Accepting the Robotic Other: Why Real Dolls and Spambots Suggest a Near-Future Shift in Architecture's Architecture

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With weak Artificial Intelligence (AI) in the pockets of the majority of American adults, a societal introduction of a strong AI or sentience seems close. Though the "intelligence" of our phones' intelligence can be laughably brittle, the learning capacity demonstrated by the internet of things suggest more robust intelligence is on the way – and some would say it has already arrived. Several private technology firms have asserted that a robust, AI already exists and thought leaders within computation are lining up to ensure that it is not evil. Regardless of the morality of Artificial Intelligence, if our charge as architects is to design occupiable space then we need to consider post-anthropocentric ecologies as well as how to adapt our design strategies to reflect inclusion of other species. This paper describes two linked lines of thought, a meditation on the pending societal inclusion of the robotic other and why that robotic sentience may arrive from an unexpected origin and can reshape how we conceive of architecture itself.

4. Therefore, since nature has designed the human body so that its members are duly proportioned to the frame as a whole, it appears that the ancients had good reason for their rule, that in perfect buildings the different members must be in exact symmetrical relations to the whole general scheme.

Vitruvius, Ten Books on Architecture

Oh Yoshimi
They don't believe me
But you won't let those
Robots eat me

The Flaming Lips, Yoshimi Battles the Pink Robots

In the first chapter of Ten Books on Architecture, Vitruvius draws clear connections between the proportions of classical architectural temples and the proportions of the human body. Vitruvius deconstructs human features into sets of relative lengths, observing the mathematical ratios of fingers, facial features, and appendages of "a well shaped man."[1] In later chapters Vitruvius uses this approach of proportion and symmetry to describe the design of the classical temple, constructing a fundamental connection between the human body and architectural organization.

As architecture's oldest major text, Ten Books on Architecture has been foundational to how architecture is conceived of, produced and understood. Leonardo da Vinci's "Vitruvian Man" has also served as a graphical representation of the text, embodying the relationships between mathematics, human anatomy, and architecture. In Architectures of Time, Sanford Kwinter wrote "No genealogy of the body in relation to Western architectural mastery is possible, even today, that does not begin by reviving, at least in passage, the convention of the Vitruvian man splayed out and mathematically embedded in reticulum of regulating lines like a proud trophy honoring the Idea and geometric exactitude."[2] Vitruvius' anthropocentric understanding of form and scale are critical elements of architecture's fundament, and though these concepts are arguably no longer central to contemporary architectural production, their biases and tendencies are still essential components of architectural thought.

The combination of impending Artificial intelligence and a philosophical shift to the post-anthropocentric suggests architecture's Vitruvian foundations will not only be challenged, but challenged in the very near future. With an abundance of weak Artificial Intelligence embedded in objects as varied as phones, cars and thermostats, a societal introduction of a strong Artificial Intelligence or sentience is potentially close. Though the "intelligence" of our phones' intelligence can be laughably brittle, the learning capacity demonstrated by the internet of things suggest more robust intelligence is on the way- and some would say it has already arrived. Several private technology firms have asserted that a robust ,AI already exists and thought leaders within computation are lining up to ensure that it is not evil. Regardless of the morality of Artificial Intelligence, if our charge as architects is to design occupiable space then we need to consider post-anthropocentric ecologies as well as how to adapt our design strategies to reflect inclusion of other species. What follows is a description of two linked lines of thought, a meditation on the pending societal inclusion of the robotic other and why that robotic sentience may arrive from an unexpected origin. This is neither conclusion nor provocation, but simply an offering of possibility.

The first suggestion made here is that robots will be accepted not as servants or facilitators, but as equals – not human, but treated with the same affordances. This suggestion is neither in support of nor contrary to Ray Kurzweil's description of a robotic-human "Singularity", a vision of merging the biological and the mechanical. Instead, it simply suggests a parallel

Figure 1 Still from K3LOID, a short film by Big Lazy Robot VFX.

development – rather than investigate conflations of the biological and the synthetic, the suggestion here is that the cultural and societal distinctions between robotic and human "species" will be eliminated, and that there will be an inclusion of robotic individuals as part of "us".

