Birthing Machines

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Technology has, and always will, impact the language of a culture. The onset of genetic research, biotech and nanotechnology greatly challenge the future definitions of words like parenthood, birth, womb, gender, male, female, life, artificial, procreation, and creation. When we begin to have "birthing machines," meaning machines assisting in birth and pregnancy as simple as the sonogram to test-tube babies, Alife, cloning, cyborgs and nanotechnology's assemblers, who becomes the parent of the child? Is the child really a child? These technologies blur and confuse traditional meanings of sex, gender and reproduction and develop a new sub-lexicon.

In her recent lecture, "Story as Journey: The Role of Myth in Almost Everything," Margaret Atwood introduces the idea of myth as a 'map for how we locate ourselves in time and space'. There is no connotation of truth or fiction in a myth, but what a myth reveals is the 'core identity of a culture' (Atwood). Every culture in every time seems to have some sort of creation myth, whether it be the creation of the world from nothing by a higher power in six days, or some sort of "Big Bang Theory" of scientific extravaganza. Myths are the way we answer questions about the unknown, or, the not completely proven or understood.

Mary Shelley and her novel, Frankenstein tends to enter a discussion about creation and this time is no different. Victor Frankenstein became the creator/inventor of an unnamed monstrosity, a race parallel to humanity that mimicked our mechanisms of movement and was brought to life by a spark of electricity, the modern elixir of life.

> *It was on a dreary night of November that I beheld the accomplishment of my toils. With an anxiety that almost amounted to agony, I collected the instruments of life around me, that I might infuse a spark of being into the lifeless thing that lay at my feet* (Shelley 43).

Shelley was familiar with research that had taken place a century before by Luigi Galvini who demonstrated that amputated frog legs would twitch momentarily with a shock of electricity (Grand 2). Perhaps the only difference in a modern Frankenstein story would simply include a different elixir, that of DNA and genetics.

Before we develop a narrative on how a new creature can be created it is necessary to understand how technology has already begun to evolve a cyborg society, and thus, has already begun to alter what life is, compared to the times of Mary Shelley. Technology today is used in many

formats as the extension of our selves: a fork is an extension of our hand, the phone is an extension of both our ears and our mouths, the wheel is the extension of our legs, etc. Although many of these tools can easily be separated from oneself, when they are attached, is one not participating in a cyborg environment? Answering that question might require understanding the origins of the word cyborg. NASA member, Manfred Clynes, developed the concept of cyborg as a compilation of the words "organic" and "cybernetic" (Gray 18). Cybernetics, refers to the "The theoretical study of communication and control processes in biological, mechanical, and electronic systems, especially the comparison of these processes in biological and artificial systems" (Dictionary). So, in essence, any interaction between biological and mechanical processes can be studied as cyborg behavior. Many people have a direct connection with a cyborg existence. My father, for example, was diagnosed with Type One Diabetes at the age of one. His first treatments included insulin, from animals, by injection. In the 1990s his connection with biotechnology strengthened when Humulin, human insulin molecules made by bacteria, was introduced (Drexler 7). Around the turn of the century his interaction with technology became intimate and cyborg, as he now is continuously attached to an insulin pump that regulates and injects insulin on a timed schedule. Each step of technological development has greatly improved his quality of life and his status of "alive." I would doubt, however, that he would consider himself a cyborg. The point is that technology, in many ways, has become seamlessly integrated into our society and its categorization of "cyborg" is often overlooked.

Machines, or machine components to a cyborg existence, no longer look to simply imitate the physical movement of the organic. In many ways the industrial revolution created thousands of machines that replicated the movement of human beings, but on an "industrial level" meaning that they created arms strong enough to move concrete beams. Machines largely referred to the implementation of pulleys, levers and planes used in combination to do some sort of predetermined task. Complex industrial machinery could usually be described as multi-part, big and metal. Our conceptual understanding of machines has taken a large turn and become nano-small. Biotechnology and nanotechnology are the new wave of machining where machines emulate organic processes like birth, and the creation of enzymes, proteins and DNA. This conceptual change will, ultimately, revolutionize the world, much like the industrial revolution, if not on a much greater scale.

