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HPS 130

Units of Selection and Altruism discussion summary

One of the first points we discussed was that of genic selectionism. Dawkins as well as Sterelny and Kitcher are major proponents of this viewpoint. To Dawkins, organisms are nothing more than "lumbering robots" created for the benefit of the gene. Genes are germline replicators with the possibility of leaving "infinitely many" descendants. Supporters of genic selectionism also view genes as "selfish" entities. That is, each gene works solely to maximize its own fitness. This viewpoint clearly leaves no room for group selection or altruism. Genic selectionists claim that situations that appear to represent altruism or group selection are simply more involved versions of selfish gene interaction. The concept of genic selectionism also appeals heavily to the ideas of reductionism and parsimony. Sober actually criticizes this point, stating that, "there is no a priori reason to prefer lower-level selection hypotheses over higher-level ones." Various members of the class voiced the viewpoint that although many types of selection may be reduced to the genic level, this is not always the best way to look at selection. Class members also seemed skeptical about reducing all types of selection down to the selfish gene. Some instead voiced support for multilevel selection theory, specifically MLS2 (at some point smaller units becoming sufficiently integrated into larger collectives with their own distinct fitnesses). An interesting topic that was only touched on is the idea of heterozygote superiority. Is this an example where the unit of selection is the genotype rather than the individual allele?

Kin selection was another topic of interest during the discussion. Kin selection was first put forth by Maynard Smith as a way in which altruism could evolve, separate from group selection. Hamilton later showed that in order for an altruistic gene to be favored by natural selection a certain rule must be satisfied: $b>c/r$. In this formula, b stands for benefit, c for cost and r for the relatedness (the coefficient of relationship). Thus, kin selection can be viewed from the genic selectionist point of view. The cost suffered by an altruistic gene is offset by the benefit gained from helping a sufficiently related party. That is, the "altruistic" gene is still working to maximize its own fitness. Some philosophers, such as Sober, view kin selection as a special case of group selection. For altruism to evolve, altruistic individuals must tend towards interaction with other altruistic individuals. If all altruistic individuals are also disposed to use a certain watering hole, then this will occur and altruism can evolve. In this case, the idea of the selfish gene does not seem to be at work and thus genic selectionists are not convinced.

Another topic that was touched on briefly was the topic of transposons. Transposons or transposable element are large regions of noncoding DNA that are capable of shifting to different areas of the genome. Transposons typically act as mutagens and can destroy or harm the host genome. Sober, a proponent of multilevel selection theory, brings up tranposons in Chapter 4 to show that in some cases "genes can be selected for in spite of their effects on organisms." Sober simply means to show here that fitness should not be viewed solely from the perspective of the organism. Dawkins on the other hand would point to transposons as another

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fine example of selfish genes. An adaptationist might views transposons as units that work cooperatively with the organism or contribute to its genomic diversity. In class, we discussed how our individual points-of-view heavily influence how we topic about this subject. It seems that in philosophy, one must be careful not to fall into the trap of fitting ideas to preconceived notions. Instead we should attempt to find where the ideas themselves fit best. As Sober points out, the best way to answer questions or decide hypotheses is not by invoking rules or "maxims but by doing biology."

From the idea of transposons, we moved forth to the general idea of parasitic DNA, and even other organisms that seem to take advantage of live host cells. One example is the mitochondria, an organelle of bacterial origin that is the energy factory of the cell. One interesting observation was that the human body and even the human cell are like miniature ecosystems in which many components rely on each other for mutual survival and fitness, creating a highly symbiotic environment. The fact that mitochondria require many host cell proteins to proliferate costs the cell energy in terms of generating those proteins, but these organelle generate all the ATP the cell has. Similarly, transposons do compromise genomic integrity and cost cells energy to replication, but the fact that large chunks of the human genome is junk DNA (in part as a result of transposons) helps prevent deleterious mutations that occur at a statistical percentage from happening to the coding regions of the genome. We also discussed the concept of the baculovirus as an example of DNA spreading itself. The bottom line is that while Dawkins would argue that genic selection explains all areas of evolutionary biology, Sober would argue that selection occurs at many levels. In the case of the "selfish DNA," Sober would concede that this would indeed be evidence of genic selection, but that one incidence does not discount the possibility of other levels of selection in other cases.

Toward the end, we revisited the topic of altruism. The question of interest to us was whether altruism can be taught and learned through experience or whether it is more encoded in the genome. Some had a strong opinion that nurture played a stronger role in cultivating altruism, particularly in the context of cultural influence. Most people seemed to agree that experience played a stronger role in determining altruistic behavior in people than genetics. Sober also hints that timescale of things are important in determining altruistic behavior of groups in that overtime, altruistic individuals tend to bud off from the general population and form their own group to prevent selfish individuals from taking advantage and causing subversion to their altruistic endeavors. The result is that in the long run, altruistic individuals do better. In the end, we realized that our latest discussion of altruism might not fit the definition of altruism at all, which is essentially the act of decreasing one's own ability to reproduce in order to improve another's ability to reproduce. A large part of this is a result of the fact that fitness is still a loosely defined term. Perhaps in humans, altruism is a slightly different concept than in other creatures.