

Shiwei Huang

Biochemistry Major

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HNRS 177

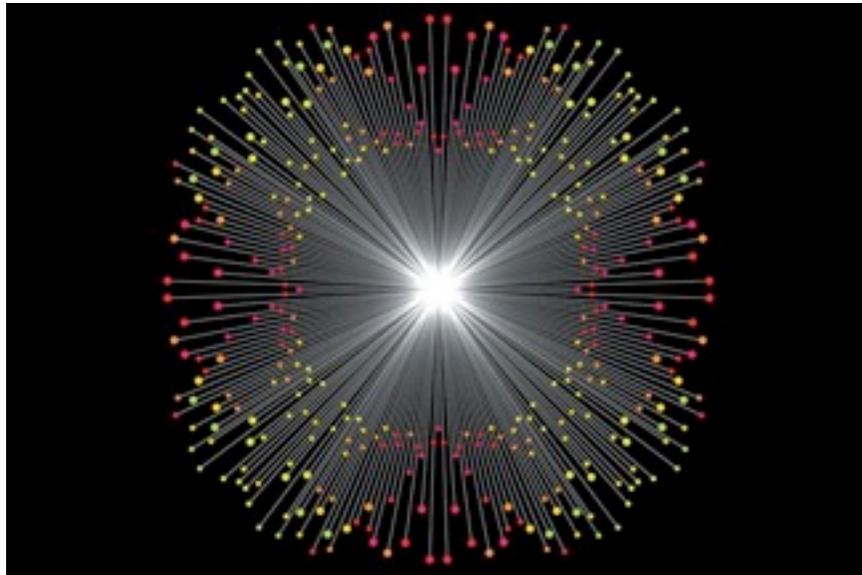
Professor Vesna

Week 1 blog: Two Cultures--Shiwei Huang

Hello, my name is Shiwei Huang. I am a fourth year biochemistry major, and I entered UCLA as a transfer student. I am determined to become a doctor since high school, so I have been focused on science and put all my effort into it even since. I learned the violin for eight years and the flute for one year, so I can confidently say that I love art and enjoy it. However, I have never thought about the relationship between art and science, or if there was a relationship at all. By taking this class, I hope I can see how art and science can influence each other.

Charles Percy Snow first came up with the idea that Western society started to split into two groups, literary intellectuals and scientists. He believed that overspecialized school system caused that problem. For instance, there are specialized buildings for different subjects in schools. The campus of UCLA can be divided into North and South Campus. Being a south campus major at UCLA, I rarely go to north campus. Last Wednesday was my first time visited sculpture garden.

Snow proposed the idea of “Third Culture,” in which literary intellectuals can communicate with scientists. Stephen Wilson believes that the influence between artists and scientists is not symmetrical. Artists are willing to adopt cutting-edge technology to their artwork while scientists don’t believe artists can contribute to their work. Stephen Wilson argues that there are three ways in which artists work with science and technology. The first one is that artists use technology to create their artwork. The second one is that artists analyze and critique science and technology using art. The last one is that artists use art to address scientific research or technology development. He believes that many artists choose to work in the heart of scientific research. Here are some examples:



This picture was inspired by the experiments to detect neutrino trails in neutrino detectors.



Gina Czarnecki created sculpture from crystals and children's milk teeth, which could be related to stem cell research. She wanted to educate the children as well as the public that stem cells are not limited to embryonic stem cells, and stems cells can be extracted from many kinds of cells including adult teeth.



This figure shows a florescent dog, and it is created by genetic engineering, which has the potential in treating disease.

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Week 2 Blog

My family moved to San Francisco after I graduated from high school in China. My diet used to consist of my grandmother's Chinese cooking. I am not picky about what I eat, so I only have Chinese food when I go home. The main food in a Chinese meal is rice, and it is commonly eaten as steamed rice. Rice is also a common material in many dishes. I want to discuss rice in this blog.