Evolutionary programmer, Steve Grand, applies this organic knowledge towards his creations within the computer. Grand developed a video game called Creatures that demonstrates the basic premises of biotech and organic creation. The biggest theme in Grand's writing seems to be this idea of birth and growth and that the programming and creation of a virtual world must be created from the bottom up to emulate earth and evolution. Thinking about what he has created, and what he wants to create, Grand argues,

> *Life is not made of atoms, it is merely built out of them. What life is actually 'made of' is cycles of cause and effect, loops of causal flow. These phenomena are just as real as atoms – perhaps even more real. If anything, the entire universe is actually made from events, of which atoms are merely some of the consequences (6).*

The programs Grand creates elicit the use of metabolic cycles, proteins, glucose, hormones, and neurons to simulate the digestive, reproductive, circulatory and nervous systems that combine together to form a working whole. Unlike many historical uses of programming, where the end goal is the starting point, Grand takes an object-oriented approach that formulates the systems of a body and their interactions rather than an empty shell that acts like a body. When Grand creates an entity from computer code is it alive? If it exists in a virtual world, does it live there? Do these creatures have parents? What he is developing is Alife, or artificial life, "the simulation of biological phenomena through the use of computer models, robotics or biochemistry" (Dictionary). I would then challenge is there a point when Alife is no longer artificial? Artificial can be defined as "made by humans; produced rather than natural; Brought about or caused by sociopolitical or other human-generated forces or influences" (Dictionary). Does that mean that the first generation of Alife is artificial and as that life form evolves and reproduces on its own, it no longer can be labeled as artificial because that life form was not directly created by a human, but, rather, through processes natural to that Alife? This is just another example of how technology confuses language and language confuses technology. Grand further argues that an Alife can be alive, even though its components are not real,

> *A simulation of a living thing is not alive, and a simulation of intelligence is not intelligent. On the other hand, intelligent, living things can be made out of simulations… for example, if we simulate nerve cells using computer code, then they are not really nerve cells. But if we use these simulated nerve cells to build a brain and the brain thinks, it is not the brain's fault that its constituent neurons are a sham; it will still be a brain and its thought will be real thoughts (78).*

In many ways this line of thinking is not much different than questioning whether or not my father is living because he, essentially, uses a synthetic pancreas. Most, I would think, would agree that he is very alive indeed. The Turing test seems like an obvious place to start and question intelligence. Turing's test simply implies that if a computer can fool a human being then it is truly intelligent. What about all of the other organisms on the planet that have levels of intellect like our dogs and cats, or the squirrel on the hunt for food? Descartes implies through his famous line, "I think, therefore I am," that if an entity can think such a thought, be it human or otherwise, it is very much alive. Living, unfortunately, is one of those fuzzy cyclic words that language never really defines, the dictionary only offering the definition of living as alive and alive as living. Life seems to be a term no one dares to define. It was the fact that Frankenstein's monster was alive that scared Victor; the monster had survival instincts to eat, to learn language, learn to read, and make decisions based on previous knowledge, perhaps some of these traits imply what life means to us.

Nanotechnology brings living machines onto the scene. Drexler explains that nano-machines are not impossible, for the processes already exist within cells, we simply need to learn how to extrapolate them from their natural existence. Evidence that we are headed in the direction of nano machines can be found in the bacteria example that makes synthetic insulin. Assemblers, disassemblers and nanocomputers are organic entities that will be programmed to make/evolve more advanced machines that can create more advanced machines. Drexler's description of this process caused me to visualize a synthetic womb that grows machines like rockets. To grow a rocket a vat, or womb, large enough would need to be constructed. Within the womb assemblers will make small component pieces that will build upon one another, replicate and divide, like cells, to create a rocket. Although the technology is different, to some extent, think of nano-machines as a process similar to the growth and development of a child from 2 chromosomes caring DNA, or a building map. Drexler explains that although we may not understand the process completely, it has analogous siblings already in existence.

> *Compilers translate computer programs from one language to another without understanding how they work. Photocopiers transfer patterns of words without reading them. Likewise, researchers will be able to copy the neural patterns of the brain into another medium without understanding their higher-level organization (77).*

Before we jump in and say OK, it is important to understand the social implications of what we, as a society, would be doing. If a machine is grown, are we giving birth to it? Does this machine then, have human parents? Is this process pregnancy? Are we playing god, by creating organisms that create things? Are we enslaving these organisms? Is that ethical? Many of the same concerns come up when we talk about genetic engineering and genetic manipulation.

