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Technology in Sociology

There is never, not going to be new technology. No matter how much I want to push back the advancements constantly being made every day, or at least stall some devices for another ten years, there is nothing that can halt the tide of progress or turn back the Omni-present success of innovation. I, and therefore we as the current accumulation of humanity, need to get adjusted to this rapid fire delivery of almost too advanced-for-our-time technology and learn that no matter how adapt we feel or how accomplished, we will always be grasping at the concept of the latest and greatest. So in this vein, this vein of struggle for the unknown but must-have greater good, technology in sociology is attempted to be comprehended. Sociology is the study of human nature, how culture ideals through the ages have created this considered-pre-existing outline of society that is crucial to a civilization's survival. Societal hierarchy is thought up by man so it only makes sense for this time and people that man-made technology is in the uppermost echelons of this man-made world.

Technology is at the centermost point and it has so described and transcribed our everyday lives that it would only make sense for it to have affected how humanity interacts with itself, which is to say how now humanity interacts with itself via a third-party member, machine. Our interactions with each other have evolved, or devolved depending how one chooses to view it, through technology. Technology is such an unretractable feature of the 21st century that it is

impossible to study human nature without the aid of its ever constant companion; it is impossible to quantify behavior anymore without our trusty zeros and ones. So it is appropriate to say technology in sociology is actually better just called sociology because these gigabytes and wires and screens are forever apart of our nature now. Two key examples of this are gesture-based computing and artificial intelligence. Two intrinsically linked areas among themselves and to the meaning of man, for they are all for the promotion of man becoming machine and machine becoming better than man. Sociology is no longer the study of man and how his surroundings change him, but how man has changed himself so much that he *is* his surroundings; we are becoming our own material possessions and there is no stopping this tide.

Section One: Gesture-Based Computing

Gesture-based computing is the intuitive manipulation of content; it "allows users to engage in virtual activities with motions and movements similar to what they would use in the real world." (2011 HR) Gesture-based computing is one of the relatively mainstream forms of man-machine interaction today; dreamed up since the 1940s in science fiction and cropping up in futuristic movies with increasing regularity since, it was not implemented into the real world until the late 1980s. There does not seem to be one prototype that originally came out promoting the wonders of gesture-based computing, it was an accumulation of the theories and tests probably dating back since the 1940s that rather stealthily issued out into the world at this time. Some of the most primitive, initial concepts of gesture-based computing were the trackball, the joystick, and the mouse (Freeman). Still physically connected to the device but in all actuality a huge advancement compared to the original way of inputting into a machine what was desired. It was also used in robots, infra-red beams, and CCD cameras video capture analysis. Small-idea models that were needed to get the big-idea off the ground.

In 1994 the big-idea being strived for was to achieve a visually based method of gesture-based computing that did not involve gloves or wires. Datagloves and visual marker systems were all fine and dandy as starter-products but the dream was to create a "simple and fast algorithm…[without the use of] special hardware or lengthy training analysis" (Freeman and Roth p.1). "The Orientation Histograms for Hand Gesture Recognition" is a write up for the "method to recognize hand gestures, based on a pattern-recognition technique developed by McConnell employing histograms of local orientation" (Freeman and Roth p.2). They were successful in that they distinguished a vocabulary of ten different hand gestures and only used specialized hardware when digitizing the image. Their approach processed data at what amounted to pixel intensities, it did not have the power to make inferences about the occluded data but it was simple and fast. It worked well with the pattern recognition used to see the smallest possible transformation necessary to allow recognition of hand gestures. The hand gestures were separated into two categories: static and dynamic. The definition of static in this example is a particular hand configuration represented by a single image and that of dynamic is a moving gesture represented by a sequence of moving images. Throughout the training and trial sets it was a successful endeavor to match the computer's interpolations to the gestures using only the low-level approach of pattern recognition. Even with lighting invariance the system correctly identified the physical data that is gesturing and was proficient enough in its work to even be capable of games, such as rock/paper/scissors. Though certain representations of gestures were similar to other motions and movements at times could be misconstrued, these errors are easily fixed by reconfiguration and more training (Freeman and Roth). This experiment was just in the 1990s; innovation and drive have come a long way since then.

