

Entities in Natural Selections

The organisms on the earth are not identical. At least, they vary in appearance when observed by humans. One of the major explanations for this variation is natural selection, which is a theory proposed initially by Darwin. If the resources on earth are indeed limited, then competition between entities would arise. Therefore, natural selection acts as a mechanism, filtering out entities less fitted for survival (at that moment / time period) and thereby contributing to the maintenance of equilibrium on earth.

Lewontin argues that selection will operate on any entities that fulfills “heritable variation in fitness”. Since many entities may fulfill this requirement, selection could operate on different levels (Lewinton, 1970). Here, it is relevant to add that heritability is an abstract concept, and can only be qualified by observing traits from appearance or quantified by measuring genes, while defining traits (Boucher, 2014) and genes are still issues in the field of biology. Generally, the levels of selection, i.e the entities, are regarded to be, from genes, to individuals, to groups, and to species. However, those entities are unobservable.

Since genes are defined to be physically small, scientists can only observe genes via instruments. It is worth bringing up that there exists controversy between realists and anti-realists on whether such instruments are reliable enough to confirm the “realness” (e.g. no distortion) of the objects being observed (Duhem, 1914), yet the common sense in science is to believe in the instruments. Even though nucleotide structures inside DNA are detectable via mass spectrometry and observable by visual techniques associated with Polymerase Chain Reaction, as previously mentioned, genes remain unobservable because they are not even explicitly defined. Examples of different interpretations of genes are “units of inheritance”, “unit of biological function”, “unit of selection” (which is circular) and “transcription units”. “Surprisingly, there is no definition that is entirely satisfactory” (Morlan et al.). If the definition of genes remains abstract and unified within the scientific field, then genes may not be reliable or “real” upon close consideration. Thus, genes should not be regarded as an entity that natural selection operates on.

Given that humans, as three-dimensional creatures, can only observe objects as the combination of multiple two-dimensional pictures, scientists naturally tend to perceive the world as if organisms are individuals. To elaborate, we may naturally recognize a person as an individual, but it’s worth to notice that bacteria inside that person are also individuals that compete with other bacteria and are able to reproduce descendants with heritability. A new problem has arisen: without bacteria such as e coli, humans would die due to inability to function; without the human body, bacteria would die due to lack of nutrients. Now, since one “individual” is dependent on some other “individuals”, the term “individual” would be counterintuitive. Toon proposes that we may view science in a way that is analogous to valuing art (Toon, 2010). On one hand, the concept of “individual” is counterintuitive, “individual” is not a precise artwork. On the other

hand, “individual” is easy to comprehend, so “individual” is an artwork that can be appreciated by the public.

Additionally, I would like to compare “individuals” with “holobionts”, a possible alternative for individuals. A holobiont is an assemblage of a host and the many other species living in or around it, which together form a discrete ecological unit through symbiosis (Margulis and Fester, 1991). Though the discreteness is still a subject of debate, it can be considered as a fancy artwork that is shocking at the first glance and integrated when taking close scrutiny. Since its alternative, “holobiont”, is a better artwork, individuals may not be more reliable or “real” than holobionts are. Thus, individuals should not be regarded as an entity that natural selection operates on.

A group usually refers to a group of individuals. Suppose we get rid of the unclear definition of individuals. One controversy is “how many individuals can form a group”. Now we assume a group can be formed by more than one individual. Many scientists agree that some traits that particularly happen within a group are amazing, two classical examples are flocking and altruism. However, flocking and altruism can both be explained on individual level and kin level, where the kin level is an extension of gene level that is developed based on the relationship of the individuals. Zebras are a representative flocking animal, famous for their behavior of standing in a circle to protect other zebras in their flock. Comparing the situation of a zebra flock to an alone zebra, the flock, as a unit, would benefit from having an increased chance of survival. At the same time, each individual zebra inside the flock would also benefit from the same reason. The kin relationships within the flock would be benefited by having an increased chance for their genetic materials to be passed down, which is basically the same reason. John B. S. Haldane famously joked that “Would I lay down my life to save my brother? No, but I would to save two brothers or eight cousins”, and scientists should not ignore the kin level of selection when speaking of groups, because it is rare for groups to not contain kinship. As for social animals such as monkeys, their behavior of looking out is often considered as altruistic, because they own a high risk to be preyed on. But it’s necessary to point out that at the individual level, monkeys can get their social status elevated or higher chance to mate as a reward. Then, it is questionable whether altruism at the group level exists. Even though the definition of individuals is counterintuitive, the definition of group is rather reflexible, that means the definition of group is reliable and thus “real”. Group can be considered as an entity, or a level of selection. But if group is a level of selection, then individual and gene would also be considered as levels of selection.

Though it has been widely used, species would be the most controversial unit. This is because the point where a species is speciated is fuzzy. For example, when did human’s ancestors partition into different species, and how did they part? Moreover, species are defined to be that two species cannot reproduce successful descendants (no further descendants). However, scientists should not neglect that some species, for example some fish and fruits, are the result of

interbreeding of different species. Also, within one species, the animals cannot interbreed. As an example, large male dogs cannot breed with small female dogs, because the infant would be too large and will cause dystocia, but they are still the same species. A possible alternative is clades, which is the group of organisms who share the same ancestor. Similar to groups, clades are more reliable and thus “real” than species. Different from groups, clades can be real without species being real.

Overall, the natural selection theory is authoritative in some domains. Mainly, what I’m saying is for educational purposes. As [some reading in class] implies, scientists are aiming to approximate the world as precisely as possible. The reason why primary school science class teaches “gravity is a force” instead of introducing the debate over “gravity isn’t a force” would be attributed to the students not being able to process and understand the latter. Similarly, when a parent take their children to zoo, and their children asked “what is this”, it would be more reasonable to answer “this is a tiger” instead of “this is some living organism that their ancestor survived and refined themselves in every competition with other organisms at their time, but I wouldn’t give it a name because species aren’t real”.

Some other implications of natural selection would be preferably avoided, for example the social Darwinism, i.e. losers should accept the fact that they are losers and people should not expect to be treated equally. As Engels famously draws, “Darwin did not know what a bitter satire he wrote on mankind, and especially on his countrymen, when he showed that free competition, the struggle for existence, which the economists celebrate as the highest historical achievement, is the normal state of the animal kingdom”. Those uses of natural selection are related to colonialism, eugenics, racism, imperialism, and etc, which would result in serious ethical concerns.

However, the necessity for natural selection to happen is that resources on the world are limited. Moreover, scientists should remember that the biological hierarchy themselves are products of evolution.

I would also like to add an analogy by Golden Dog to my (most recent) view of realism. There is a parrot who held a toothbrush to accompany his owner brushing teeth. Some day he becomes angry and throws the toothbrush away because he found that he doesn’t even have a tooth. But then he picked the toothbrush back because he found out that the real happiness is not brushing teeth itself, but accompanying his owner.

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