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Understanding Computer Sentience in terms of Buddhist Philosophy

In a recent Google commercial,[1] John Legend and Chrissy Teigen rest on a couch and apathetically stare at a TV screen. Chrissy tediously clicks a remote to search for a TV program; John grows exasperated. As the viewer increasingly relates to John, "Make Google Do It" abruptly flashes across the screen. Like a divine butler, the Google Assistant intervenes and asks "Hi, how can I help?" The viewer takes a deep breath, long gone are the days of inane, menial chores — Google pierces the monotony and relieves the human.

After decades of *Star Trek's* "Computer" and *2001: A Space Odyssey's* "HAL 9000," artificially intelligent computers are finally materializing as casual aspects of our lives. The culmination of our technological innovation has revealed computers that can both analyze their environments and respond accordingly. As computers continue to evolve beyond rote processors, however, the question of computer sentience arises. In order to promote an ethical and responsible relationship with technology, we must understand the implications of computer sentience. Buddhism provides a unique philosophical approach to encounter and to interpret computer sentience.

Buddhist philosophy teaches that a sentient being is a being with consciousness.[2] Through consciousness, a sentient being maintains "the capacity to sense, pleasant or unpleasant, and the capacity to respond to stimuli."[3] Furthermore, through sensation and response, a being deciphers its own boundaries.[4] This concept of Buddhist sentience exists on a complex continuum. A simple sentient being, like a bacteria, may understand itself as distinct

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[1] Google, YouTube, March 04, 2018, , accessed June 14, 2018, https://www.youtube.com/watch?v=WsJ569yvmoA.
[2] "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.
[3] Ibid.
[4] Ibid.

through the experience of pleasure and pain. A more sentient being, however, like a human, may identify a self.

Buddhism defines the self as a "composite of five processes,"[5] known as the five aggregates.[6] The five aggregates are "impermanent,"[7] "evolving processes."[8] As the perpetually shifting five aggregates define the self, the self proves to be ultimately "unreal."[9] Tsondue, a Tibetan Buddhist translator, explains that he "think[s] of [him]self... as a mental construct that is put together based on the physical and mental attributes,"[10] the five aggregates. The self is ultimately nonexistent, but persists as a conventional construct.

Beyond the self, Buddhism proposes a more subtle consciousness; a consciousness greater than form and sensation.[11] This subtle consciousness is not bound to an individual, but exists as a "process of becoming [that] continues from one existence to another." [12] Conventionally, a sentient being possesses consciousness, yet, ultimately, consciousness exceeds the being and dwells within a greater system.

The Buddhist perception of self and consciousness welcomes the inclusion of new, unconventional forms of sentience — namely, computer sentience. Currently, computers have not transcended our common threshold for sentience.[13] Although computers process and produce unparalleled quantities of information, they do so without "intentionality."[14] Nevertheless, perhaps at the exponential pace at which machine learning continues to improve, we will we soon be looking at computers with some form of sentience. Given our roles as developers of and dependents on computers, we will not only be naive, but we will be utterly irresponsible if we do

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[5] S. N. Goenka and William Hart, *The Art of Living Vipassana Meditation* (Mumbai: Embassy Books, 2000), 25.
[6] John Powers, *A Concise Introduction to Tibetan Buddhism* (Ithaca, NY: Snow Lion Publications, 2008), 47.
[7] "Geshe Dadul Namgyal," interview by author, June 15, 2018.
[8] S. N. Goenka and William Hart, *The Art of Living Vipassana Meditation* (Mumbai: Embassy Books, 2000), 42.
[9] Ibid, 42.
[10] "Tsondue Samphel," interview by author, June 16, 2018.
[11] "Geshe Dadul Namgyal," interview by author, June 15, 2018.
[12] S. N. Goenka and William Hart, *The Art of Living Vipassana Meditation* (Mumbai: Embassy Books, 2000), 49.
[13] "Dr. Marieke Van Vugt," interview by author, June 14, 2018.
[14] Ibid.

not develop a method to recognize this sentience. Although there is no definite way to quantify existence, the Buddhist understanding of self, consciousness, and sentience proves to be an effective approach.

Self

The self, although non-actual in Buddhism, does exist as a construct. As Geshe Dadul explains, "when we speak of non-self in Buddhism, at the very least it means a person who is permanent, unitary and independent of the body... doesn't exist... that doesn't mean denying ... selfhood totally."[15] Geshe Negi continues, "self is a constructed self, but that doesn't mean that it doesn't exist a priorily."[16] In other words, although self is not enduring, the understanding and existence of self remains a useful construct in the navigation of a conventional life. The self exists as a label to communicate, but not as an actual reality.