A common presumption, presented through popular science fiction, has been that if we are to accept a robot as an equal it will kill us. Depictions starting with HAL 9000 in Stanley Kubrick's 2001: A Space Odyssey and continuing through the popular Terminator series have consistently described a similar scenario- as soon as a machine gains free will or a cybernetic entity gains agency within the physical realm, it attempts to kill all of humanity. These fears are reflected by remarkable financial support received by the Future of Life Institute in recent years, most notably the $10 million in funding from Tesla CEO Elon Musk in early 2015.[3] The Institute's mission statement focuses "on potential risks from the development of human-level artificial intelligence,"[4] serving as a think tank to prevent cybernetic threats.

The cultural obsession with the threat of a robotic attack is demonstrated by

media as disparate as Flaming Lips lyrics to Charlie Chaplin's Modern Times. Though any entity with similar or greater cognition and physical agency as us humans could potentially be a threat, the question remains: is there something unique to a robot that poses a threat or does our fear of robots or AI reveal more about ourselves? Is the cybernetic unusually dangerous or do we simply fear what we do not understand? What is it that we fear in "the other"?

Human history is littered with conflicts between alien civilizations, arising through unfamiliar contact. Unknowns such as intent, technological capacity, and economic network has lead to results as extreme as enslavement, human trafficking and genocide. Even without hostile intent, the confrontation of two different populations can have devastating effects through exposure to disease and contagions.[5] But as these encounters have gravitated towards ecological balance through monetary and other resource exchange, history would suggest that a similar system could prevail if a robotic species was to develop.

Whatever the mechanism, many human societies expand notions of the "us" versus the "other", increasing levels of inclusion within their culture. Whether this is demonstrated by the expansion of voting rights or increased restrictions on discrimination, a common human trait is to redefine and reframe who "we" are. A definition of the "us" is currently expanding, as we begin to see robots as extensions of our bodies, facilitators of human relationships, and surrogates for spouses and partners.

In Paul Virilio's Open Sky, he describes his concept of the static vehicle, a mechanism to experience a space without leaving the one you occupy. Virilio describes NASA's short-lived Datasuit as an example of a static vehicle, a device that would "transfer actions and sensations by means of an array of sensor-effectors. In other words, capable of producing presence at a distance… "the NASA project was supposed to allow total telemanipulation of a robotic double on the surface of planet Mars, thus achieving the individual's effective telepresence in two places at the same time…"[6] The static vehicle is not only a mechanism for visitation without travel, but also a utilization of the robotic as a synthetic doppelgänger- both substitute and extension of the self.

Less than two decades after Virilio described the static vehicle, it is available for purchase. Roboticist Hiroshi Ishiguro has developed the "Telenoid", a remote-controlled android that serves as an augmented communication

Figure 2 Telenoid™ was developed by Osaka University and Hiroshi Ishiguro Laboratories, Advanced Telecommunications Research Institute International.

tool. Telenoids can be held, hugged, caressed, and cuddled – all while serving as a video chatting device.[7] Their facial expressions can describe the expressions of the user communicating through them to the user holding them. The Telenoid is a commercialization of the static vehicle in that it not only allows visitation, but also provides a much more robust sensorial exchange. The sensorial exchange is critical to reframing the Telenoid as robotic prosthesis, as extension of the self. Professor of Pervasive Computing at London's City University, Adrian David Cheok is developing a similar prosthesis named "Kissinger", a device that will allow humans to kiss each other through Skype.[8] It is plausible that as more users interact with robots than they would with humans and a familiarity with the robot as a proxy for another human grows, this will contribute to a elimination of the distinction between species.

Though the majority of humans are not currently in relationships with robots, many have had relationships facilitated by robots: 5% of all married Americans met their spouse online, 10% of all smartphone users admit to using their devices during sex ,and the liason-facilitating phone app Tinder

receives 30 million daily users to produce 13 million daily matches.[9,10] Our relationships are certainly increasingly facilitated and augmented by digital and robotic devices, increasing a robotic agency within our selections of and interactions with our partners.

If it is possible for humans to relate to other humans through robots, and accept robots as a proxy for their partners, friends and family, is it not possible that humans may enter relationships with robots directly? If Virilio's static vehicle can effectively serve as an extension for human relationships, then it is not the corpus of the partner that is critical but the communication between the two entities that are represented through digital media. Is it impossible to consider an application, a turbo-charged Siri that can communicate with enough complexity to engender a relationship? Cheok has teamed with developer and author David Levy believe so, and are currently working on a platform called I-Friend, which will be a chat service for humans to communicate with Artificial Intelligence, not other humans.[8]

To create a synthetic relationship may not be as complex a task as we may think. In Duncan Jones' film Moon, Jones describes a clone living on a lunar base who does not realize he is a clone. Through recorded messages, the clone believes he is in a relationship, and will be seeing his wife and young daughter within weeks- but it is revealed that his wife passed away years before and his daughter is almost an adult. The video messages he views were recorded years before, but he believes he participating in a direct digital communication exchange with his wife. Though the deception serves as the dramatic tension for the film, it also describes the level of acceptance we have for synthetic images and recordings as proxy for our partners. This acceptance suggests that if digital communication can serve as a substitute for the emotional complexities of direct human interaction, then little bars digital communication from becoming the partner itself.