There are two species of rice plant, *Oryza sativa* and *Oryza glaberrima*. *Oryza sativa* is Asian rice, and *Oryza glaberrima* is African rice. The seeds, which grow at the top of rice plant, are collected and milled to get rid of the husks, which are rough coatings of the seeds. After this step, we have brown rice. To get white rice, the rest of husk and germ need to be removed. Rice can be cooked in water.



Oryza sativa (Asian rice).

White rice does not contain as much as nutrition as brown rice. For instance, in 100g white rice, there is 4.31g iron, 0g Vitamin A, and 0g of beta-carotene. Beta-carotene is a precursor of Vitamin A. Vitamin A deficiency can cause blindness. Iron deficiency can cause iron deficiency anemia, which can lead to morbidity and death. To address this problem, scientists have

discovered methods to generically engineer rice so that it can contain additional vitamin and minerals.

Potrykus et al. at the Swiss Federal Institute of Technology Institute for Plant Sciences developed Golden Rice to address the Vitamin A and beta-carotene deficiency. They introduced a biosynthetic pathway of beta-carotene. The rice is transformed with phytoene synthase gene and phytoene desaturase gene, which are necessary for beta-carotene synthesis. These enzymes are expressed in rice endosperm. Beta-carotene will be converted into Vitamin A in animal intestines.



Golden Rice grains are easily recognisable by their yellow to orange colour, the stronger the colour the more β -carotene.

Potrykus et al. also developed iron rich rice to prevent iron deficiency. A ferritin gene is transformed into rice to increasing iron content. Ferritin is an iron storage protein. To decrease the iron absorption inhibitor, phytic acid, a thermo-tolerant phytase is also transformed into rice. Finally, they intend to increase the amount of cysteine peptides, which are iron absorption enhancer, by over-expressing a cysteine-rich protein. The iron rich rice contains higher amount of iron along with higher amount of iron absorption enhance and lower amount of iron absorption inhibitor.



Iron rich rice in Potrykus's lab.

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Week 3 blog

Although I have never had any pets, I have worked with lab rats when I volunteered in a research lab. To handle the lab rats (just handle, not performing surgeries, injections, or any procedures), I had to take a few trainings. The lab focused on the study of traumatic brain injury, so I had to say that the treatment to those lab rats were very invasive. I would help the researchers transport the lab rats to the lab and hold the lab rat while they injecting anesthetic into the rat abdomen (surgical procedures must be performed on anesthetized animals). Later, the researchers would open up the rat's skull, destroy certain brain tissues, and close it using surgical staples. To test if a drug was helpful to traumatic brain injury, the researchers would inject the drugs into the rats and perform some tests. Nowadays, people become more and more concerned with the ethics in experiments with animals. The lab inspection on animal handling became more frequently in that research facility. When I was volunteering last year, I heard that a whole lab in another department got shut down because the lab inspectors found undead lab rats in a fridge there. All the employees in that lab had to undergo animal handling training again.



Lab rats.

Transgenic animals are used in research, and they are also used for entertaining. For instance, GloFish is a type of genetically modified fluorescent zebrafish, which is sold as pet. The techniques used to create such fluorescent zebrafish is quite simple. The scientists can insert the genes that code for fluorescent proteins into the zebrafish embryos, and after the gene is integrated into the zebrafish genome the zebrafish will be fluorescent.



GloFish.

“Strange Culture” tells the story of Steve Kurtz, whose work dealt with genetically modified organism. He and his colleagues tried to alert people about the risks of GMO using their artwork. When his wife died, the paramedics suspected him had something to do with his wife’s death after they found petri dishes. I think it is reasonable suspicion. However, the situation became ridiculous after that. Kurtz’s wife’s body was autopsied, and people found out that her death was not related to the bacteria he worked with. The bacteria he worked with were available online and harmless. The FBI still charged him of bioterrorism. The movie suggests that Kurtz was targeted because his work questioned government industry policies. I think Kurtz is innocent, and I am glad to know that he was set free in 2008.



The poster of Strange Culture.

