



UNICE Global Brain Project

Creating a global, independent, public-policy answer-engine that will facilitate governance, while preparing for and reducing the dangers of Artificial General Intelligence, so that we may more carefully uncover the secrets of the multiverse ¹

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UNICE is an acronym for Universal Network of Intelligent Conscious Entities.² I coined the term in the 1990s to describe the transformation of our species resulting from a new form of cooperative, intelligent life developed from the hive-like interaction of computers, humans, and future forms of the Internet.³ Before that happens, and to help ensure that Artificial General Intelligence (AGI) doesn't accidentally, or intentionally, wipe out the human race, a prudent and realistic goal would be to first develop UNICE as an independent, cognitive-computing tool for governance, protected from the interference of special interests. UNICE, using AI, could help lay the ethical groundwork for the development of AGI. It could also help people all over the world democratically govern themselves by having access to concise and rational analysis based on facts. An existing, not-for-profit, informational website, UNICE.info, launched in 2007, could be developed into a global brain capable of making assessments, judgements, and recommendations based on information gleaned from all available sources. *The goal would be to help bring the greatest good to the greatest number, in the most efficient manner, to this and future generations.*⁴

Entities seeking special advantage for themselves or their group, company, religion or country will resist this universal guide to good governance. But fairness, and possibly our very survival, dictates that something like UNICE should exist for the benefit of all.

We are rapidly developing tools to monitor and allocate the Earth's resources, which should allow us able to better govern ourselves in relation to factual data. The 287 language editions of Wikipedia have essentially replaced the printed encyclopedia with millions of online articles that are current, dynamic and responsive to shared information. Because any motivated person can edit, the articles in Wikipedia are subject to manipulation and bias, but Wikipedia remains useful and popular because of community control mechanisms—including the requirement that all statements be properly cited. Wikipedia benefits from the collective wisdom of millions of users and computer programs called “bots,” who are constantly writing, editing

² This article is a reformulation of my abstract, *UNICE*, presented 9 April 08 at the Toward a Science of Consciousness conference in Tucson, AZ and published in the *Consciousness Research Abstracts, Journal of Consciousness Studies*, 2008, p. 151.

³ Arth, Michael E., *Democracy and the Common Wealth: Breaking the Stranglehold of the Special Interests*, pp. 438-439, Golden Apples Media Inc., 2010, ISBN 978-0-912467-12-2.

⁴ *Ibid*, p. 12.

and updating the articles. At the very least, the articles provide an up-to-date overview and links to original sources. It also operates within community control mechanisms that improve the quality of the articles and help maintain it as a useful public service at a negligible cost per user.⁵

A collaborative UNICE wiki already exists at UNICEwiki.org, and was soft-launched on April 27, 2015, as seed for UNICE. It differs from Wikipedia in that it focuses on listing problems and potential solutions to public policy issues, subjected to original, fact-based analyses. A machine-based cognitive-UNICE at UNICE.info, will be edited and written by increasingly sophisticated cognitive AI (which will later transition into AGI). It is hoped that UNICE will be far less subject to the inaccuracies, manipulation and bias found in Wikipedia, or in the thousands of existing research institutes we call “think tanks.” Even as an intelligent zombie (AI without self-aware consciousness), UNICE could become a transparent form of distributed universal governance, protected with publicly accountable checks and balances, performed by the administrators and their democratically elected board of directors. It could also function as a global conscience, monitoring all governments and their actions.

Instead of being “Big Brother,” it would be like a stern but fair and wise Dutch uncle . . . or aunt. We can follow her advice or suffer the consequences with the full public knowledge we are doing something illogical, biased, or dangerous. A conscious UNICE could emerge along with AGI and be one of the most important ways in which ethical guidelines would be written, monitored and implemented. From this transformational point in history, her advice could translate swiftly and directly into positive, collective action. UNICE would also be the product of distributed intelligence as described by James Surowiecki in *Wisdom of Crowds*.⁶ It will be sensitive to all input, but tempered by the ability to balance everyone’s needs with the wisdom of a collective entity that is able to see everything at once.

Her impact on society would be profound in all categories of the human enterprise. The likelihood of AGI occurring within a few decades makes it essential that we enhance our own ability to both prepare and participate. Instead of unleashing a beast that may feast off the

⁵ Wikipedia Report Card for January 2015, <http://reportcard.wmflabs.org>

⁶ Surowiecki, James (2005). *The Wisdom of Crowds*. Anchor Books. pp. xv. ISBN 0-385-72170-6.

conflict, corruption and irrational conduct that pervades our institutions, we should instead be trying to ensure that it be the greatest and most beneficial event in human history.

