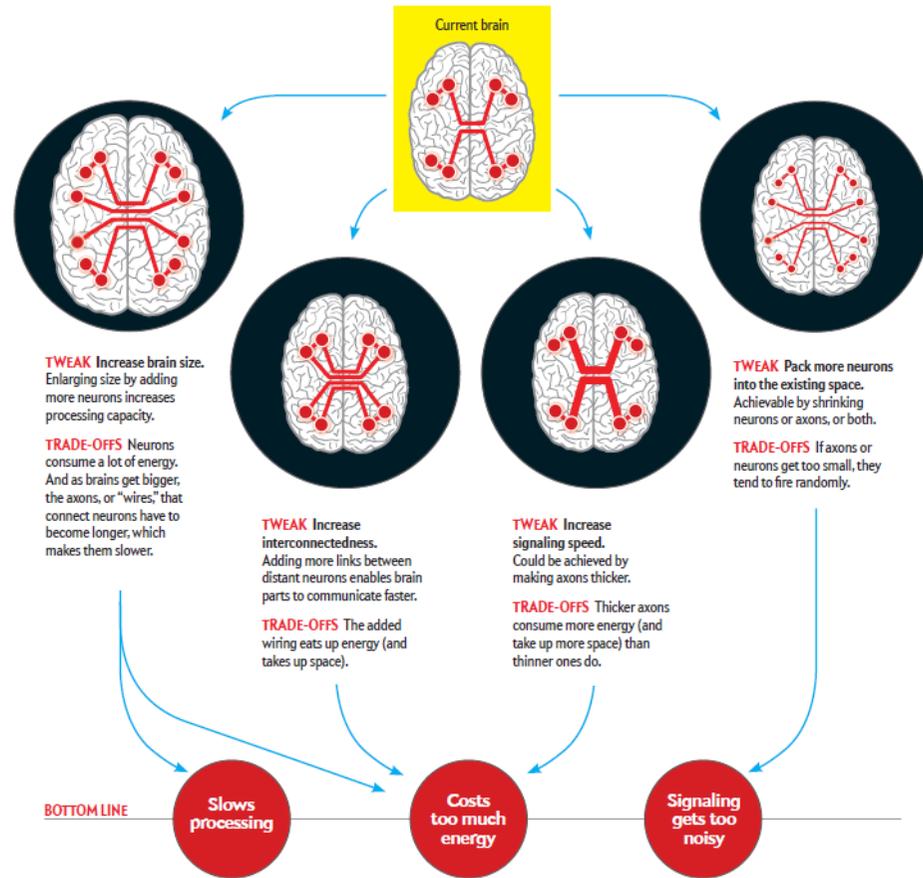
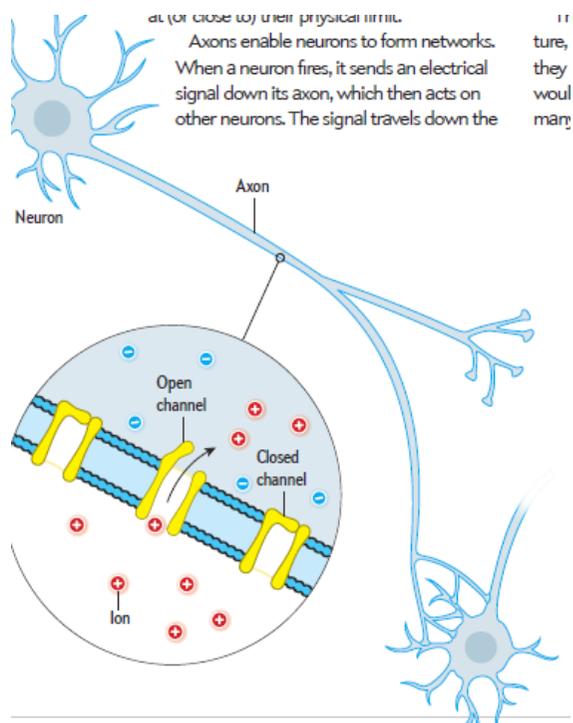
The Evolution of Intelligence

- Large animals typically have larger brains, smarter or not.
- Brain size grows as fixed percentage $\frac{3}{4}$ power of body mass.
- This is straight line on log scale.
- Smarter animals towards top and those that deviate from power law the most.
- Humans beat power law by factor 7.5, the best of any species. We have highest compaction density of cortical neurons in the brain.
- Bottlenose dolphins by 5.3.
- Monkeys by 4.8.
- Increasing brain size further brings diminishing returns.