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Week 4 blog: Noa Kapan and Medical Technology

Noa Kaplan's work explores the relationship between texture and structure. Her works also involve the relationship between nanoscale images and macroscopic images. I think the most interesting piece is "Pollen." The part that stands on the ground is an enlarged sculpture of a grain of pollen. I like the idea that she did not simply take a picture of a grain of pollen and let the computer do all the work. She created several pieces of the pollen and put them together by herself. The part that suspends right above that grain of pollen is a bottle of honey, which is dripping honey onto that grain of pollen. With the light above the bottle of honey shining upon it, it creates a gradient of color from light orange at top to pink at bottom. It is difficult to visualize that a drop of honey is composed of millions of grains of pollens, but Kaplan has managed to demonstrate such a relationship for us using this piece of work. Another interesting piece of work is the wool jacket she made based on the wool fiber under a microscope. We are so accustomed to the daily mundane clothes we wear, but Kaplan showed us the magnified image of a fiber. Using the jacket that resembles the interwinding of the fibers, Kaplan successfully demonstrated the relationship between microscopic and macroscopic materials.



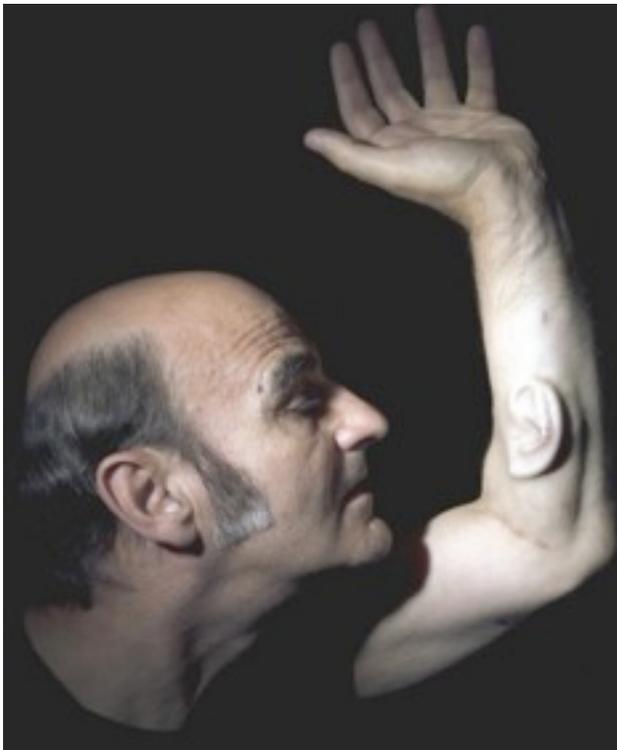
The lower part of "Pollen."

Stelarc has been performing using his body, and his theme is "enhancing the body both in a physical and technical manner." Some of his works involve some surgeries with artificial body parts. I think one of the most interesting work is called "The Ear On Arm." He had two surgeries. In the first surgery, he had an ear implanted into his left arm, which he claimed could hear and

transmit the sound. The second surgery was done in Europe because it was illegal in the U.S. as some part of the ear lobe was grown from Stelarc's own stem cell. A microphone was inserted into the ear so that it could connect to the Internet in hope that people in different places could use that ear to listen. Also, it could act like a Bluetooth. The idea that our body can be engineered into some devices for communication is really interesting. Stelarc commented that the project aimed to replicate and relocate a body part and invented some new function at that new location. He further commented that through these medical technology we could reengineer ourselves so that our organs are better suited for the media technology world. Our organ, in this case the ear in the arm, can facilitate the devices that we are using.



The surgery of "The Ear On Arm."