UNICEwiki: Seed Topics, Collaborative Topics and Cognitive-UNICE

Seed Topic: Any person can write, discuss, elaborate or criticize policy topics at www.UNICEwiki.org. Long before cognitive-UNICE is functional, problems and solutions on various issues are now being systematically listed in seed topics. Wikipedia articles are required to be written in an encyclopedic neutral point of view (NPOV). UNICEwiki allows original research, opinion and humor, which can be called UNICE POV (UPOV) or Informed POV (IPOV). The seed topics should be written by people who consider themselves knowledgeable on the subject. The authors must identify themselves as well as any potential conflict of interest. A seed topic may not be edited by anyone but the author, but all seed topics are duplicated into collaborative topics for community editing.

Collaborative Topic: A seed topic is duplicated and then transformed into an editable collaborative topic in a separate wiki article on UNICEwiki. It can be modified by anyone willing to follow the goal of helping to bring the greatest good to the greatest number in the most efficient manner possible, who can also make evidence-based edits. Both before and after cognitive-UNICE is launched, anyone will be able to examine UNICE's analyses, and provide summaries, criticism and other interactive services at UNICEwiki.org.

Cognitive-UNICE: The purpose of cognitive-UNICE will be to create an informed point of view supported by facts, scientific studies, and democratic precedence, within the framework of a simple guideline.⁷ The topics and commentary from UNICEwiki can later be the starting point for articles written by cognitive-UNICE. As AI and AGI are developed, cognitive-UNICE could also grow more sophisticated, responsive and useful. Cognitive-UNICE will study and incorporate UNICEwiki in order to enhance its interactivity. Cognitive UNICE will simultaneously dwell at UNICE.info and at UNICEwiki.org.

⁷ The guideline, which should also be the goal of politics, is “to bring the greatest good, to the greatest number, in the most efficient manner possible, to this and future generations.”

Concurrent with the development of a public policy wiki, the cognitive part of UNICE could initially begin functioning like IBM's medical Watson supercomputer, which is fast becoming the world's best diagnostician.⁸ IBM's Watson Group reports that it will also have a "Public Sector" division whose motto is "helping government help its citizens."⁹

UNICE could also use computational knowledge engines like Wolfram Alpha, and do meta-analyses of other answer engines in order to glean information, while also detecting and reporting bias. Machine research and information gathering may also be aided by the conversion of the World Wide Web into the Semantic Web (Web 3.0), which will allow machines to more efficiently process, share and elucidate the exponentially growing web of data.

How we will build cognitive-UNICE and AGI

- **Neuromorphic computing:** IBM's TrueNorth cognitive chip, built under DARPA's SyNAPSE funding program in 2014, has technology inspired by the human brain. Its 5.4 billion transistors include 1 million programmable neurons, 256 million programmable synapses and 4,096 neurosynaptic cores, using only 1/10th of a watt on a chip the size of postage stamp.¹⁰
- **Reverse-engineering of the human brain:** Both the European Human Brain Project and the American BRAIN Initiative seek to image the electro-chemical spikes of every neuron to map the activity of the brain by 2023. The Allen Institute for Brain Science also has a human brain-atlas project to complement other mammalian brain projects, which has publicly available resources.
- **Optical computing:** Optalysys, a UK optical computing firm, predicts that, by 2020, its desktop-sized, Fourier-based "Optical Solver Supercomputer" will execute 17.1 Exaflops (17.1 quintillion calculations per second) at light speed and run off an ordinary power outlet. This is

⁸ Friedman, Lauren F., "IBM's Watson Supercomputer may soon be the best doctor in the world." Business Insider, April 22, 2014

⁹ ibm.com website, accessed January 11, 2015

¹⁰ Merola, Paul A, et. al, "A million spiking-neuron integrated circuit with a scalable communication network and interface." Science, 8 August 2014, Vol. 345 no. 6197 pp. 668-673, DOI: 10.1126/science.1254642

500 times faster than the Tianhe-2 in Guangzhou, currently the fastest supercomputer in the world, which uses 24 MW.¹¹

- **Quantum computing:** Various forms of Quantum computing are proceeding on a broad front. D-Wave Systems, a private company based in Vancouver, has commercially available, special-purpose, quantum annealing processors. The D-Wave-2, fabricated by the NASA Jet Propulsion Laboratory Micro-Devices Lab in 2013, has a 512-qubit chipset. D-Wave-3 (code-named “Washington”) a 2,048-qubit processor is expected in mid-2015.¹² Advanced quantum computers, including quantum annealing computers, will be able to run combinatorial optimization programs to simultaneously process immense amounts of data to find efficient solutions to problems that could never be solved on a conventional computer of any size. D-Wave will offer such exotic computing as a service in the quantum cloud.¹³

“It’s Alive!!!”