Fox, D, "The Limits of Intelligence", Scientific American, July 2011.

The Physical Limits of Intelligence



Fox, D, "The Limits of Intelligence", Scientific American, July 2011.

Last And First Men

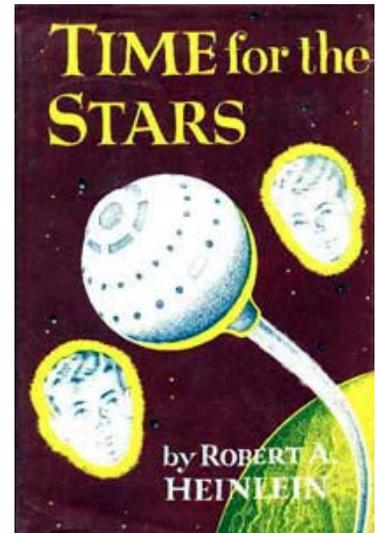
- From Section 3 of one of the later chapters of "Last and First Men“:.

“The designers of our species set out to produce a being that might be capable of an order of mentality higher than their own. The only possibility of doing so lay in planning a great increase of brain organization. But they knew that the brain of an individual human being could not safely be allowed to exceed a certain weight. They therefore sought to produce the new order of mentality in a system of distinct and specialized brains held in "telepathic" unity by means of ethereal radiation. Material brains were to be capable of becoming on some occasions mere nodes in a system of radiation which itself should then constitute the physical basis of a single mind. Hitherto there had been "telepathic" communication between many individuals, but no super-individual, or group-mind. It was known that such a unity of individual minds had never been attained before, save on Mars; and it was known how lamentably the racial mind of Mars had failed to transcend the minds of the Martians. By a combination of shrewdness and good luck the designers hit upon a policy which escaped the Martian failure.”

- ...thus Stapledon appears to have presaged the argument about brain limitations.

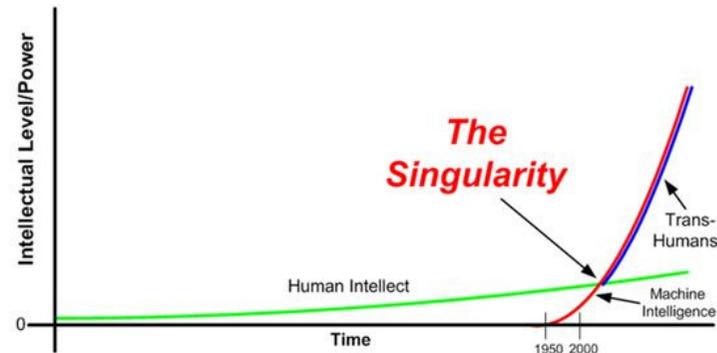
Telepathy

- Telepathy represents a bypass to the physical limits to intelligence.
- No evidence is known for this phenomenon, but has featured in science fiction literature.
- If a group of humans could somehow link the minds of each brain, then each individual mind would effectively become one processor in a parallel computing network. This would allow for the storage of a greater amount of information as well as the improved processing speed of that information.
- The group-mind is achieved in "Last and First Men" by incorporating the Martian radio producing and sensing cells into the genetic structure of the Fifth Men (and their successors.) Thus a form of electromagnetic telepathy, one we might eventually engineer ourselves.



