

Title:

Birth Order and Natural Selection

Paper:

The paper explores why senescence occurs at different times in the lives of different organisms. The authors use an age-and-stage structured population model to study the impact of environmental inequality on siblings. They modified Hamilton's classic model of strength of selection on genes affecting age-specific survival and reproduction. The authors simplified the model to include two ages (1 and 2) and two development situations (good and bad), and then they ran the model using different probabilities for good and bad environments. The paper found that when later-born siblings experience environments that are detrimental to lifetime reproduction senescence accelerates.

Citation:

Gillespie, Duncan O., Meredith V. Trotter, Siddharth Krishna-Kumar, and Shripad D. Tuljapukar. "BIRTH-ORDER DIFFERENCES CAN DRIVE NATURAL SELECTION ON AGING." *EVOLUTION* 68.3 (2014): 886-892. *NC Live*. Web. 1 Mar. 2014. <nclive.org>.

In-Class theories:

Natural selection- natural selection is a mechanism of evolution. Natural selection causes heritable traits to become more or less common in a population, because of environmental factors affecting reproductive success. Natural selection helps create organisms that are uniquely suited to their environments and ecological niches.

Life-History Evolution- life-history evolution is when and for how long important events happen in an organism's life to produce the largest number of viable offspring. Life-history evolution includes events like the age of sexual maturity, the number of offspring, senescence and death. By studying the life history of organisms scientists try to explain how evolutionary forces shape organisms to optimize their number of viable offspring and survival in the environment.

Epigenetics- epigenetics is the study of changes in gene activity that are heritable, but not caused by changes in the DNA sequence. Essentially, it is the study of anything that affects development of a complex organism other than DNA. Epigenetics often focuses on changes to gene expression or cellular phenotype, which are not attributed to DNA changes.

Linking:

The paper discusses the way birth order and developmental environment relate to the evolution of senescence in both parents and offspring. The paper suggests that senescence is particularly important to species like humans where family interactions and resource inheritance affect lifetime reproduction. In families each sibling is born to progressively older parents, changing the environment in which the child develops. Senescence is generally thought to occur with the declining strength of natural selection. The paper shows a link between environmental inequality during development and the life-history evolution of the offspring. Epigenetics is one of the ways scientists are studying development and heredity. The different environments in which siblings are raised may be significant to the study of epigenetics.

Explanation:

The video is in the style of the short explanation videos that are popular on YouTube and some educational websites. It is generally easier to get school-aged students to pay attention to short, plainly explained lessons. I chose to make the video as a short educational aid that could be used as part of a lesson or as a stand-alone summary of this specific research.

FEEDBACK FROM INSTRUCTOR:

Hi [REDACTED],

You did a great job on the movie. You included most of the elements I asked for and satisfied most of the criteria indicated in the rubric. You earned 72 out of 75 points.

Your movie was very well done, you did a great job at explaining the study.

A few things I noted:

I missed the explanation of theory concepts in your movie. The only technical term you explained was senescence (which is not one of your theory concepts – life history on the other hand is, it would have been nice to link this since you mention life history at a later point). Epigenetics, which is a concept you list in your paper, is not mentioned in your movie at all. Also, you showed a graph, which was great, but it would have been good to explain it a little more so your audience can follow you better (you could have done this by explaining it verbally or by using text annotations).

But overall, very well done!

Here's what your peers said about your movie:

- *Clearly presents idea, seems technical but made understandable*
- *Some funny parts*
- *Good spatial arrangement*
- *Cudos for doing it on your own!*
- *Unique display – liked the moving around*
- *I liked the random pictures mixed in*
- *Good and clear explanation*
- *Good homage to idea channel*
- *Research explained well*
- *I've seen a little of the YouTube channel she's basing her movie off of and the style was pretty similar*
- *Creativity!*
- *Very interesting topic*
- *To create it by herself – very good! Explained concepts very well.*
- *Presented study & theory well – interesting and unique*

Overall, you did a very good job on the final script. You included most of the elements I asked for and satisfied most of the criteria indicated in the rubric. You earned 71 out of 75 points.

Here are some comments:

- Your theory concepts are very short, I required 100-200 words PER concept, your entire section consists of 172 words. This word limit was an indication of the level of detail I was expecting. (-3 pts)
- Your movie description was short, I expected more detail. (-1 pt)

Best,

D. Magdalena Sorger