"The Ear On Arm"

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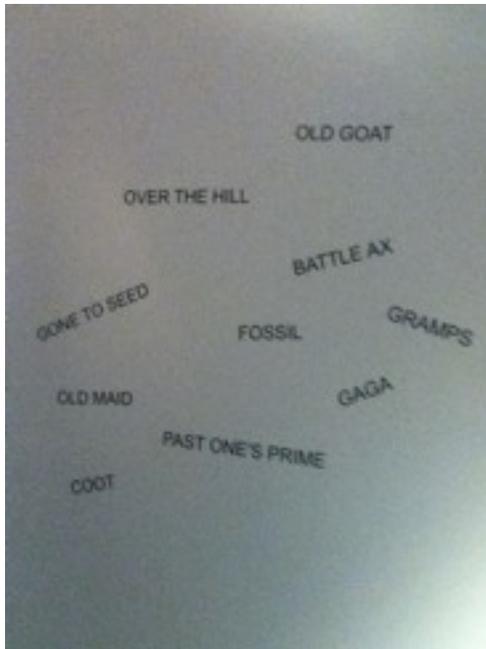
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Week 6: Going Gray

Kathy Brew's exhibit challenges the social attitude towards aging. She started to dye her hair since 20 years old when her hair started to go gray. She accepted aging and stopped dyeing her hair when she was 50. Although most people would admit that dyeing hair is time consuming and the chemicals are carcinogenic, people would still do it since they live in an ageist society. People have come up with all types of "euphemisms" to refer to old people, such as old goat, fossil, and past one's prime. These words are full of humiliations. Our society is an ageist society. For instance, employers want to hire young people instead of older people. Our society is also a sexist society as a woman with gray hair will be considered as old and a man with gray hair will be considered as mature. I think Brew's work has successfully addressed people's efforts and attitude on anti-aging, and she has challenged this attitude and called for a different one towards aging. I like her exhibit, and I think it's easier for me to accept this type of art form than Orlan's performance. I think Orlan didn't have to record the process of the surgery to raise the issues regarding plastic surgery since Brew didn't use any extreme measures to address the issue of aging.



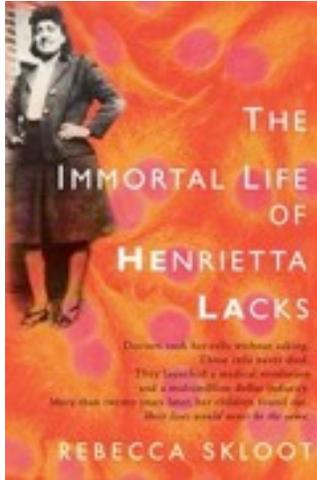
These are the photos of Kathy Brew herself when she stopped to dye her hair.



The euphemisms to describe old people.

Bio art is always controversial and hard to define. It also raises many ethic issues about the use of animals in art and issues about the definition of property. For instance, the GloFish was intended for sale as a fluorescent fish at pet store, but protesters were worried about if the GloFish were set free in nature. An artist named Larry Miller designed a legal document, which intended to claim his own DNA. It raised the questions like, whether the genetic materials belong to an individual. Also, if the genetic materials are modified, does the individual still have the claim. It can be related to the issue of HeLa cells.

The video about the HeLa cells and the interview with Rebecca Skloot talks about the immortal cell lines. Henrietta Lacks was an African American women who had cervical cancer. When she was receiving treatment, some of her cancerous tissues were removed by her doctor without her consent. The doctor had good intention, and he wanted to study the cells so that he could find a way to cure the disease. After a few years, Lacks died, and her cells ended up in research labs all over the world, but her family members was unaware of it. The cell line is known as HeLa cell line. Rebecca Skloot wrote about the life and family members of Henrietta Lacks in her book "The Immortal Life of Henrietta Lacks." It was shocking to know that their family no benefit from the immortal cell lines, and they could not afford medical insurance. Since these cells were the cell lines of the cells taken from Henrietta Lacks's body, can Henrietta Lacks' family claim to be the owner of the cells and gain benefit from them?



Book cover of “The Immortal Life of Henrietta Lacks.”