Gesture-based computing is so main stream that even though rock/paper/scissors can be

played against a computer, it is much preferable to play fruit ninja or angry birds on an Iphone. Gesture-based computing is now the essence of interaction with machines; it has more systems at the entertainment level than those at the academic. Iphones, smart phones, IPads, IPods, Kindles, Kinect for Xbox, Nintendo ds, Windows 8 – all use gesture-based computing like it is not a technological phenomenon. This type of computing is so easily available to the public because it is so easily accessible, the body is the controller and even the most inept young and curmudgeonly elderly know how to use their bodies and so can understand how to use Tap Tap Revenge. It is not just hand motions anymore, it is the entire body, it is facial expressions, and it is eye movements, our entire being can be synced up to nearly any system anymore. There is more time spent bonding with appliances these days than with actual people; who needs to travel and be face to face with loved ones when it is easier and more socially acceptable to trade Draw Something pictures and join anonymous teams over online League of Legends.

And no, it is not just enough to have all this new gesture-based technology, it is also imperative to communicate with everyday objects as well. Disney has designed Touché, a system that can sense a wide variety of human hand and body interactions not just with screens but with everyday items, including liquids and plain air (Honan). It is does not use just one frequency like most gesture-based devices, it has a whole set of frequencies to fully capture the entire assortment of human motions. It has the ability to sense pressure, placement, and probably even miniscule adjustments on any object within range of its scope. It is not just enough to pick up a favorite stuffed animal, now the animal as well as the computer knows how gently you hold it. It is just another step towards turning our entire bodies into devices capable of matching a machine data log for data log and task for task.

Speaking of bonding with an inanimate object, a study was published in 2005 discussing

the communications between a partner robot and a human based on visual tracking and imitative learning. “Fuzzy Computing for Communication of a Partner Robot Based on Imitation” describes the relations between a partner robot and a human based on gestures translated via a spiking neural network, self-organizing map, and steady-state genetic algorithm. The thought that “a partner robot should have the same communication capabilities as a human” (Kubota and Nishida p.1) is explained by the relevance theory, where human thought is not transmitted but shared and that understanding is achieved through attention and repetition of utterances and gestures. So this shared cognitive environment between humans can also and should be replicated when a robot is involved. The MobiMac robot had two servo motors, eight ultrasonic sensors, and a pan-tilted CCD camera all used to differentiate various behaviors such as collision avoidance, human approaching, and line tracing (Kubota and Nishida). The robot takes images, extracts human colors, and then can further extract the motions of said human’s hand. The trials were based on one cycle of human research, human hand motion extraction, spatial and temporal pattern generation, gesture clustering, softmax action selection, and behavior generation. The trials proved that the robot can learn action patterns by incorporating human hand motions and can regulate the pattern-symbol relationship of the cognitive environment through the communication with the human (Kubota and Nishida). The only low point is that the robot should have known to enlarge the cognitive environment as a set of percept, so in all disclosure the robot knew enough but not as much it thought it could.

This is just early imitation in mechanisms, coded algorithms inputted by human hands that can be altered or added to only by those particular hands. Gesture-based computing and imitation are just the beginning for this new type of sympathetic technology, the starting point really. All this ‘we are the controller’ is all leading up to ‘we are the controlled’ because now we

are trying to manufacture intelligence in technology. We are trying to get technology to think for its self, only so we no longer have to think at all.

Section II: Artificial Intelligence

Artificial Intelligence is defined as "the study and design of intelligent agents" (Poole), such as robots and other machines, that can perceive its environment and take actions that maximizes its chance of success. Artificial Intelligence (AI) predates modern history; it has been recorded in Greek myths, seen in Egyptian hieroglyphics, and thought to have origins in Alexandria. The dreams of man have always been fueled by the thought of recreating their own likeness. Man's desire has always been considered as an attempt to "forge the gods" (McCorduck p.340), but whose gods? It is not to have new beings to worship but to have new beings worship them. It is all in the search of power, the creation of humanoids will be to forge man into gods; to become those with the power over life and death. We do not want to be viewed as weak, lacking, we want to be all; thus we endeavor to form a new existence. "Thou shall not worship false idols" (Exodus) but it seems that the creation of such falsities goes unheeded in the pursuit of technological advancements. Man's need to recreate humanity, to have this power, is paradoxical because in doing so he sacrifices himself at the altar of technology. In creating beings with artificial intelligence we in essence create creatures that in the future will make us obsolete. In the course of making way for the new, the older models will get discarded.