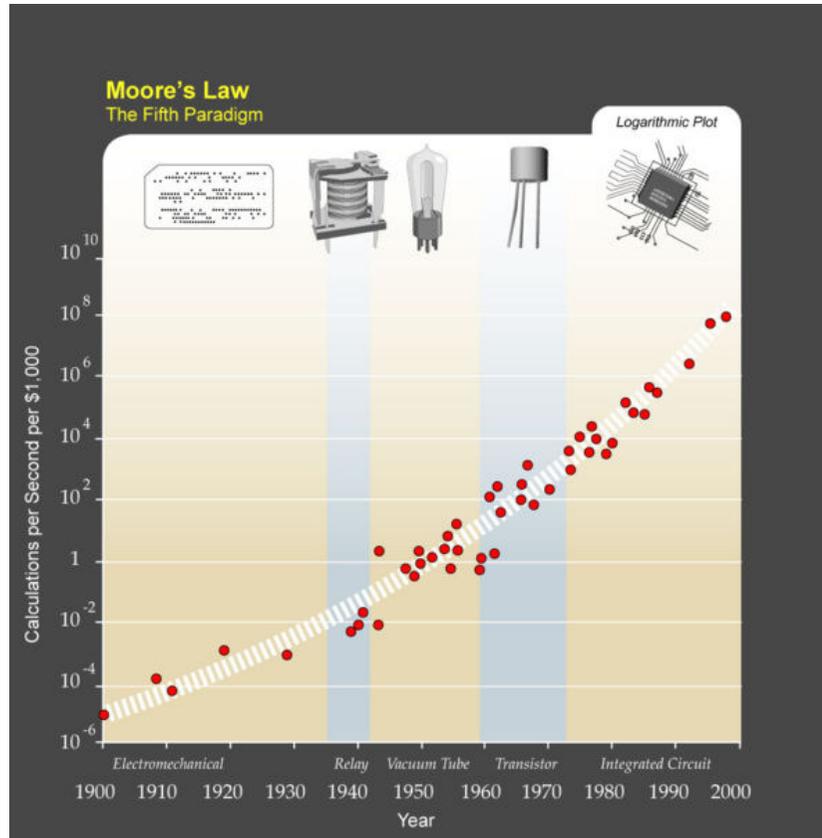
Technological Singularity

- Ray Kurzweil; wrote of the potential for a technological singularity in our near future.