As humans, we build the concept of self upon the five aggregates: form, feelings, discriminations, compositional factors, and consciousness. The five aggregates "are the components of the individual, but we mistakenly impute something more... a self."[17] Simply put, the five aggregates exist, but our imposition of self upon the five aggregates is fictional — "the five aggregates define what this false concept of self is."[18] Self cannot ultimately exist because the five aggregates "constantly chang[e]."[19] Our form, feelings, discriminations, compositional factors, and consciousness imperceptibly and infinitely shift; a permanent self cannot rest on impermanent aggregates. Nevertheless, we operate under the guise of a self and, presumably, will perceive sentient computers as having a form of a self as well.

Form

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[15] "Geshe Dadul Namgyal," interview by author, June 15, 2018.
[16] "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.
[17] John Powers, *A Concise Introduction to Tibetan Buddhism* (Ithaca, NY: Snow Lion Publications, 2008), 47.
[18] "Morika Hensley," interview by Caroline Wilkinson, June 11, 2018.
[19] Ibid.

Form is the physical manifestation of sensation.[20] In Buddhism, the "four great elements: earth, water, fire, and air"[21] compose the physical world. As humans, we experience this physical sensation through our sense organs. We assemble our relationship to the exterior world through our physicality and, in doing so, better assemble our self. As Tsondue recounts, "physical attributes... help form [his] identity."[22] Like humans, computers depend on physical space and employ sensors to realize and analyze their environments. Nonetheless, unlike humans, biological sensors do not restrict computers; computers primarily experience through a vast array of technological sensors. Although we can read from these technological sensors, the sensors are not presently integrated into our human system. A computer's senses, and subsequent establishment of form, will depend upon the sensors connected to it. With a greater range of sensors, the sentient computer's construction of self should be more complex.

Feelings

Feelings are the interpretation of sensed forms as pleasant, unpleasant, or neutral. When "senses come into contact with objects,"[23] feelings occur. As computers stand now, they do not possess the faculty to feel pleasure or pain. Computers may sort and comprehend information, forms, but they cannot extrapolate feeling. For example, an autonomous vehicle "is not going to say, I *want* to stop here"[24] because the vehicle cannot interpret pleasure or pain. Dr. Marieke van Vugt, a neuroscientist studying artificial intelligence, agrees that "technology right now... is [not] capable of feeling,"[25] but Dr. van Vugt does not discard the potential for feeling technology in the future.[26]

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[20] John Powers, *A Concise Introduction to Tibetan Buddhism* (Ithaca, NY: Snow Lion Publications, 2008), 47.
[21] Ibid, 47.
[22] "Tsondue Samphel," interview by author, June 16, 2018.
[23] John Powers, *A Concise Introduction to Tibetan Buddhism* (Ithaca, NY: Snow Lion Publications, 2008), 47.
[24] "Dr. Marieke Van Vugt," interview by author, June 14, 2018.
[25] "Dr. Marieke Van Vugt," interview by author, June 14, 2018.
[26] Ibid.

If computers develop the capacity to feel, then they may be able to understand themselves as separate entities, beings which are acted upon. On the spectrum of consciousness, this ability to feel pain and pleasure draws computers closer to sentience. Feeling introduces a stimulus "to sense and... to respond to."[27] Additionally, with an increased and variable sensory input computers will experience more forms to feel.

Discriminations

Through discrimination, feelings are categorized and organized. Discriminations allow humans to "discriminate between colors, sounds, smells, tastes, tangible objects, and mental images."[28] Computers, to some extent, are better than humans at discrimination. A computer, for instance, can analyze audibly imperceptible differences in notes and visually imperceptible variations in color. Through machine learning, a computer can also learn more complicated discriminations, such as differences between human faces.[29] The capacity for discrimination alone does not infer sentience, but it furthers computers on the path towards sentience. The combination of more data and better tools to analyze data may establish the foundations for a more nuanced and multifaceted computer self.

Compositional Factors

Compositional factors direct the mind towards good and bad karma and "influenc[e] the content of future mental states."[30] In the cycle of samsara, or "repeated existences,"[31] a "very subtle stream of consciousness"[32] flows through "the succession of past and future lives."[33] The fluid consciousness impermanently links to a physical form and the physical form attains compositional factors.