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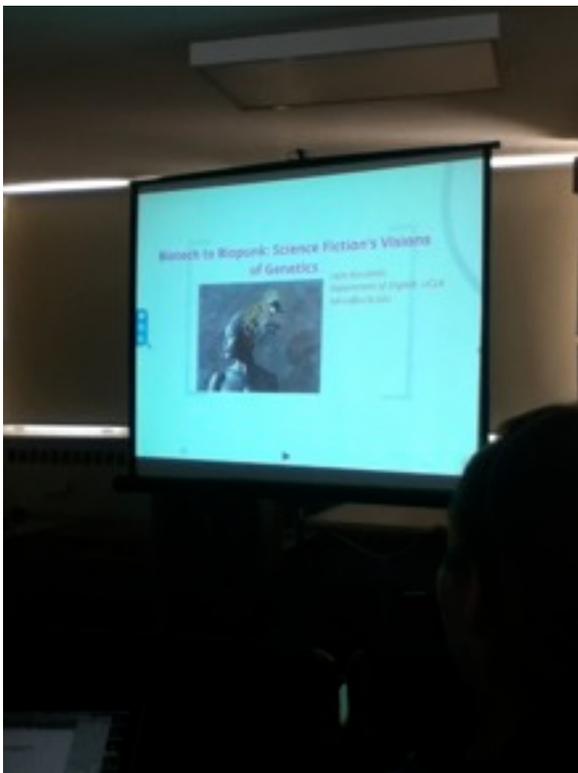
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Extra Credit: The Biotech to Biopunk

Lejla Kucukalic talked about biopunk and different types of science fictions on Thursday. The illustration on the Genetics and Society website is from Wildseed by Wayne Barlowe. Science fictions reflect the popular interested in biotechnology and biomedicine. At the same time, science fictions also have influenced biomedical research. One of the earliest science fictions is Frankenstein written by Mary Shelley in 1818. Kuckalic discussed about Frankenstein, and she believed that it represented a tormented scientist and the rewards and dangers resulted from science. Kuckalic summarized four types of science fictions of genetics, and they are monster narratives, human being narratives, GMO narratives, and biopunk. Examples for monster narratives are “Tarantula,” “The Deadly Mantis,” “Splice,” and so on. In Human being narratives science fictions, there is usually an empathy towards the humans that are manipulated and critical assessment about the significance of new technology. Examples of this type of science fiction are “Never Let Me Go,” “Problems of Creativeness,” “Screwfly Solution,” and so on. A typical GMO narratives science fiction is “The Windup Girl.” It is set in 23rd century when biotechnology is dominant and controls food production, and the novel blames businessmen and politicians because they use biotechnology to seize power. Biopunk is the last type of novel that includes all the first three categories. It emerged in 1980s, and it has elements of traditional science fiction, urban-industry, gothic fiction, and extreme violence. Examples are “Gene Wars” “Neuroolution” “Necrosis”, and so on. Biopunk as a movement holds the belief that the public should not rely on institutes for results, and it advocates open access of genetic information, such as the genetic information of influenza.



The illustration is from Wayne Barlowe.

FRANKENSTEIN;

OR,

THE MODERN PROMETHEUS.

IN THREE VOLUMES.

Did I request thee, Maker, from my clay
To mould me man? Did I solicit thee
From darkness to promote me?—

PARADISE LOST.

VOL. I.

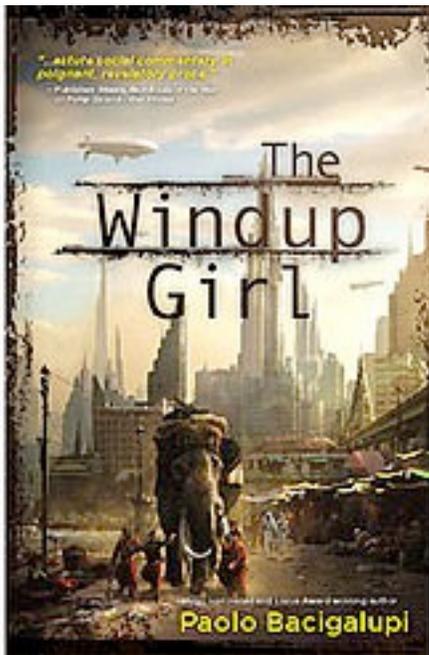
London :

PRINTED FOR

LACKINGTON, HUGHES, HARDING, MAVOR, & JONES,
FINSBURY SQUARE.