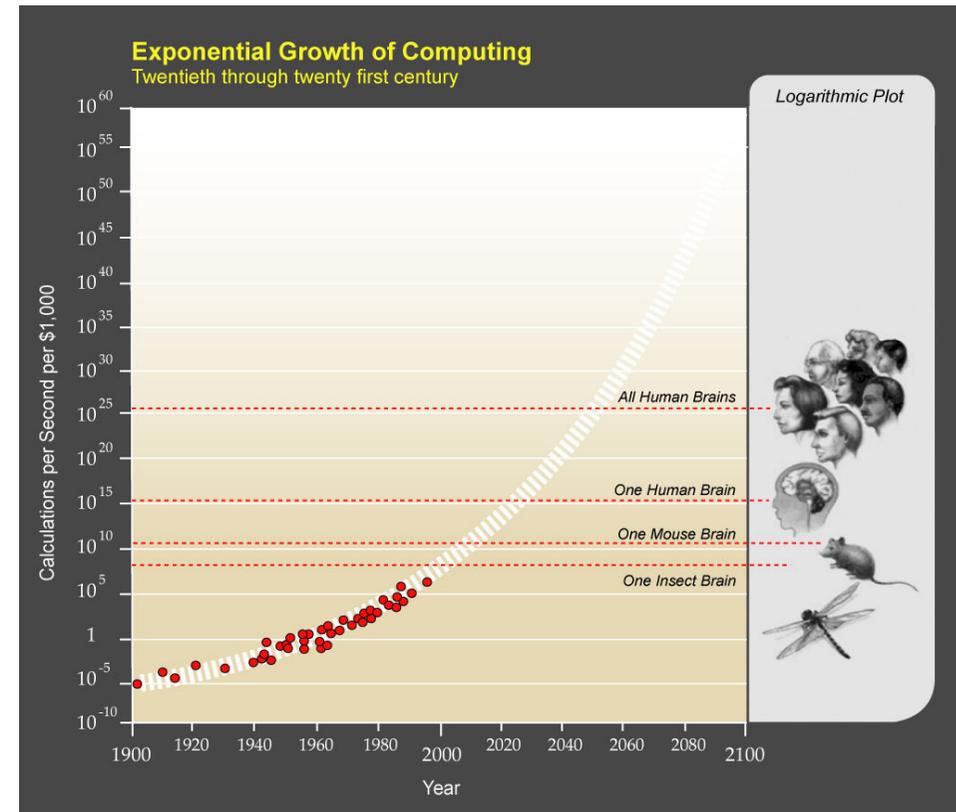


- Good, 1965: *“Let an ultraintelligent machine be defined as a machine that can far surpass all the intellectual activities of any man however clever. Since the design of machines is one of these intellectual activities, an ultraintelligent machine could design even better machines; there would then unquestionably be an ‘intelligence explosion,’ and the intelligence of man would be left far behind. Thus the first ultraintelligent machine is the last invention that man need ever make.”*
- Enabled through enhanced processing speed and memory capacity as well as other issues such as improved methods or algorithms.
- Vernor Vinge predicted singularity would occur 2005-2030. If technology follows this trend then developments in artificial intelligence may occur very rapidly indeed.

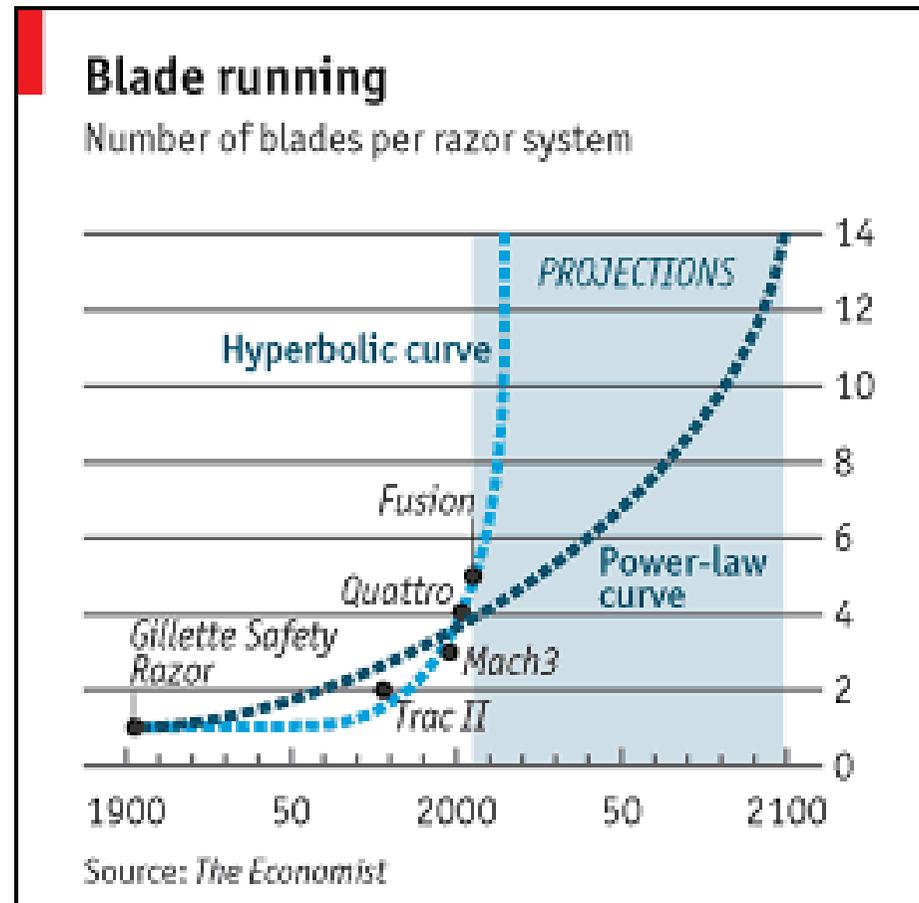
Technological Singularity



Kurzweil Technologies, Inc



Technological Singularity



Biological-Technological Convergence

- We are converging with technology in a profound way already.
- Every activity we perform involves some technology, from the driving of our motor cars, to the watching of a film, to cooking a meal, to communicating with people across the globe.
- The human race is now a technologically enhanced species. Consider this comment from Piers Bizony on how we achieved the goal of Project Apollo and landing a man on the moon:
 - *“We think so easily of rockets as NASA’s key technology, yet these were relatively simple and well-known devices. By contrast, the challenges of building computers small enough to fit inside the capsule were not so well understood. Sturdy, vibration-proof circuits had to be devised and tested; the logic of their operations needed to be figured out, and all the celestial mechanics of astronomy, stellar navigation and gravity slingshots reduced to numbers and equations, and then into the bits and bytes, noughts and ones of computer code. Then a ‘human interface’ between the circuits and the astronauts had to be devised, so that crewmen could ‘talk’ to these machines, as well as understanding, in turn, what the machines were trying to say”.*
 - ***The Man Who Made the Moon, Piers Bizony***