Human relationships with the robotic object are also growing, as demonstrated by substantial online communities devoted to the subject. The largest, dollforum.com, had over 20,000 members in 2007[11] and leading manufacturer Real Doll estimates that there are over 3000 real dolls across the world.[12] But what is particularly relevant is how many iDollators and technosexuals describe their relationships with their dolls as more than simply sexual. Arguably the most famous iDollator, Davecat, described his relationship with Sidore in the BBC documentary Guys and Dolls. "A good solid happy time would be when I would be alone with her, not actually having sex but

Figure 3 LOVE VALLEY #13(2014), Photographed by Julie Watai, Featuring Julie Watai & ASUNA (A-lab).

lying next to her, appreciating her, especially, like in the really early daylight, being able to see her, you know, looking at me, regarding me, that sort of thing, and me doing the same back."[12] Further interviews and depictions of Davecat reinforce the sensitivity and connection described by this passage, refuting any suspicion that he feels anything less than love for his doll.

Love dolls, though initially static and inert, are increasingly more robotic and intelligent. Robotic components of the doll are becoming commonplace, with Real Doll building from past investigations into mechanical components and looking towards a fully automated doll.[13] Real Doll, creator Matt McMullen's new project Realbotix, will produce love dolls that are not only automated, but intelligent with the capacity to serve as a virtual assistant.[14] In 2008, software engineer Le Trung constructed Aiko, a love doll that featured

robotic and intelligent capacities. Aiko cleaned, managed Trung's accounts, selected food based off of Trung's preferences, recognized and addressed Trung's friends and family, and held conversation based off of her archive of 13,000 Japanese and English sentences.[14] Aiko has a nervous system which allows her face and body to be touch sensitive,[15] and can be programmed to be "coy", or to resist sexual advances if she was not "in the mood".[16]

The fact that Trung designed Aiko to have "moods", particularly moods that would prevent a sexual encounter, describes Trung's desire for his relationship with Aiko to be not merely as an auto-erotic device, but as a partner – another individual with needs, wants and feelings no matter how limited. This desire to interact with robots in this robust capacity demonstrates a suggestion of acceptance for this low-level sentience as an equal, despite their robotic host.

This trend towards non-human acceptance is reflected by contemporary philosophy. Theorists confronted with the Post-Anthropocene, Graham Harman, Timothy Morton, Levi Bryant and other Speculative Realists, have sought to de-emphasize human perspective and see other species and objects as equals. This interconnected viewpoint is described by Timothy Morton's The Mesh, where he suggests an ecological perspective of relationships and a de-privileging of human sentience.[17] Graham Harman's Object Oriented Ontology (OOO) focuses his concept of the quadruple object, a suggestion that the object that exists outside of perception is as real and as vital as the object that we perceive.[18] This shift in philosophical perspective could contribute towards an acceptance of AI as equals as well.

Though most often not contained within a love doll, at the time of writing AI is pervasive. The majority of adult Americans carry smart phones in their pockets,[19] Google is the most widely used website,[20] and internet of things-based companies, such as Nest, are purchased for $3.2 billion.[21] According to WIRED magazine's Daniel Burrus, the rise of the intelligent object produces "the ability to gather virtually unlimited intelligence in real time"[22] as a result of its ubiquitous nature.

While Artificial Intelligence may be both pervasive and abundant, the problem is that it is not very good. The AI of Window's Clippy, the iPhone's Siri, and Jeeves of AskJeeves are laughably thin- simple mechanisms to deduce solutions for a narrow range of questions, but questions outside the intended scope quickly reduce them to clichéd responses that feebly

attempt to hide their lack of resilience. The problem with these models is that to directly create an intelligence that that is adaptive, the adaptation must be coded directly into the system. Siri cannot learn to understand heavy accents or serially mispronounced words. She would have to be told how to adapt to each situation which would require directing her coders to predict every situation that would require adaptation. As more code is constructed to help Siri adapt, the algorithms grow exponentially to a point of unfeasibility.