1818.

“Frankenstein,” First edition.



“The Windup Girl”

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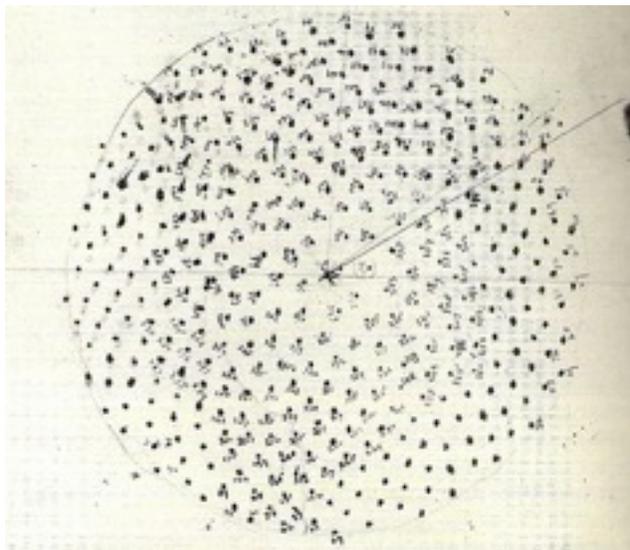
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Program sheet written by Alan Turing during his study in fir cone pattern formation.



The computer output. Turing wrote "How did this happen? Presumably ODE" on it.



Turing's numbering on the florets of a sunflower.