Human Versus Computer

- Statistics from The Singularity Institute:
 - Human neurons propagate at top speed 150 m/s.
 - Speed of light 300,000,000 m/s (2 million times)
 - Human neurons spike at maximum 200/sec.
 - Modern computer chips running at around 2 GHz (10 million fold difference).
 - Human brain contains upper limit 100 billion neurons and 100 trillion synapses.
 - Computers require massive parallelism to match this, but with Moore's law for increasing chip speeds this could change.
- It is interesting to note that the science fiction writer Sir Arthur C. Clarke believed that *the purpose of life was the processing of information.*

Homo Electronicus

- We are deeply coupled to technology and our capacity to do more seems dependent on our increasing biological-technological convergence.
- It is quite likely this trend will continue so that in the future the evolution of artificial intelligence will have a deep effect on the descendants of Homo Sapiens the species.
- Sir Arthur C. Clarke, development of AI as being the most important breakthrough in the twentieth century, with an ever approaching exploding revolution over the horizon.
 - *“In the context of the evolution of Homo Sapiens to its next level (Homo electronicus?) - it may be the most important technology ever.”*
- Clarke went further in describing the beauty of this potential union:
 - *“One day we may be able to enter into temporary unions with any sufficiently sophisticated machines, thus being able not merely to control but to become a spaceship or a submarine or a TV network...The thrill that can be obtained from driving a racing car or flying an aeroplane may be only a pale ghost of the excitement our great-grandchildren may know, when the individual human consciousness is free to roam at will from machine to machine, through all reaches of sea and sky and space”.*

Neural Networks

- Another, more practical, way we may be able to overcome this apparent physical limit is the use of a biological analogue - artificial neural networks.
- Such technology is already under development in the form of electronic neural networks.
- These are programming constructs which mimic the properties of biological neurons. An interconnected group of artificial neurons which enables the efficient processing of information for the purposes of computation and storage.
- Such networks can be constructed in a way which optimizes the strength and mass of the connections for best performance. The neural networks can be both adaptive and non-adaptive whilst providing for a non-linear, distributed, parallel and local processing adaptation.
- If such technologies are adapted within human brains in the future, to compensate, enhance or even replace natural neurons, then the capacity for evolved human intelligence may not be so limited.
- When and by what mechanism might this occur?

The Borg Star Trek

- The merging of human and technology into 'Homo Electronicus' would allow for the infinite storage and processing of information, stored memories externally and recalled at will.
- Memories can be accessed not just of ones own experience, but those of others, like a vast library of human experience. This constitutes a global network. As humans move out into space, colonize the solar system and beyond, it quickly becomes an interplanetary and then intergalactic internet – with all intelligent minds technologically linked to it.
- Represents a 'mentality of mind'. But as the species continues to evolve in this way, each person will simply become the equivalent of silicon chip, within the vast Cosmic union that represents the universal computer.
- Star Trek ideas = The Borg.