The social implications of birthing and creating machines, organisms and creating organisms and machines that give birth are already here and are evolving as technology develops.

> *"Scientists who worked on the atomic bomb, when queried about the moral implications of their work, responded in essence that ethics is the pure view of politicians, their interest was the science – a typical response among those scientists who do weapons research" (Rollins 15).*

Patenting organisms and genes has already come up in discussions of ethics and has been before congress. If I am a scientist, and I essentially join an individual's sperm with another individual's ova, have I not begun the process of creation? If I created your child, can I patent her design? I would hope, that everyone agrees that this idea is ludicrous, but demonstrates quite accurately the line biological engineering straddles. Our traditional notions of birth require sexual interaction and our traditional notions of creation and invention tend to credit the creator. These newer technologies encourage us to think and rethink what certain actions and sentences mean. Rollins warns us that our concepts of right and wrong are as complex as the processes we are contemplating:

> *Dualism, or dilemma thinking, is the enemy of compromise and the archenemy of the middle way. As long as people schematize the issues of genetic engineering of animals as "all is permitted" versus "nothing is permitted," rational social progress on the issue is impossible (10-11).*

Thinking from a holistic point of view is extremely important in the evolution of society. Many great things can come of this technology, but so can many horrible ones. A complex decision based on circumstances may be the only way to tackle such a complex problem. Rollins concludes,

> *Genetic engineering of animals, indeed all of biotechnology, is a tool, like all tools humans have deployed, from clay pots to nuclear reactors. In and of themselves, tools are neutral – pistols, surgical saws, and collection plates are not good and not bad. But tools are not just, or even primarily, in and of themselves. They are, as Heidegger says, ready*

> *at hand. They exist as tools in relation to the humans who deploy them, and they derive their "toolness," their telos, from the uses to which they are put (213).*

Determining regulations of biotechnology may be more complicated than the technology itself. Who or what group should decide on regulations? Society as a whole, essentially those that the rules will govern, is, perhaps the best place to end up. Gray points out "Locke states that the governed must consent to be governed or the state is not legitimate" (23). Many people fear that the general public is not capable of making such big decisions. Again and again in our arguments of intelligence, the ability to learn and retain knowledge is what signifies an intelligent being. Perhaps our goal, before further development, should be to educate the public.

There is no doubt that the technology that has already been developed is, and will continue to, challenge the current state of the family and gender differentiation. Genetic research and test tube babies already demonstrate the creation of children without a sexual relationship. It allows for gay and lesbian couples to have children. It allows those that could not previously conceive have a shot at parenthood. This technology has certainly had positive effects on families, even my own and those I know. In this essence alone, parenthood has greatly evolved from mother and father to sperm donor, scientist, surrogate mothers, child-care workers, etc. Kathleen Biddick points out,

> *The acts of conception, pregnancy and birthing, which had once unified the dominant cultural notion of the maternal and connected it as a "natural" sequence to social mothering, are distributed across different procedures in reproductive technology* (Gray 143).

Parenthood already involves more than two individuals, and those individuals may be male, female, transgender, etc. Parenthood no longer has a prerequisite of a male and a female, but rather an ova and sperm. Conceiving a child no longer references a sexual relationship, an intimate relationship or a romantic one. The process is more of a romance with technology and its capabilities than anything else. Conception has been reduced to a *process*, rather than an event or the culmination of many events, similar to giving blood and blood transfusions. In the words of Gray,

> *This means that the technicians can now remove eggs, insert new nuclei, and stimulate them to divide; they collect, sort, wash and insert sperm at their will. Both egg and sperm can be typed, frozen for later use, or discarded if judged inferior (87).*

Birthing through a technological process, rather than intimacy seems to be one of the struggles Frankenstein's monster also dealt with. He claimed that he felt abandoned, lonely and orphaned. Does a physical connection between parent and child need to occur for such feelings to dissipate? There have not been any long-term studies to show the effects of birthing in a test-tube, or similar processes, on a child. To not have parents in the traditional sense is quite a social taboo nowadays, although the gradual acceptance of divorce and gay and lesbian couples is opening the door to alternative social familial patterns.