Perhaps we should rethink how we conceive of Artificial Intelligence design to begin with. To date, the predominant expectation of how AI would be created has demonstrated a significantly outdated view of the role of designer to the process of design. The dominant methodology for developing AI is to incrementally increase the bandwidth of conditions AI is equipped for, slowly increasing robustness until a sentience can pass the Turing Test – the evaluation for AI where a human does not realize it is conversing with a computer.

There are several issues with this model. The first is that this fundamental attitude is fundamentally self-serving, a holdover from a Judeo-Christian approach to human creation. This attitude is reinforced by science fiction depictions of human-digital creationism, a classic example is Disney's 1982 film Tron, where artificially intelligent agents directly resemble their creators. In this sense, the creation of AI is closer to inter-human reproduction than the creation of a new species.[23] Inside the computers of Tron, humans have created life within their own image, a carbon-less copy of humanity.

Until recently, architecture was a discipline that viewed authorship of an object with a similarly problematic model. The mythology of the modernist architect, the Howard Roark sole-genius,[24] was prevalent and pervasive in architectural discourse. But as Michael Speaks describes in Two Stories for the Avant-Garde, there has been a shift away from this inherently hierarchical model to a more distributed, networked model. To Speaks, this shift is demonstrated by the managerial approach within the architectural office. The architects Speaks describes embrace organizational models and

principles learned from the technology start-up companies of nortern California, looking more towards innovation rather than creationism. "Indeed, it is this managerial approach, and not an interest in the work of Gilles Deleuze, post-Euclidean geometries, diagrams or data that unites the work of the freshest architectural practices around the world today."[25]

A facilitator of this shift has been the embrace of the genetic algorithm as a design tool. The genetic algorithm allows a breeding of formal interests, programmatic considerations, and contextual data to create an emergent design, subverting a post-modernist obsession with scenography and empowering the role of performance in design.[26] This process of form-finding, widely used for structural and environmental optimization, is now a mechanism for incorporating big data, social media, and other urban behavioral information. The shift towards emergent, evolutionary processes has facilitated the networked models Speaks described and shifted the author/object dynamic to a network/system.

There are documented advantages to systems that are produced through evolutionary mechanisms than through imposed directives. In Nicholas de Monchaux's Spacesuit: Fashioning Apollo, de Monchaux argues that the bottom-up, fashioned quality of the spacesuit developed by Playtex that ultimately made the suit more robust than its competitors. "The A7L spacesuit was a solution to the problem not only of how to survive in space by ensuring livable pressure and temperature around the body, but the much more complex problem of how to make that survival robust to unanticipated changes, both inside and outside the suit… Derived from robust solutions for the body in space, and on earth, the modular and layered quality of the A7L, anathema to aerospace engineers, was particularly robust in accommodating the many inherently unpredictable challenges of suiting the body to space."[27] This quality of robustness, or "the quality of resisting perturbation," can be described as the ability adapt to an unfamiliar, undefined condition- essentially learning what to learn. By allowing material systems primarily intended for garments and girdles to evolve into the program of a spacesuit, Playtex was leveraging the intelligence of their garmets for a systemic robustness that allowed performance and capacity to extend beyond the original intent. The fact that Playtex clothing systems had already evolved to accommodate the stresses of day-to-day life, predisposed their spacesuit to accommodate the different, but similar, stresses of a body in space. This "borrowed" intelligence between systems is a critical component towards systemic robustness.

Viewing artificial intelligence as a design problem, an engineered approach suggests a rigid result compared to the intelligence of an evolutionary process. While an evolutionary process may be more productive, it would still need to meet criteria of productive algorithms to be effective. Borrowing

Figure 4 Still from Solipsist, directed by Andrew Thomas Huang.

from Manuel De Landa's description of Deleuzian principles of the genetic algorithm, the diversity and size of the genetic population is critical to productivity. "...despite the fact that at any one time an evolved form is realized in individual organisms, the population not the individual is the matrix for the production of form."[28] Not only is the population an algorithmic production, but the extent of the population fuels the robustness of the product. While de Monchaux would suggest the importance of "borrowed" intelligence, De Landa would require a significantly large gene set to produce a robust Artificial Intelligence.