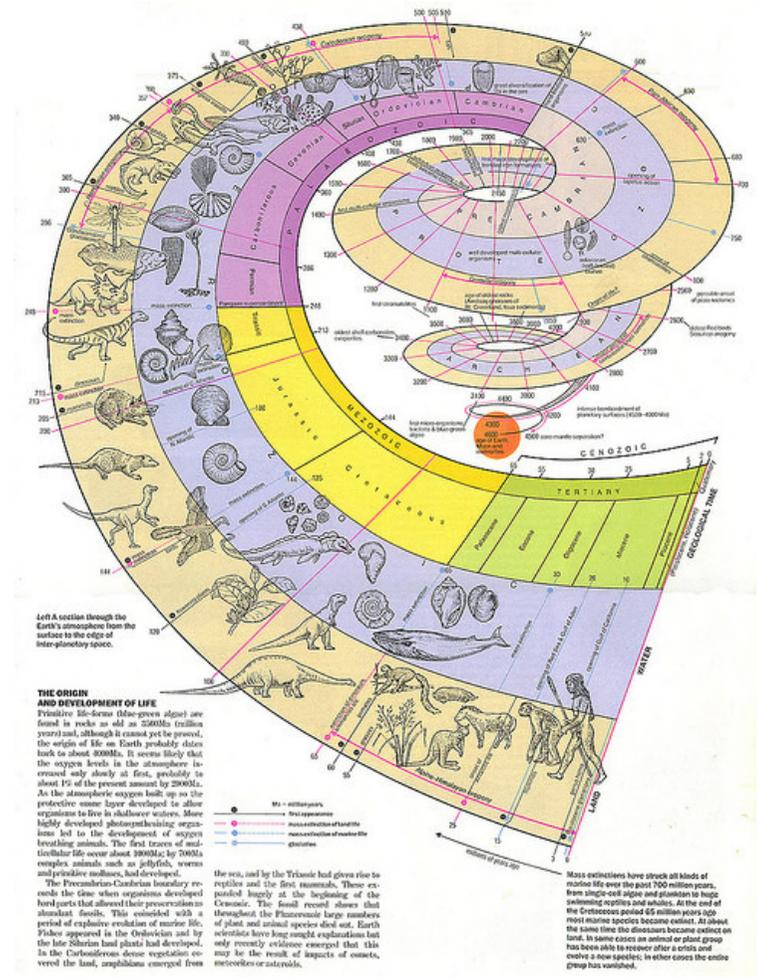
The Borg Star Trek

- Intelligent life in the universe may be not just connected to technology, but coupled to it in a converging way. Starship Man may become a complete artificial intelligence with negligible or even zero biological component. We would not recognize that description being as being human, but it will have evolved from us and will possess our vital characteristics, so in this sense it will be.
- Our entire evolution would have gone from Cells, molecules, proteins, animals, intelligent animals, technologically aided intelligent animals, to technologically dependent intelligent beings (Cyborgs) and eventually technologically dominated full-blown artificial intelligence.
- Perhaps Homo Sapiens were just a stepping stone to this greater creation and this may see the end of our race.
- But the potential for a unions of mentalities appears clear to this author, if this increasing convergence with technology is set to continue to its logical conclusion.

PART II

Evolution Through Reductionism

- The accepted picture of human evolution goes from simple to complex chemistry to life.
- Somehow, life has evolved this species became the top of the food chain - Homo Sapiens.
- As the human became more intelligent it became more aware of its surroundings.
- The creation of language led to the formulation of structured questions to explain all observations and eventually answers.
- Thus began the process we recognise today as science.
- This abridged history makes us believe that we have evolved in some way to be separate from our environment, that we have the capacity to observe that environment without interacting or influencing it.



Source: http://eb.com/Product_EU.htm

Image: Steve M, cheers.

Evolution Through Reductionism

- Indeed, the objective observations of science depend on the assumption that the observer is not part of the observed. What if this is only an approximation to the truth? What if in fact the very act of observing does in some way influence what is being observed?
- Our belief that we are somehow isolated from that which we observe has led to a particular paradigm in the way we view reality.
- That paradigm depends on the determination of reducing complex phenomena to mechanical laws and behaviour. We like to break things down into ever smaller parts, a so called reductionism approach.

Mechanical versus Purpose

- Freeman Dyson has written of this in describing how biologists and physicists view the world.
- He argues that some modern molecular biologists have come to accept a narrow definition of scientific knowledge.
- This is because of their great success at reducing the complex behaviour of living creatures to the simpler behaviour of molecules out of which the creatures are constructed. A bacterium is considered more mechanical than a frog and a DNA molecule is more mechanical than a bacterium.
- This is a reductionism approach, from the complex to the simple, from the apparently purposeful movements of an organism to the purely mechanical movements of its constituent parts.
- A molecular biologist will view a cell as a chemical machine, with the protein and nucleic acid molecules controlling its behaviour.
- They can be visualized by molecular biologists using plastic models built from ball and pegs to describe the structure and function of nucleic acids and enzymes.