There are already cases of heightening ourselves through technology, using AI to enhance the senses. Cybernetics is a sub-field in AI that deals with the organisms that have been

modified to perform at higher levels than unmodified counterparts. The most notorious form of such a thing with both biological and artificial parts is a Cyborg. Usually thought of in horror stories about the distant future, they are actually now walking and talking among us. It is no longer a dream, a desire, it is reality; we can alter ourselves into something stronger, better, something bionic. It is not some rare person with expensive surgeries either who can achieve this status, everyday people have slowly but surely been altering themselves into something not-quite human. Cosmetic surgeries such as collagen or lap band are alterations of the body, medical procedures like prosthetic hips and artificial hearts are biological improvements, Lasik eye surgery, braces – all in thanks to technological progress designed to advance humanity.

The first ever man to be considered a cyborg was Johnny Ray in 1997, a Vietnam vet with a neurotrophic electrode implemented in his brain to help with his motor skills (Baker). He may be considered the 'first' but there were people to some degree before him and there are very few people now who have *not* benefited from some form of cybernetics. An average person can be considered a cyborg if so inclined to keep to the literal most simplistic sense, but there is new movement gaining momentum in the world to be even more than what we once were. Than even what we are now. Neil Harbisson is a colorblind man now cyborg artist who can hear colors. He has an eyeborg, a cybernetic body apparatus worn around the head that perceives color through sound waves, which allows him to listen to colors (Harbisson). Harbisson is also the president of the Cyborg Foundation, an organization dedicated to cyborg rights and the advancement of cybernetic applications. Harbisson believes that we should all try to be a cyborg, whether disabled or not- "we are all disabled when we compare ourselves to other species, a dog for instance can hear and smell much more than any of us" (Harbisson). Though the most renowned cyborg, he is not alone in his quest for technology-human union.

The European Commission in the 5th Framework Programme in the Information Society Technology-Future and Emerging Technologies Programme are working on and doing research for biomimetics microrobots, cybernetic prosthetic hands, and anthropomorphic implementation (Dario et. al., p.29). The main goal of such research is to "increase the performance and miniaturization of the hardware platform and to increase the intelligence of the integrated system" (Dario et. al., p.29). The current challenge is to achieve the kind of sophisticated machines that biomechatronics demand. Biomechatronics is the term coined for a machine whose design takes inspiration from biology, which robotics tend to do these days, leaning heavily on biorobotics and biomedical applications (Dario et. al., p.29). Areas for such precision and miniaturization include robotic surgery in the medical field; using robots to aid in remote surgery, minimally invasive surgery, and unmanned surgery (Science Daily). The European Commission in the 5th Framework Programme presents three projects demonstrating the three levels of the biomechatronics evolution: "the biomimetics wormlike microrobots for endoscopic exploration, a cybernetic hand prosthesis, and an anthropomorphic robotic platform implementing learning schemes for sensory-motor coordination in manipulation" (Dario et. al., p.29).

The IST-FET Biomimetic Structures for Locomotion in the Human Body Project objectives are to understand motion and perception systems of lower-animal forms and to design, model, and fabricate bioinspired mini and micromachines able to navigate in the human body. This project initiated from the need to make more powerful tools for microendoscopy, a challenging frontier in modern medicine. Prototypes have been created that near-realistically imitate locomotion of an earthworm but the computational methods need implementation of a different hardware to overcome the wiring problems evident in the prototypes. The IST-FET