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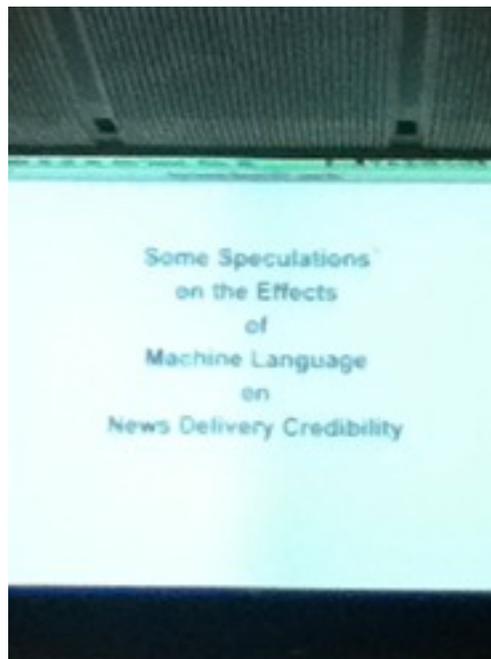
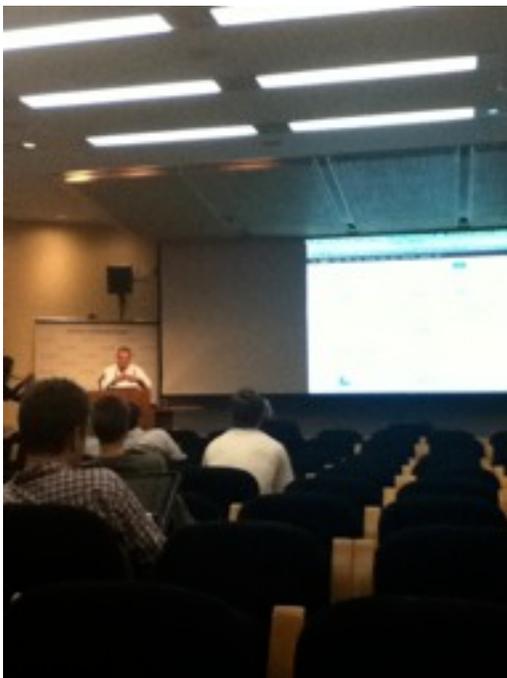
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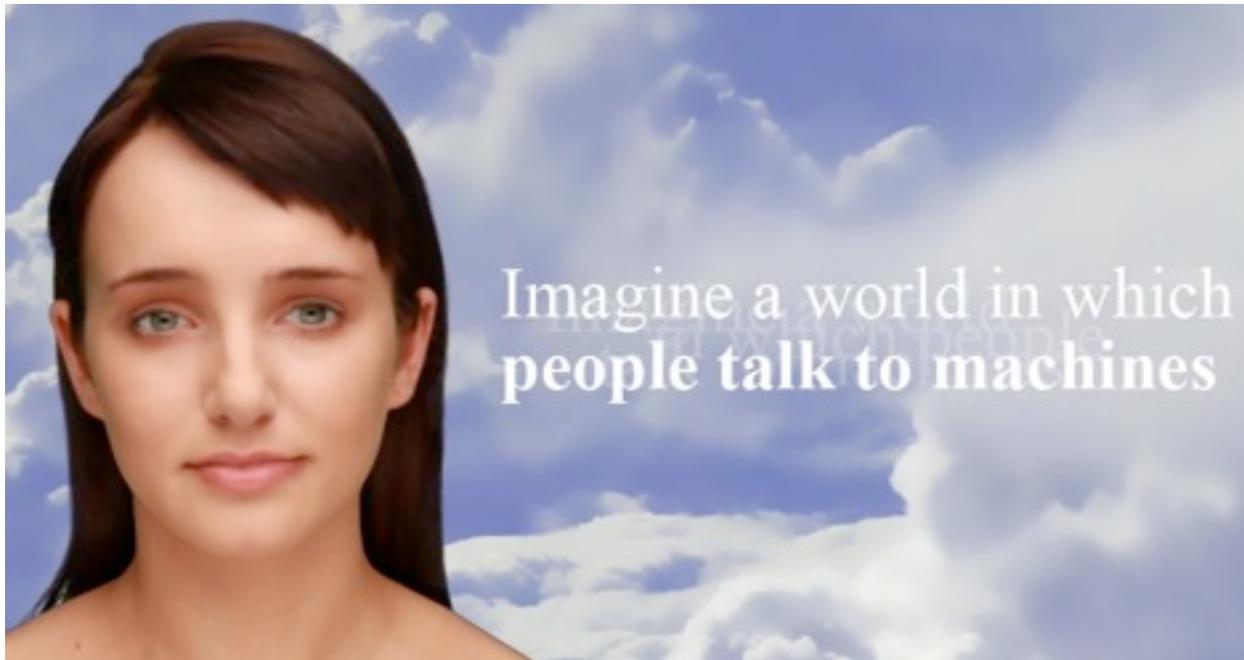
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Week8: Turing Symposium--Extra Credit

On Friday, I went to the Turing symposium and heard the talk from Jon Beaupre. The title is “Some Speculations on the Effects of Machine Language on News Delivery Credibility.” Beaupre first introduced us the concept of avatar, which is a virtual representation of the user. Avatar can be two dimensional in online communities or three dimensional in online gaming. Avatars can also be embodied with artificial intelligence. For instance, many websites provide customers with services from artificial assistant with AI. Avatar also has commercial use animated if we can create a face with recorded voice. People can make virtual stars who never exist, and these virtual stars are just what we think as attractive. Beaupre introduced his audience the talking machine--Evie. It is a virtual artificial intelligence created by Existor. On that website, visitors can type questions or words, and the artificial intelligence will respond accordingly although it takes the AI a while to respond. Next, he talked about speech to text technology, which can translate spoken words into text. Microsoft Word is equipped with such technology, which can reproduce the flow of human sentences from speech. Beaupre also mentioned artificial intelligence in science fictions, such as Cylons in Battlestar Galactica. Cylons are robots, and when they have human appearance and human personality they start to think that they are human and they want to produce human and cylon hybrid. The idea of artificial intelligence is related to Alan Turing because he was the first to work on this concept. He developed the computing machine in 1935. Turing wanted to developed machine that could learn from experience and solve problems by searching possible solutions. In 1950, he developed Turing test, which could test the computer intelligence, and so far no artificial intelligence could pass that test.