In Cyborg Citizen, Gray points out that the constitution of the United States claims that only a "natural-born" citizen can become president of the United States. That of course, excludes those born in foreign countries, but, as Gray alludes, does that also mean that test-tube babies are also not eligible? (22-23). Natural is another vocabulary word we may have to work on redefining. For that matter, natural birth is still referred to as birth from the vagina, but what about all of those babies delivered by C-Sections? Perhaps that technology has become transparent, accepted, and, therefore, natural.

Future implications of biotechnology include creating super-babies, designed to genetic specifications. Whereas, this implicates the possibility to rid a baby of an inherited disease or cures for parents who have diseases, this also implies the creation of *designed*, biologically alive, but not biologically evolved children. If we push this envelope we begin to label children as commodity, something to be purchased and perfected. If we create children in this manner are we taking their humanness away from them?

With the ability to genetically, biologically or technically alter ourselves and those around us we will have entered, full-fledged, the state of cyborg society. We currently inhabit the outskirts of this type of culture, but as it becomes a reality our social order will also need to evolve. With this type of technology there is no longer a social dichotomy of male and female, this and that. We are in flux between the dichotomous nature of the 19th and 20th centuries to what Donna Haraway regards as fields of difference. Sex is, by definition, differentiated by spermatozoa and ova, male as the fertilizer and female as conceiver. With technology that can procreate this black and white divide between male and female is no longer necessary for function or evolutionary continuity.

Fields of difference alludes to a time when gender and sex are not important and are often overlooked. Gray developed, after Haraway's Cyborg Manifesto, a Cyborg Bill of Rights based on the socio-political changes that would need to occur in the U.S. constitution to accommodate and protect those engaged in biotech practices. There are ten to coincide with our current bill of rights, but a couple are seemingly necessary to touch upon regarding this discussion of gender diffentiation. Right number four protects the "Freedom of Consciousness" as an extension of our current 1st, 4th and 8th amendments, guaranteeing "Unreasonable search and seizure of this, the most sacred and private part of an individual citizen, is absolutely prohibited" (27-29). This is a shift that demonstrates the obsession with the sacredness of sexual reproductive organs, i.e. private parts, that was emphasized in the Victorian era, to the simple state of existence and consciousness that seems so important in our technological time. To summarize a few of the other rights include the right to life, the right to death and the right to alter one's body, as well as, the right to travel anywhere, including virtual travel, electronic privacy and the right to peace (27-19). The one declaration that sticks out is this discussion of language, gender and reproduction is the ninth,

> *"Freedom of Family, Sexuality and Gender. Citizens and individuals have the right to determine their own sexual and gender orientations, at their own risk and expense, including matrimonial and other forms of alliance. Congress shall make no law arbitrarily restricting the definition of family, of marriage or of parenthood" (29).*

This declaration summarizes the evolution of language and the protection of the evolution of language in regards to the evolution of technology, in particular, biotech. Birth and gender are not what they were 100 or even 10 years ago and they are not what they will be 10 years from now. The introduction of gene building and nano-machines questions our social identity. If we embrace these technologies our social constructs, social relationships between couples, between families and between parent and child will greatly change. To have a baby no longer implies that you are a part of a heterosexual couple, or that either member of the couple is actually pregnant. It is no longer a shock to talk about in-vitro conceptions. Changing the way we approach and discuss these issues will allow us to become more aware of changes that have already occurred in our society and changes that will come. It will also help us to become more aware of the language we are using and the baggage it comes with.

Whether or not to embrace nanotechnology, biotechnology or genetic research is not a worry of the future, it is already here. As a society we are responsible for guiding the direction these technologies follow. It is important to consider the social implications of any of these developments and their implementations. Every technology, every tool has the potential to become whatever the technologist/user makes of it, whether it is positive or negative. Its also important to remember that without these technologies we would not have to think about such social changes, but the fact is the technology exists, and so will the social impacts. We are pursuing a cyborg era, a social order submerged and engrossed in biotechnology, a social order that mixes the black and white into shades of gray.

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