CyberHand Project works to mimic the capabilities of the human manipulation system and ultimately to achieve a truly human-like artificial hand, one which "whose shape, functions, and, above all, perception are so advanced that it is interchangeable with the natural hand" (Dario et. al., p.34). A hand in current work has low-level control and is being used for a model to evaluate the performance of every underactuated hand function, and the human hand geometric and kinematics characteristics have been studied to be much closer to anthropomorphic size and movements. The IST-FET Paloma Project aims at "developing an anthropomorphic robotic manipulation platform, which mimics human mechanisms of perception and action, and can implement neurophysiological models of sensory-motor coordination through a strict interaction between the roboticist and neuroscientist partners" (Dario et. al., p.38). The integrated platform designed is now being used for implementing a multinetwork architecture that correlates sensory and motor signals and for "validating a five-step model of progressive learning mimicked from human babies" (Dario et. al., p.43). This is synthetic evolution, technology will continue to progress and progress until it reaches a status equal to humanity. There will no longer be interactions that do not involve the access point that is technology.

Conclusion

There is no stopping the tidal wave that is technology, there are very few left who even see it as a tsunami. Social interactions between people are being tested in a highly specialized, highly stylized manner. There is no one way of connecting with someone anymore; there are a thousand and one ways that are infinitely simpler in their complexity to aid one in bonding. Gesture-based computing and Artificial intelligence are just two very broad areas that have become the norm in society, so much so that their real value and potential are forgotten amidst the stream of superficial entertainment. The collective conscious might not realize that these

technological advancements are reshaping and shifting their world, taking it to a new place of machine-man development, but soon it will be undeniable. Technology and humanity are going to be fundamentally linked in the not-so far away future and the study of sociology is going to have an entire new field of civilization to research. We as a society are completely invested in our technology; wait for the day where we as a race are completely unidentifiable from our technology.

Works Cited

Dario, P., M.C. Carrozza, E. Guglielmelli, C. Laschi, A. Menciassi, S. Micera, and F. Vecchi. "Robotics as a Future and Emerging Technology Biomimetics, Cybernetics, and Neuro-robotics in European Projects." *IEEE Robotics & Automation Magazine*12.2 (2005): 29-45. Web. 13 Dec. 2012. <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1458320>.

Baker, Sherry. "Rise of the Cyborgs." *Science Reference Center* (2008): n. pag. *Wikipedia*. Web. 2012. <http://en.wikipedia.org/wiki/Cyborg>.

Exodus. *The King James Bible*. New York: Holman Bible, 2006. Print.

Freeman, William T., and Michal Roth. "Orientation Histograms for Hand Gesture Recognition." *Mitsubishi Electric Research Laboratories Cambridge Research Center* (1994): n. pag. Web. 2012. <http://aimm02.cse.ttu.edu.tw/class_2009_2/CV/OpenCV/References/Orientation%20histograms%20for%20hand%20gesture.pdf>.

Honan, Mat. "Mind-Blowing Disney Sensor Tech Brings Gesture Based Computing To Everyday Objects." *Gizmodo*. N.p., n.d. Web. 17 Dec. 2012. <http://us.gizmodo.com/5908000/mind blowing-disney-sensor-tech-brings-gesture-based-computing-to-everyday-objects>.

Harbisson, Neil. "Neil Harbisson: I Listen to Color." *TED: Ideas worth Spreading*. TED, n.d. Web. 17 Dec. 2012. <http://www.ted.com/talks/neil_harbisson_i_listen_to_color.html>.

"2011 Horizon Report The Web Version." *2011 Horizon Report Four to Five Years GestureBased Computing Comments*. N.p., n.d. Web. 15 Dec. 2012.

Kubota, Naoyuki, and Kenichiro Nishida. "Fuzzy Communication of a Partner Robot Based on Imitation." *International Conference on Robotics and Animation* (2005): 4380-385. *IEEEXplore*. Web. 2012. <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1570794>.

Poole, Mackworth, and Goebel. *Intelligent Agents*. N.p.: n.p., 1998. Web. 2012. <http://en.wikipedia.org/wiki/Artificial_intelligence#CITEREFPooleMackworthGoebel1998>.

"Robotic Surgery." *ScienceDaily*. ScienceDaily, n.d. Web. 17 Dec. 2012. <http://www.sciencedaily.com/articles/r/robotic_surgery.htm>.