Evie--the talking machine.

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Summary

This class focused the relationship between biotechnology and art and the relationship between scientists and artists. The class also examined several controversial issues. Through taking this class along with attending the events and listening to the guest lecturers, I have gained some insight about how art could inspire scientific invention, and how science could in turn inspire art work.

At the beginning of the course we were introduced with the concept of two cultures, which suggested that societies tended to split into scientists and artists. Charles Percy Snow was the first one to come up with this concept, and he believed that modern university system reinforced this split by dividing all courses into different subjects. However, literary intellectuals can communicate with scientists and work together. Art work inspired by science could be used to educate the public.

Next, Paul Thomas gave us a lecture regarding his art piece. He used automatic force microscope to study how our touch or breath could affect the world. He also showed an art piece which showed that skin cells started to die after they touched gold. In the blog, we examined the food we consumed regularly. I studied rice since it is a staple for Chinese. There were research groups who developed genetically modified rice so that it could contain high level of vitamin A and iron. The genetically modified food could be beneficial, and in this case the modified rice could alleviate the vitamin A and iron deficiencies, especially in developing countries. However, the side effect of GMO on our body was quite unclear.

Christina Agapakis gave us a lecture regarding smell and taste and the commercial potential behind them. She also suggested that it was hard to define the line between enhancing the flavor of the food and tricking ourselves into eating junk food which tasted good. In the blog, I discussed my relationship to lab animals since I never had pets. Through genetically engineering, we could put fluorescence genes into animals, such as fish, so that we could keep them for entertainment. We were introduced with a movie named "Strange Culture," which introduced the tragic story of Steve Kurtz, and how the government targeted artists who questioned industrial policies.

Noa Kaplan delivered a wonderful speech about her art work, which mainly dealt with the relationship between microscopic and macroscopic materials. Her art pieces examined daily materials, such as pollen and honey, wool fiber and jacket. In that week's blog, I did some research on medical technology and the artists who used it to create art. One of the artists named Stelarc planted artificial ear in his arm, and he intended to present enhanced human body with his art.

After the midterm, we went to Kathy Brew's art exhibition, which dealt with aging. She presented all the advertisements of dying hair to argue that people's attitude toward aging was wrong and unjust for women. Brew used her own photos to call for a different attitude toward aging. I like her art work, and I think it is more acceptable than performer like Orlan, who recorded the process of her plastic surgery as her "art" to raise the awareness of plastic surgery. In the class, we were introduced with the controversial problem of the ownership of transgenic organisms. For instance, we discussed whether the artists could claim that they owned

fluorescent animals. In the case of HeLa cells, whether the family of Henrietta Lacks had the right to be benefited from her immortal cancer lines.

My portion of Alan Turing project focused maths and morphogenesis along with Turing's paper "The Chemical Basis of Morphogenesis." He was inspired by the discovery of Fibonacci series in plants. He used maths to describe his diffusion reaction model, which stated that the local concentration of morphogen depended on the rate of the synthesis and the diffusion. The concept of diffusion was related to my physical biochemistry class, so I enjoyed reading and researching the materials about that topic.

For the extra credit events I attended, one of them was biopunk and biotech and the other was Alan Turing symposium. In "Biotech to Biopunk," Kucukalic talked about different types of science fictions, and how they influenced people's view about scientists and inspired scientists. In Alan Turing symposium, I attended Beaupre's speech about avatar. Turing was the first to work on artificial intelligence, and avatar could embody artificial intelligence for commercial use.

The class taught me that art and science were intercorrelated. I was surprised to find out that I could apply my knowledge from science classes to these art work. Artists and scientists could work together to raise the public awareness of many controversial issues.