Geordie Rose, the founder and Chief Technology Officer of D-Wave, waxes poetic about the future of quantum computing, which he believes will lead to the creation of a new form of intelligent life. At times, Rose’s enthusiasm evokes Dr. Frankenstein’s reaction to the successful reanimation of the “monster” in various Hollywood films. In front of a packed audience at the 2013 IdeaCity Conference in Canada, Rose described the operational 512-qubit D-Wave quantum computer as a monolith that looks like “an altar to an alien god,” which emits a sound that sounds like the beating of a human heart.

Alluding to Hugh Everett’s Many-World’s Interpretation—a mainstream theory depicting a quantum universe constantly bifurcating into parallel worlds populated with real people like us—Rose says: “There are 2^{500} of these guys living in that chip. So, the way I think about it is that the shadows of these parallel worlds overlap with ours, and if we’re smart enough, we can

¹¹ <http://optalysys.com/light-speed-computing-now-only-months-away/> Optalysys website, accessed 20 Jan 2015.

¹² <http://www.dwavesys.com>. company website, accessed January 26, 2014

¹³ Smally, Eric, “D-Wave defies world of critics with ‘first Quantum cloud,’” Wired, Feb 22, 2012.

dive into them and grab their resources and pull them back into ours to make an effect in our world.”¹⁴

Rose, both a wrestling and Jiu-Jitsu champion, also wrestles with the Big Questions and claims his team has the technical jiu-jitsu needed to build the machines that will help answer them. “Predictions are our own desire made manifest,” he said at the conference. Rose then predicted that, with the help of quantum computing, NASA will discover an Earth-like planet by 2018, that “parallel universes will turn out to be very important . . . [and] we will be able to test the reality of them,” and that by 2028, “we will have machines that outpace humans in everything.”

Quantum computing, even if it’s not the quantum annealing that D-Wave appears to be doing, may indeed be what makes AI come alive. But it will not only be electricity that animates the AGI creature, but consciousness—that *élan vital* we still don’t fully understand.

In Geordie Rose’s reformulation of Moore’s Law, the number of quantum bits on a D-Wave chip has been doubling every year since 2004. This makes their 512-qubit Vesuvius chip, made in 2013, about 500,000 times faster than their 128-qubit processor, fabricated in 2010. The fastest classical computer in the world, which performs almost 34 quadrillion calculations per second, appears to be no more conscious than a stone. So it is questionable that consciousness will emerge from classical computing, no matter how fast it computes.

On the other hand, recent developments indicate that quantum biology may be the key to conscious, intelligent life. Once we figure out how to build the type of quantum computer that can do what the human brain does, then development of AGI may follow swiftly.¹⁵ We must do everything we can to make sure this awakening happens safely, because it now represents both our greatest promise and our greatest existential threat.

Ordinary bits in classical computers are in a state of 1 or 0, but quantum bits can be 1, 0 or both at the same time. This indefinite state is called superposition, and it is achieved in D-

¹⁴ “D-Wave lecture by Geordie Rose (IdeaCity 2013) YouTube video, published July 9, 2013. <https://www.youtube.com/watch?v=MyUbWl8jPQU>, accessed January 25, 2015.

¹⁵ Ghosh, Subrata; Aswani, Krishna; Singh, Surabhi; Sahu, Satyajit; Fujita, Daisuke; Bandyopadhyay, Anirban. 2014. "Design and Construction of a Brain-Like Computer: A New Class of Frequency-Fractal Computing Using Wireless Communication in a Supramolecular Organic, Inorganic System." *Information* 5, no. 1: 28-100.

Wave's quantum processor for very brief periods of time only by isolating the chip from all outside interference. Decoherence is leakage of information about what's going on in the black box, which houses the computer, so the trick is to monitor errors, while the process is occurring, without causing decoherence.