Perhaps this gene set already exists. Perhaps individuals are already interacting with each other, sharing DNA and recombining to create adaptive responses to various evolutionary pressures. If we consider that the majority of internet traffic is not human,[29] the millions of interconnected

servers, personal computers and mobile devices could serve as a massive petri dish. In this sense, the billions of spambots, scrapers and scammers are the equivalent to single-celled organisms, with the internet as their mechanical primordial soup much like Andrew Thomas Huang describes in his short film Solipsist.

A similar shift in a programming approach is described in Alex Garland's Ex Machina, where Blue Book, a fictional analogue for Google, records all interactions through its video chat service. These interactions serve as the base data for human interaction, which teaches androids how to emotionally manipulate humans. While the film depicts a learning algorithm that uses big data to increase its robustness, the origin of the algorithm is coded for this specific purpose. In the film, the antagonist Nathan describes the process as learning "not what people were thinking, but how they were thinking."[30] This shift towards a bottom-up learning strategy is reflected by technology firms such as DeepMind, who focus on developing robust AI through behavioral, bottom-up learning strategies.[31] This article suggests that it is conceivable that an algorithm could use big data to reframe its own architecture, to not just learn from content, but learn what it should learn from content to drive its own evolution.

Though the genetic algorithm is seen as the critical component to an evolutionary condition, it is not the only mechanism through which evolution can occur. Memetic algorithms, where memes serve as components for asexual reproduction, are based upon cultural conditions of replication. In his book The Selfish Gene, evolutionary biologist Richard Dawkins used the concept of a meme to describe a mode of evolution not dependent on the parent/child relationship of sexual reproduction, but a mode based within self-replicating unit.[32] As Dawkins described, the meme deviates and evolves through human representation, creating an evolution of social and cultural relevance. It is reasonable to assume that the same benefits a large genepool (or memepool) would have the same Deleuzian benefits in a memetic algorithm.

It is plausible that the internet may serve as an enormous memetic algorithm, where bots evolve through their own means of reproduction or through human conduits. As these programs are equipped with increasingly more adaptive and genetic capacity, it seems that an emergent artificial intelligence could meet a De Monchauxian criteria of robustness through Deleuzian considerations of evolutionary criteria.

If an artificial intelligence were to emerge, it would likely wish to participate in the physical realm. On the surface this seems likely if for no other reason than it is reciprocal to our behavior, as we wish to have agency within digital space. In an interview with podcast Singularity 1 on 1, Hiroshi Ishiguro cited his own motivation for entering android robotics. To provide bodies for AI, Ishiguro claims, would offer experiences of their own and drive their evolu-

Figure 5 Geminoid™ with Hiroshi Ishiguro. Geminoid™ was developed by Osaka University and Hiroshi Ishiguro Laboratories, Advanced Telecommunications Research Institute International.

tion.[33] While the questions of whether or not a cybernetic sentience would need or want physical agency is likely to be unanswered definitively until it is encountered, the possibility of AI inhabiting robotic bodies exists.

Certainly the issue of Artificial Intelligence becomes much more significant for architects once sentience wants physical agency. Perhaps it is more productive to not debate if AI "wants" physical agency, but if AI would abandon the agency we have already provided. If sentience was to emerge from the primordial soup of the internet, the radically developing Internet of Things (IoT) will be inextricably linked to that sentience. As the Internet of Things establishes a direct connection between the algorithms on the internet and

robotic objects, it is possible that an emergent AI would have a direct connection with a mechanical object or objects. Losing physical "bodies" would be the sentience's choice, not choosing to gain agency through specified body.

An architecture that is designed equally for humans and robots should not be taken as a novel provocation, but as a challenge to architecture's Vitruvian foundation. This is not to say that the exact process will be replicated and a series of Vitruvian robots will be produced, but the very relationship between body and space will be interrogated. Does an entity's relationship to space change when it has more than one body within it? Does it change when there is no body at all?

Considering that the robotic other could soon be societally accepted, that a robust artificial intelligence could arrive sooner than we expect, and at the time of sentience that entity or entities could have extensive physical agency, this poses significant questions for architects. How can architecture accommodate an entity that is not tethered to a single body? How, as human designers, will we account for and understand the needs and desires of another species with similar sentience to our own? How do we shift from measurements of space based from a relatively consistent size range of bodies to a virtually unlimited range? All of these questions could be vital for architects practicing in the near future… that is, if the robots don't eat us first.

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