

Jordan Habibi

Dr. Frohlich

Evolution

February 20, 2020

Writing Assignment 3

In order to progress, science must explain phenomena. These explanations set the groundwork for future thinking. The Modern Synthesis (MS) formed with the integration of the bases of evolutionary biology: natural selection, population oriented research, and Mendelian inheritance. One of the major achievements of biology, it led to the adoption of the six MS assumptions. However, since its establishment, the field of evolutionary biology itself has evolved, covering more phenomena. However, not all new findings are able to be implemented. It seems that there is a disparity in interpretations in evolutionary biology. There is the MS interpretation, but now also the Extended Evolutionary Synthesis (EES) which emphasizes organismal causes of development, inheritance and differential fitness, the role of constructive processes in development and evolution, and reciprocal representations of causation. Previously, EES has appeared unclear and incohesive, but it is not. The objective here is to show the clarity of the EES.

Here we will focus on four specific research areas that have been subject to alternative interpretation. Evo-devo (evolutionary developmental biology) focuses on the phenotypes that change, understanding that those changes are from genotypic changes. However, it seems with convergent selection this is challenged. Research in this field suggests that there are biases in development responsible for the phenotypic changes. Next, phenotypic plasticity, which is the

ability of an organism's phenotype to change to fit its environment. This is like evo-devo, but it does not involve changes in the genotype. Inclusive inheritance encompasses all that offspring inherit from parents, including (but not limited to) genetics and behaviors. Niche construction (building structures to change the environment) also directly affects evolutionary development. However, this is debated.

To many biologists, the above-mentioned points are not evolutionary explanations, but instead provide supplemental backing. Most biologists only consider processes and events that directly change the genetic code of an organism to be evolutionary causes.

The incorporation of EES viewpoints into MS are likely why most are skeptical of fully adopting an EES viewpoint. Two main themes unify the interpretations. Constructive development, where an organism changes its developmental trajectory, and reciprocal causation, where organisms are not only affected by evolution, but also cause it. There also seems to be a third (seems to be an example of improper formatting on behalf of the editor): the structure of the extended evolutionary synthesis. It holds the same facts and foundation as MS, but conceptualizes them differently. Specifically, EES holds the organism as the central role in the evolutionary process. An extent of this is its recognition that natural selection and internal and external constructive processes are the causes of adaptation.

EES is also valuable in that it's made predictions in evolutionary patterns. It also raises new questions that haven't been asked. We expect EES to be more universally adopted soon.