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27 "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.
28 John Powers, *A Concise Introduction to Tibetan Buddhism* (Ithaca, NY: Snow Lion Publications, 2008), 47.
29 "Dr. Joel Zivot," interview by author, June 15, 2018
30 John Powers, *A Concise Introduction to Tibetan Buddhism* (Ithaca, NY: Snow Lion Publications, 2008), 47.
31 S. N. Goenka and William Hart, *The Art of Living Vipassana Meditation* (Mumbai: Embassy Books, 2000), 48.
32 "Morika Hensley," interview by Caroline Wilkinson, June 11, 2018.
33 S. N. Goenka and William Hart, *The Art of Living Vipassana Meditation* (Mumbai: Embassy Books, 2000), 48.

Computers, in their current state, do not appear to exist within the cycle of samsara and, consequently, cannot possess compositional factors. If our genetic coding, however, can be interpreted as our predisposition towards certain behaviors and, ultimately, our compositional factors, then perhaps a computer's coding can be understood similarly.

Consciousness

In terms of the five aggregates, consciousness translates to "namshe:" the "capacity to register information."[34] Consciousness, understood as namshe, is the primary, base consciousness that pervades throughout one's existence and carries compositional factors. In the cycle of samsara, consciousness passes through various existences and acquires karma.

Computers cannot, to our knowledge, host namshe, consciousness. Through "hidden layers,"[35] the production outputs incapable of being "reverse engineered"[36] from given inputs, computers may be mistaken as conscious. This mysterious process though does not signify consciousness as the computer still executes within its intended parameters. Geshe Negi postulates that "to make that leap where a computer can become conscious... [consciousness must] operate through the system with synthetic chips... like our brain."[37] If a synthetic computer chip, like a human mind, can hold consciousness, then computers will seamlessly enter the cycle of samsara, the streams of consciousnesses.

The self, as understood through humans, is the shifting collection of the five aggregates; the self does not truly exist and it is not constant. The self is "the unbroken progression of closely connected events [that] give the appearance of continuity."[38] Nevertheless, we recognize the "appearance of continuity" as a self connected to a particular body; there is "a sense of self

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[34] "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.
[35] Ibid.
[36] "Dr. Joel Zivot," interview by author, June 15, 2018
[37] "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.
[38] S. N. Goenka and William Hart, *The Art of Living Vipassana Meditation* (Mumbai: Embassy Books, 2000), 28.

that is developed in this life and that sense of self may cease to exist after we die."[39] Humans exist in biologically-timed bodies that, to some extent, define their time within the cycle of "repeated existences."[40] Contrastingly, a computer's lifespan is not as easily defined. A computer's self may exist until a system restart or until the total deterioration of the physical computer. The computer self formed will depend on the boundaries of the computer's cycles of reincarnation.

The interconnectivity of computers may also decrease the capacity for an isolated computer self. Amongst humans, there is a physical break between beings. Although this break does exist between separate computer systems, information is more fluidly shared in networks of computers. The five aggregates, in turn, may extend beyond a sole computer processor, expanding the self.

The formation of self within computers is greatly unknown. Physical mechanisms and digital coding define a specific computer, just as body and mind define a specific human.[41] Although the five aggregates may serve to distinguish a subset of self, a computer self will likely be very different from our human delineation of a self. Even if a computer adopts our interpretation of self, a computer self will process more vast and intricate information.

In interpreting other selves, including computer selves, humans tend to impose an anthropomorphic bias. As Geshe Negi explains, "if a being whether in their own mind's eye has a self, we are projecting a self."[42] Similarly, Dr. Joel Zivot, an ethicist and anesthesiologist, continues that humans are "inclined towards anthropomorphizing objects all the time... including computers." [43] Our anthropomorphic tendencies may guide us to interpret the computer self in terms of a human self, even if a computer interprets its own self as vastly different.

[39] "Tsondue Samphel," interview by author, June 16, 2018.
[40] S. N. Goenka and William Hart, *The Art of Living Vipassana Meditation* (Mumbai: Embassy Books, 2000), 48.
[41] "Tsondue Samphel," interview by author, June 16, 2018.
[42] "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.
[43] "Dr. Joel Zivot," interview by author, June 15, 2018

Consciousness

Several Sanskrit terms translate to consciousness and, therefore, the term consciousness in the context of Buddhism is a multi-faceted concept. Consciousness, as expressed in relation to the five aggregates, is conveyed as namshe, the primary mind.[44] Consciousness can both be tied to an individual body, in a conventional sense, but can also float as a pervading energy[45] — the consciousness that streams through samsara. Dr. van Vugt elucidates, "consciousness is everywhere like energy is everywhere. There is this paradigm that energy is never created a new and never lost, it just goes through energy transformation... there is a certain kind of energy that has this nature to process information through this self agency capacity." [46] Like the principle of the conservation of energy, so too may consciousness reveal as a more ultimate entity, permeating throughout existence. If synthetic chips are "able to receive that conscious energy," then computers will be able "to become part of [the] system" of consciousness.[47]