Quantum Mechanics

- But physicists know differently, that atoms are not really little plastic balls and in fact if one keep reducing the size of these models, instead of becoming more mechanical, they behave less mechanical.
- This is the world of the electrons, nucleus, protons and quarks.
- The famous Einstein, Podolsky and Rosen thought experiment in 1935 demonstrates the difficulties of the quantum theory, that the notion of an electron existing in an objective state independent of the experimenter is untenable.
- In general, physicists agree that that the results of experiments are not independent of the observer. In the atomic world, the atoms and electrons cannot be decoupled from the experiments or the observer. To quote Dyson:
 - *“The laws of subatomic physics cannot even be formulated without some reference to the observer. ‘Chance’ cannot be defined except as a measure of the observers ignorance of the future. The laws leave a place for mind in the description of every molecule”.*

Quantum Mechanics

- The observer dependence on reality can be starkly illustrated by considering the use of wave functions.
- Every particle can be described as a wave, this is the so called wave-particle duality model of quantum physics and differs from the classical model of simple point particles. In effect all particles are waves, with a distribution of probabilities on their position in space and in velocity.
- The Heisenberg Uncertainty principle of quantum mechanics places an inherent limit to accuracy of knowing both simultaneously. So rather than being a defined point, the particle is described by an equation called a wave function.
- This describes the probability of the particle being at any one position or interval, for example, as determined by an intensity (or probability density), which is proportional to the square of the wave function. However, when one attempts to observe the particle, it is forced into having either a definite velocity or a definite position (but not both).

Quantum Mechanics

- The action of making such an observation is referred to as collapsing the wave function. We tend to think that the principle of wave function collapse is only appropriate at the quantum level, otherwise the macroscopic world around us would be chaotic.
- Speculating, what if wave function collapse is how all observations are made? What if the event of someone observing a leaf falling from a tree, has some physical analogue in reality to the collapse of a quantum wave function? But then, what if several people make this same observation, who collapses the wave function first and how does nature know that each person is observing the phenomenon of the falling leaf.
- The only explanation, if this situation were found to be true, is that reality and mind (of the observer) would be more profoundly connected than we are led to believe by the simple mechanical axioms upon which we define the Universe.

Hawking-Hartle Wave Function of the Universe

- Cosmologists have gone even further to attributing a wave function to the entire universe based on Feynman path integrals.
- A no-boundary proposal that the universe is infinitely finite, before the Planck epoch.
- There was no beginning to the universe, it simply had no initial boundary in space or time.
- Speculating (wildly), what if the entire universe was defined by a wave function even now?
- Does the existence of observers within the universe have any connection to the collapse of the universal wave function? Or perhaps, controversially, is it being collapsed by a Star Maker?
- Although if the wave function describes 'The Universe' then in order to collapse the universal wave function this Star Maker must be an inherent part of the internal structure, because by definition 'The Universe' is all there is, except in the possibility of a Multiverse.

Did the Universe know We Were Coming?

- Animists = People who believe in the deep connection of mind to reality at the highest and lowest levels. This may include the coupling of soul/spirit to physical self.
- Dyson refers to the work of Jacques Monod, who claims that the ancient covenant between man and nature is in pieces and:
 - *“Man knows at last that he is alone in the Universes’ unfeeling immensity, out of which he emerged only by chance”.*
- Although Dyson appears to accept that we emerged by pure chance in the universe, he goes further to state:
 - *“I do not feel like an alien in this universe. The more I examine the universe and study the details of its architecture, the more evidence I find that the universe in some sense must have known that we were coming”.*

Cosmic Co-incidence

- The UK Astronomer Royal Sir Martin Rees has written of the many co-incidences that inhabit our universe, including the fundamental physical constants of our universe, which lie within a narrow range such that if they were only slightly different the universe would be unlikely to be conducive to the conditions for life emerging. Rees identifies six dimensionless constants specifically;
 - the ratio of the strength of electromagnetism to that of gravity;
 - the strength of the force binding nucleons to nuclei;
 - the relative importance of gravity and expansion energy in the cosmos;
 - the cosmological constant;
 - the ratio of the gravitational energy required to pull a large galaxy apart to the energy equivalent of its mass;
 - the number of spatial dimensions in space-time.
- In addition there are other co-incidences that make the universe habitable for us. This includes:
 - The average distance between the stars is about right for life to thrive. Too short or too great and the chances for life, intelligent life in particular, to emerge would be reduced.

