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September 27, 2024  
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Linguistics 123

## Natural and Sexual Selection

Traits play an important role in organisms within a population as they help to determine both the physical and behavioral characteristics of the individuals. Many of the physical traits can be described as characteristics such as the organism's shape, size, and coloring. Some examples of behavioral characteristics includes the ability to fly, walk, or swim. These traits are important as they may be advantageous towards an individual's survival. Both natural selection and sexual selection are mechanisms of trait evolution that change between generations.

The idea of natural selection was first discovered by Charles Darwin in the mid 1800's (Nova PBS 00:30-1:00). This theory helps to reveal the ways in which a population of organisms is able to adapt as well as evolve. Natural selection is used to filter out the individuals within a population not suited for survival, and thus allow the future generations of the organisms to evolve. One main cause of natural selection is an individual's variations. Many of these variations include physical traits, and can be caused by a mutation in the individual's DNA. Natural selection is a result of both differential survival and differential reproduction. Differential survival is when an individual with beneficial traits is more likely to survive, whereas differential reproduction is when the individuals are likely to reproduce and pass these traits to their offspring. If an organism has more favorable variations, they are more likely to both survive and reproduce. As these traits are passed down through generations, these characteristics may become more common within the population. This reveals how the organisms are able to evolve in order to allow the species to have a greater chance of survival.

Natural selection generally produces a trait to help aid in an organism's survival. This is seen in many of the adaptive traits of song birds including that of the California Towhee. The California Towhee, also called *Melospiza crissalis*, is a song bird in the Passeriformes order. It is a large, grayish brown sparrow, mostly found in California and a few regions of southern Oregon. These song birds also have the behavioral trait known as double-scratching, in which they will lunge forward and then quickly hop backwards in order to scratch the floor in search of food ([lyricbirdfood.com](http://lyricbirdfood.com)). One of the California Towhee's adaptive traits is having a thick, triangular shaped bill. This thick bill helps with their behavioral trait of ground foraging (double-scratch) and allows them to find sources of food such as seeds and berries. Their thick bills help the birds crack open the seeds and berries in order to eat them. This trait is also adaptive as it aids in the birds finding food specifically within the California region. As poison oak is one of the common plants on the West Coast of the United States, the California Towhees are able to use their adapted bill to help them eat the pale white berries of the plant ([allaboutbirds.org](http://allaboutbirds.org)). This is particularly helpful, as the California Towhees are known to make nests in poison oak and this provides them both with a place to nest and to find food.

Although natural selection reveals that traits will evolve to be beneficial for the organism's survival, there are still many disadvantageous traits that may evolve. A clear example is that of the brightly colored male peacock feathers which might make the birds more visible to their predators. According to Charles Darwin, some of these traits may develop not because of the struggles they may face between other organisms or other "external conditions," but because of the struggle to possess a member of the opposite sex (Ayala 2016). This illustrates the evolution mechanism known as sexual selection. During sexual selection the traits with a mating

advantage are more likely to evolve, and are more likely to be seen in the males as many of these traits, “yields greater success in securing mates” (Ayala 2016). This difference in traits is known as sexual dimorphism. According to Cyrus Chu, “sexual dimorphism across species is highly correlated with the intensity of competition for mating partners.” (Chu 2012).

Swainson’s Warblers are a clear example of a bird that uses sexual selection. The Swainson’s Warblers’, or *Limnothlypis swainsonii*’s, song is sexually-dimorphic as only the males use the song to attract a mate into their large territory. The male’s song is often described to be a, “whee-whee-whee-whip-poor-will” ([audubon.org](http://audubon.org)), and can be heard up to ninety meters away. This song can cause a risk factor to some males as it may notify other Swainson’s Warblers that it is within their territory, and these birds are extremely territorial. Although it is uncommon, it may lead to one Warbler attacking another. ([allaboutbirds.org](http://allaboutbirds.org)) The Swainson’s Warblers’ song is useful when it comes to keeping their large territory, and attracting a female to their areas. This song has many capabilities as it travels over a vast distance, but because only males have this trait, it may lead to excess competition between the individuals within the population.

Sexual selection is a form of natural selection to reproduction within a population. Many of the traits in sexual selection could be caused by a variation, similar to natural selection. The traits in sexual selection are preferred by the members of the opposite sex, showcasing differential reproduction as they are more likely to reproduce, passing these traits to the next generation. However, these processes also have many differences in terms of an individual’s survival. Many of the traits related to sexual dimorphism have a negative effect on those in the species. This can be seen as some traits result in the individuals being more vulnerable to predators and to harsher competition among other males, leading to a lower chance of survival.

In conclusion, we can see how both natural selection and sexual selection assist a species to keep reproducing and thriving.

Word Count: 975

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