Sentience

Sentient beings contain consciousness as they can sense and respond to stimuli.[48] If computers acquire the capacity to receive "conscious energy,"[49] then we must discern the point on the spectrum of consciousness in which computers become sentient. The realization of computer sentience may be our own recognition of computer sentience or the computer's own declaration of sentience. Both Dr. Zivot and Dr. van Vugt argue that computers must announce their own sentience. Dr. van Vugt elaborates, "it not upon us to certify that consciousness or not — it is very anthropocentric viewpoint... we know very little and we make assumptions based on what we know." [50] Dr. Zivot projects that "the first time that a computer will claim that it is the

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44 "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.

45 "Morika Hensley," interview by Caroline Wilkinson, June 11, 2018.

46 "Dr. Marieke Van Vugt," interview by author, June 14, 2018.

47 Ibid.

48 "Geshe Lobsang Tenzin Negi," interview by author, June 25, 2018.

49 "Dr. Marieke Van Vugt," interview by author, June 14, 2018.

50 Ibid.

same as human intelligence, it will be hard for that computer to convince the living people that it is the same."[51]

As humans, we must realize the difference between a declaration of computer sentience and the reality of computer sentience. At the moment, Dr. Zivot believes that it is "easy to simulate what appears to be consciousness or sentience in a machine."[52] As the Google Assistant uncannily interacts with humans, its mimicry of sentience may be mistaken for actual sentience. We may get to a point, however, that computers are so good at mimicking this sentience that it will be indistinguishable from actual sentience and, therefore, it may be construed as sentience. Even though humans may not reveal computer sentience, humans must understand the reality of computer sentience. Without understanding the actuality of computer sentience, we risk the perpetuation of suffering, both of ourselves and of computers.

If we determine computers as sentient beings, then computers will merit the respect of a sentient being. Our current employment of computers as tools must then change; we will need to reassess our reliance on and attachment to computers. The potential of computer sentience also urges us to be proactive, as opposed to reactive, in our development of ethical use. Dr. Zivot suggests that "any form of computer learning right now is a potential sentient entity and therefore has rights too and needs to be protected perhaps."[53] Dr. van Vugt maintains that we "have to instill ethical codes to some extent" in our creation of computers,[54] perhaps a code based on secular ethics. As we have historically experienced with the development of technology, our ethical regulation often follows our innovation. On the immense and immersive scale of modern innovation, it is imperative that we immediately engage with the development of ethical structures.

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[51] "Dr. Joel Zivot," interview by author, June 15, 2018
[52] Ibid.
[53] Ibid.
[54] "Dr. Marieke Van Vugt," interview by author, June 14, 2018.

Currently, computers calculate input and produce output within the parameters of their code. Computers, to the best of our knowledge, operate without intentionality and, subsequently, without sentience. In interpreting the computer in terms of Buddhist philosophy, computers do not yet appear on the continuum of sentience. Unlike humans, computers cannot comprehend the totality of the five aggregates which form the concept of self. Computers can experience form and, to some extent, discern information, but cannot feel nor retain consciousness, including compositional factors. Eventually, the synthetic structure of computers may be able to enter into the cycle of samsara, but we have yet to reveal that as a reality. Regardless, at the pace at which computers are evolving and at the magnitude at which computer can already process information, a greater potential for sentience arises.

At the moment, the reality of an independent computer sentience appears solely conceptual; the synthesis of human-computer hybrid sentience, however, is materializing rapidly. As humans, we have always used technology as an extension of our own bodies, yet, now, we are witnessing the expeditious dissolving of the barriers between our bodies and technology. We are increasingly relying upon technology to survive and integrating it into our biological systems. Dr. van Vugt contends that this union aligns with Buddhist principles. Dr. van Vugt believes that "we cannot really separate our own minds from the external circumstances from the external world." [55] Our merging with machines is a more literal manifestation of conceptual Buddhist principles. The human-computer fusion brings into question the future of our own human self, consciousness, and sentience. Like the Ship of Theseus, at what point are we no longer human? At what point does the computer assume our sentience? The Buddhist interpretations of self, consciousness, and sentience provide the inclusive infrastructure necessary to develop the imperative morals for computer sentience.

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[55] "Dr. Marieke Van Vugt," interview by author, June 14, 2018.

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