The Laws of Physics

- Cosmology has a term to describe the deep human link to reality and the world we observe. It is known as an Anthropic view points.
- These are philosophical argument that the observation of the physical universe must be compatible with the conscious life that observes it.
 - The strong version of the principle argues that this is the case because the universe is compelled, in some way, to have conscious life eventually emerge from within it.
 - The weak version of the principle argues that the universe is the way that it is, appears finely tuned, because we are the survivors left to observe it – it is a logical statement of our position.

Implications

- All we can conclude from this is that mind appears to be important in the universe.
- If we go further than this, to admit the possibility of an all-seeing, all-knowing, all-observing universal mind for example, then this constitutes a particular philosophical view point, of which our understanding of physics has not the explanatory power to frame a hypothesis upon which to test this notion.
- If it could ever be proven that such a universal mind exists, and that we, were in some way connected to it, this would represent a form of Supreme Cosmic Unity.
- Here are some tantalizing words from Freeman Dyson:
 - *“I conclude from the existence of these accidents of physics and astronomy that the universe is an unexpectedly hospitable place for living creatures to make their home in. Being a scientist, trained in the habits of thought and language of the twentieth century rather than the eighteenth, I do not claim that the architecture of the universe proves the existence of God. I claim only that the architecture of the universe is consistent with the hypothesis that mind plays an essential role in its functioning”.*

The Special Theory of Relativity

- *The Principle of Relativity*: The laws by which the states of physical systems undergo change are not affected, whether these changes of state be referred to the one or the other of two systems in uniform translatory motion relative to each other.
- *The Principle of Invariant Light Speed*: Light is always propagated in empty space with a definite velocity which is independent of the state of motion of the emitting body.
- *Special Principle of Relativity*: If a system of coordinates is chosen so that, in relation to it, physical laws hold good in their simplest form, the same laws hold good in relation to any other system of coordinates moving in uniform translation relative to the first.
- These laws remain a physical barrier to the achievement of a Supreme Cosmic Unity or universal mentality in space and in time.

The Special Theory of Relativity

- For universal mentality to exist, throughout the universe, implies that it contains the following elements:
 - Omniscience: The capacity to know everything infinitely, or at least everything that can be known about a character including thoughts, feelings, life and the universe.
 - Omnipresence: also known as ubiquity. This is the property of being present everywhere.
- These two elements must apply on a local level (for group mentality) or on a large scale level (for universal mentality).
- But ‘thought transmission’ is itself limited to the speed of light, surely? And so galaxy-galaxy linked mind seems impractical.
- This is not a reason to prevent the idea of a universal mentality but it is a physical limitation on that capacity of that mentality.
- So far the special theory of relativity has stood up to every experimental test thrown at it.
- If in the future a ‘loophole’ is found which allows for superluminal information (even thought) transmission this will have ramifications for the potential of any galactic dwelling nebula, the likes of which were only imagined in the mind of Olaf Stapledon.

The Four Arrows to Mentality

1. Humans are conscious and (apparently) intelligent beings, aware of our self and each other.
 1. How are we aware of each others conscious state too?
 2. Through interaction by the senses of touch, taste, smell, hear, see.....mind??
2. Our interaction with reality and the environment appears to be observer dependent.
3. There are many co-incidences in the universe, anthropic arguments.
4. The increasing convergence of biology and technology.

Conclusions

- We have conjectured in a very hand waiving way, the possibilities of group or universal mentality.
- We can provide no hard evidence to support such a conjecture from the stand point of known laws of physics. This discussion has only been presented for the purposes of stimulating intellectual possibilities.
- However, a broad examination on the role of mind in nature, and the future possibilities for human intelligence, are at least suggestive of the possibilities.
- Speculating further, it is perhaps through the continued evolution of biology to artificial intelligence, and their permanent merging, conducted over galactic scale, which will give rise to something we may equate to a 'universal mentality'.
- The fundamental barrier to such a merging however, remains the speed of light limit for signal transmission.
- If a mechanism can ever be identified that permits superluminal signal transmission, through space or other mediums, the possibilities for universal mentality become ever more tantalizing, provided other technology developments are satisfied.