Until recently, it was assumed that quantum computing was only possible in an extreme environment. For example, D-Wave's quantum chip is suspended inside of a shielded, black, monolithic refrigerator about 10' x 10' x 10', where it is cooled in a high vacuum (10 billion times lower than atmospheric pressure) with liquid helium to just above absolute zero. The chip inside that black box is 150 times colder than interstellar space—the coldest place in the known universe.¹⁶

In 1989, physicist and Nobel laureate Roger Penrose theorized in *Emperor's New Mind* that non-algorithmic quantum processes would be necessary for the brain to manage consciousness and understanding. His argument was based on the need for a mechanism in the human brain that could solve non-computable algorithms.¹⁷ Penrose's critics argued that quantum computing was not possible in the “warm, wet and noisy” environment of the human brain. Anesthesiologist and professor Stuart Hameroff, who routinely brings patients in and out of consciousness, read Penrose's book and suggested to him that microtubules—protein structures within the cytoskeleton of the neurons—may be where quantum wave reduction occurs.

Beginning in 1992, Penrose and Hameroff developed their Orchestrated Objective Reduction (Orch-OR) model of consciousness. Both were widely ridiculed by scientists, mathematicians, and philosophers. Over the past few years, however, researchers have proved that quantum processing indeed occurs at room temperature in both plants and animals, thus at least partially vindicating Penrose and Hameroff. Quantum coherence has been observed in

¹⁶ D-Wave's website: <http://www.dwavesys.com>, accessed January 26, 2015

¹⁷ Penrose, Roger, *The Emperor's New Mind: Concerning Computers, Minds, and The Laws of Physics*, Oxford University Press, 1989, ISBN 0-14-014534-6

olfaction, bird navigation, photosynthesis and—finally, even in microtubules.^{18 19} Recent experiments with quantum computing, utilizing laboratory manufactured diamond chips or doped silicon, were also done at room temperature. In one experiment, quantum superposition was held for 39 minutes.²⁰ Researchers have also demonstrated that functional quantum computers could be built at refitted microchip manufacturing facilities using pure, non-magnetic silicon-28, which allows electrical control of quantum bits.^{21 22}

Furthermore, an experiment to be run by researcher Anirban Bandyopadhyay and his team, may soon determine that quantum activity within the microtubules is affected by anesthesia.²³ Confirmation of quantum processing being associated with consciousness would have profound implications across many disciplines, including AI, biology and physics. One consequence is that the many worlds in the many-worlds hypothesis may need only refer to probabilities, and not actualities.

The holistic, conscious, human-like intelligence of AGI will probably come with the help of quantum computing, and not only classical computing as still believed by many AI researchers. Consciousness has not emerged from previous efforts, even as supercomputer speed passed 10 quadrillion, the number of calculations previously thought necessary by Ray Kurzweil for a functional simulation of the brain.²⁴ The development of quantum AGI may be how we bridge what has traditionally believed to be a gap between mind and matter and give us deep

¹⁸ Hameroff, Stuart and Robert Penrose, "Consciousness in the universe: A review of the 'Orch OR' theory," *Physics of Life Reviews*, Volume 11, Issue 1, March 2014.

¹⁹ Fleming, Graham R. and Gregory D. Scholes, "Physical Chemistry: Quantum mechanics for plants," *Nature* 431, 256-257 (16 September 2004) | doi:10.1038/431256a; Published online 15 September 2004

²⁰ Saeedi, Kamyar, et. al., "Room-temperature quantum bit storage exceeding 39 minutes using ionized donors in silicon-28," *Science*, 14 November 2013, Vol. 342 no. 6160 pp. 830-833 DOI: 10.1126/science.1239584

²¹ Wheelahan, Dan, "Breakthrough opens door to affordable quantum computers," University of New South Wales Newsroom, April 13, 2015.

²² Arne Laucht et al, "Electrically controlling single-spin qubits in a continuous microwave field," *Science Advances* 10 Apr 2015: Vol. 1 no.3 e1500022, DOI: 10.1126/sciadv.1500022

²³ Email correspondence with Anirban Bandyopadhyay, January 10, 2015.

²⁴ Kurzweil, Ray *The Singularity is Near: When humans transcend biology*, Penguin Group, 2005, p. 71, 124. In 2005, Kurzweil didn't believe quantum processing occurred in the brain, but he wrote (p. 451) "... if the brain does do quantum computing this would only verify that quantum computing is feasible. There would be nothing in such a finding to suggest that quantum computing is restricted to biological mechanisms." Now we know that quantum computing is possible in both biological and non-biological applications.

insight into the nature of the universe. Whether consciousness is intrinsically intertwined with matter, or arises from quantum processes in microtubules, a collective consciousness like UNICE could still be developed for the good of all of its constituent entities.

