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MSCI-260
5/1/17

Term Project Summary

The goal for my term project video was to create an entertaining yet informative video that helps the viewer understand the basic information that is essential to understand the evolution of sex and also how sexual and asexual reproduction help drive the evolutionary process in their own ways. The target audience would be students around my age who are looking for a recap of the major points that would be found, for example, in the chapter of their evolution textbook about sex. The key points of that learning are all presented in an entertaining manner and it is under ten minutes to keep the viewer engaged in the video.

To make the video, I wrote a script that was cited from my *Tangled Bank* [1] textbook as well as some of the sources in my initial bibliography. I compiled the information that I thought was most essential to understand how sex is a vital part of the evolutionary process into three mini “lessons” that would be presented in the video. The three parts that I thought were most important to having a core understanding of the topic were the differences and advantages of sexual and asexual reproduction, mating rituals and sexual fitness, and gender roles within both animals and humans. For each topic, I wrote a number of paragraphs into a script that was then given to my actor to interpret and add their own humor to in order to keep the video interesting and entertaining while maintaining the core facts.

The first section of the video discusses the main differences between asexual and sexual reproduction. There are benefits and disadvantages to both methods of reproduction that are outlined during this portion. One of the advantages to reproducing asexually is a complete lack of competition to mate, which makes it easier for asexual lineages to multiply at a rate much faster than a sexual lineage [2]. It is far easier for a clonal female to produce ample offspring. The interesting part about the intersection of asexual and sexual reproduction in an environment is that subjectively, asexual reproduction *should* be more successful than sexual, purely based on numbers. However, since sexual reproduction is far more popular, there has to be some sort of benefit that outweighs the cost of reproducing sexually. This benefit is identified as the ability to produce new genotypes through beneficial mutations. Unlike asexual reproduction, organisms who reproduce sexually can evolve new adaptations much quicker. This is because beneficial mutations in asexual organisms get lost in a singular lineage, rather than being spread around many lineages and increasing the number of organisms with the beneficial mutation through sex [1]. This essentially stunts the evolutionary process of asexual organisms, making it very difficult to adapt as quickly as their sexual neighbors. This hypothesis explains how sexual reproduction, although costly, has a greater benefit in an evolutionary perspective.

Next, when discussing sexual fitness, I made sure the script highlighted the fact that sexual selection from females is a major driving force in the process of evolution. The major

reason that sexual selection is such a driving force is because the female is always wanting to choose the best and most fit mate so that her offspring can carry his prime genes [3]. Polygyny ensures that by mating with as many fit males as possible, the female will have only the best and most fit offspring. However, this does have its downsides because often the mother will be left to rear her young all on her own, which decreases their probability of survival. The cost of polygyny is arguably at an equal value of the cost of monogamy. Although not many mammals are monogamous, those who are, have a higher survivability because the young will be raised by two parents as opposed to just the mother. However, the cost to monogamy is that the female isn't getting to mate with as many prime males as she can in order to produce the most genetically adapted offspring [1]. These choices are made easier for the female by mating rituals and displays, which are inherited genetically and are usually vibrant color displays or vocal abilities. Also, mating displays can also be a testament to the animal's strength, such as having the energy to grow large antlers or being able to hunt for food for a longer amount of time than another animal can.

Finally, the third part of the video discusses how the gender binary that humans adhere to is rooted in the same reason for animals to adhere to that; which is simply biological. Since sperm is so cheap and plentiful and female eggs are so expensive, the limits of sexual reproduction are placed entirely on the female. Since the female, in most cases, must be the one to rear the young, the females who do a better job at raising all of the babies they had are going to be favored by selection over females who were less successful at raising their children. The imbalance of sperm to eggs in nature is what causes such competition for the males to fertilize as many eggs as possible [1]. Sexual selection is a term used to describe the process by which the bigger males and females end up mating with each other. The larger males are able to fight off the weaker ones in order to mate with the most ideal female so they can create big babies too; and the cycle continues. Additionally, the video discusses "gender bending" animals like seahorses and how their biology flips the normal process around and places the responsibility for carrying the babies on the male. At the end of the video, I made sure that my script touched lightly upon a cultural evolution that we are experiencing in real time. This cultural evolution is the dissolving of the gender binary in humans. Not only is the idea of only having two genders complete disintegrating, but gender roles are also falling by the wayside. While our biology still restricts us majorly, we are learning faster and faster that there is no need to maintain the gender roles that we have been "assigned" at birth [4].

[1] Perkins, Alison E. H., and Carl Zimmer. *The Tangled Bank: An Introduction to Evolution*. Greenwood Village, CO: Roberts, 2014. Print.

The textbook was a great source for my specific style of project because it helped me organize my ideas and realize all the main points I needed to make. By using the divided categories within the chapter on sex and family, I was able to narrow down the topics on which I had to do further research on. It functioned as a good jumping off point for my research and helped me create a clear idea of what I wanted my project to focus on.

[2] Otto, Sarah P. "Sexual Reproduction and the Evolution." N.p., 2008. Web.

I chose this article because it discussed the actual origins of sexual reproduction. It helped me trace back the origins of sexual reproduction in order to understand its importance. The article stressed that sexual reproduction is a vital part of the evolutionary process, and talked a lot about how asexual reproduction can hinder the evolutionary process in small populations.

[3] Harrison1, Peter W., Alison E. Wright, Fabian Zimmer, Rebecca Dean, Stephen H. Montgomery, and And Marie A. Pointer. "Sexual Selection Drives Evolution and Rapid Turnover of Male Gene Expression." *Proceedings of the National Academy of Sciences*. National Acad Sciences, n.d. Web. 01 May 2017

This source was helpful for the second part of my video to discuss sexual selection and how it is a major driving force of the evolutionary process. It provided examples as well as gave context to explain how a female choosing her mate holds an incredible amount of power to determine the future of her genotype within her population.

[4] Harrub, Brad, Ph.D. "Evolutionary Theories On Gender And Sexual Reproduction." (2003)

This article brings up an interesting point that is more relevant to the social norms of today, but discusses how the gender binary came into fruition. This was an important article to include in my research because it discussed the origin as well as the maintenance of the gender binary among humans. The article discusses the gender binary as a question of either historical accident or truly a great divine myth. Many different theories are discussed on the origins of sexual reproduction, and it is argued that there really is no explanation for the maintenance of sexual reproduction. I found that it was an interesting perspective to take and helped me form my thoughts for the final part of my video.

[5] Smith, John Maynard. *Evolution of Sex*. N.p.: Cambridge UP, 1978. Print.

This was another article that discussed the origins of sexual reproduction as well as its lasting effect on evolution. Some of the interesting things that this article touched upon were selection based on genetic variability and rising mutations that are affected by sex. I thought it was interesting to read more about how mutations are spread much easier by sexual reproduction and they can either be beneficial or harmful. The harmful mutations also tend to be weeded out because those who obtain them are unable to find a mate and die off quickly as the beneficial mutation thrives.