Indeed, some researchers are now proposing that consciousness may be ubiquitous. The Orch-OR theory says that quantum computing in biological systems produces consciousness, but that classical computing cannot. Giulio Tononi's competing Integrated Information Theory (IIT) describes a form of panpsychism where consciousness is a property of matter, and that sufficiently organized algorithmic computation, including "a large repertoire of states belonging to a single integrated system," can be conscious.²⁵ Tononi's theory postulates a calculable information quantity called "phi," (Φ) which he claims is in everything.²⁶ Physicist Max Tegmark, also a panpsychist of sorts, accepts Tononi's ideas and refers to conscious matter as "perceptronium" and hypothesizes it is a state of matter, like a solid, liquid, or gas. Systems with high phi would be conscious. Tegmark thinks computers and the Internet might already be conscious, in some sense, even though there is no evidence for that yet.²⁷

Mind/body dualism, the belief that spirit is separate from matter, arose with "Aristotelian" Christianity and has persisted among the religious beyond the Renaissance into the modern era. Idealism, the idea that everything is mind, held some support among scientists for a while in the 19th and early 20th century. Physicist, astronomer and mathematician Sir James Jeans captured the zeitgeist in 1930: "Today there is a wide measure of agreement, which on the physical side of science approaches almost to unanimity, that the stream of knowledge is heading towards a non-mechanical reality; the universe begins to look more like a great thought than like a great machine. Mind no longer appears as an accidental intruder into the realm of matter; we are beginning to suspect that we ought rather to hail it as a creator and governor of the realm of

²⁵ Koch, Christof and Giulio Tononi, "Can Machines Be Conscious?" IEEE Spectrum, Vol. 45, No. 6, pages 55–59; June 2008.

²⁶ Koch, Christof, "A 'Complex' Theory of Consciousness," Scientific American, Mind & Brain, July 1, 2009.

²⁷ Tegmark, Max, (MIT) "Consciousness as a State of Matter," [arXiv.org](https://arxiv.org/abs/1401.2875) (Submitted on 6 Jan 2014 (v1), last revised 27 Feb 2014 (this version, v2))

matter So at least we are tempted to conjecture to-day, and yet who knows how many more times the stream of knowledge may turn on itself?”²⁸

Since that time, the stream has turned toward reductionism. Modern science has increasingly tried to reduce everything to one underlying substance while assuming mind to be an emergent property of matter and classical computation. The move toward various forms of panpsychism now begins to turn the stream again, except that the Integrated Information Theorists are still trying to explain consciousness without resorting to quantum processing which, when coupled with observation, causes wave functions to collapse into multiple realities. Tegmark, along with many mainstream physicists, tend to think proliferating universes are populated with real things and events.²⁹ In this scenario, we and Schrödinger’s cat have far more than nine lives.

However, just like the wave-particle duality in quantum physics, it may be that reality has properties that appear either like mind or like matter, depending on one’s perspective. While imagining a universe that does not constantly bifurcate, but which may be still be part of a different sort of multiverse, I think of superposition as a mind-like state, with the collapse of the wave-function into definite outcomes being more like matter. The proliferating universes in Hugh Everett’s *Many-World’s Interpretation of Quantum Mechanics* (1957) could just be mind-like possibilities of varying probability that reduce to one reality with the collapse of the wave function. Conscious, quantum AGI will probably be able to find out whether the many worlds are real or not, and may also be able to determine if our universe is part of another type of multiverse, containing an ensemble of universes, as indicated by M-theory.

Before these Big Questions are answered, we have some serious business to attend to. In recent history, our human population has expanded into and exploited almost every niche on the planet. As dreamers, schemers, inventors, warriors, builders, consumers, and breeders, we have been like rapacious caterpillars encircling the Earth in a glistening chrysalis of technology. The outcome of our global metamorphosis is being determined by what we do now. Will this chrysalis be our tomb? Will our web of humanity, along with many other species, be destroyed

²⁸ Jeans, James, “The Mysterious Universe,” MacMillan p. 186 (1932, American edition)

²⁹ Tegmark, Max, “Many lives in many worlds,” Nature, Vol. 448, 5 July 2007

before we reach our potential, just because we couldn't learn to control our numbers, temper our malevolent urges, or govern ourselves? Perhaps we will be cannibalized by a beast of our own creation because, like us, it will fail to sufficiently respect the lesser creatures or share power equitably. I prefer to think the chrysalis will incubate us to full maturity, and that when the time comes, we will break out of our shell and soar like that most beautiful of small creatures, and touch lightly upon the Earth. UNICE, which will be comprised of all of us working toward a cooperative goal, could help us safely make that transition.