Diversity in the Epistemology Group: Ernst von Glasersfeld and the Question of Adaptation

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> Upshot • Richard Michod is professor and head of the Department of Ecology and Evolutionary Biology at the University of Arizona. He met Ernst von Glasersfeld at the University of Georgia and was a member of the Thursday evening epistemology seminar group. In his essay he recalls the discussions he had with Ernst on the nature of evolution and adaptation.

I went to the University of Georgia in 1973 to study science, in particular evolutionary genetics. When my advisor Wyatt Anderson found out I was interested in philosophy, he invited me to participate in a Thursday evening discussion group involving diverse scholars from across campus and the community. It was there that I first met Ernst, who was the caretaker and spirit of the group. As a first year graduate student I was impressed by Ernst and a bit overwhelmed. His heavy accent, kindness, European old world style and grace, along with the force of his intellect left me in awe. I loved to listen to him, for there was music in the way he talked. There were also profound ideas, and these had a lasting influence on my interests and research in evolutionary biology.

Ernst served on an early advisory committee in my Ph.D program, and we often discussed and argued about the meanings of the words "adapt" and "adaptation" in evolutionary biology and psychology. I was surprised to learn that my view – that the species creates its environment as it evolves – meant I was a radical constructivist. The more common view of evolution is that species adapt *to* an environment. I have often wondered just how radical a constructivist I really am and whether any particular philosophical position (radical constructivism or something else) is supported by how evolution works. What part of external reality ("Nature" in Ernst's writing referenced below) can be found in the diverse worlds created by natural selection and encoded in the genomes of each species? I have not yet found a satisfying answer to this question, yet I think an answer will eventually emerge, once genomics (which is still in an early and very descriptive stage) is merged with functional biology and ecology.

Through the Darwinian principles of natural selection (variation and heritability in fitness, that is viability and fecundity), populations of organisms adapt to the world and in the process create an environment in which they live. Organisms do not adapt in an evolutionary sense – they are born, and they die. In between birth and death, some organisms leave more offspring than others according to the features (and the underlying genes) they possess. By this process, populations of organisms adapt over time, that is, populations (and the organisms comprising them) become more fit and better designed to survive and reproduce in their environment. It is because of the repetitiveness of life cycles that we can speak of organisms as designed for their environment (without allowing the idea of directed change). So, I did not agree with Ernst when he said, for example, that "There must be no suggestion of evolutionary design or of environmental pressure toward survival mechanisms, for the moment we allow any such idea of directed change, the theory of evolution collapses into a teleological myth" (Glasersfeld 1980: 971).

Although I felt I could answer Ernst's concerns about adaptation and design, I did not feel I understood where the very units of adaptation and design came from (the cells, organisms, and other units of evolution). Let me explain. Cells can be units of evolution and design, that is evolutionary individuals, as they are in bacteria, yeast, or simple algae. However, when cells reside in multicellular organisms, the cells are parts of a higher level evolutionary individual. The transition from unicellular life to multicellular life is one of life's major evolutionary transitions in individuality. There are other major evolutionary transitions in individuality: the origin of the genome from a group of cooperating genes, the origin of the eukaryotic cell from populations of cooperating and conflicting bacteria-like cells, and the evolution of social organisms (such as the social insects and primates). A theory of evolution cannot just take this hierarchy of life for granted, it must explain it. Explaining the hierarchy of life has been the overarching goal of my research.

The seeds for this project were planted early in my struggles with Ernst in trying to convince him that there can be meaningful adaptation and design in biology. In addition, I can trace some of the concepts I ended up using in my theory of evolutionary transitions to our Thursday evening discussions, especially in our discussions of Jean Piaget and Bill Powers. I remember learning then that human behavior is the control of perception (in opposition to what B. F. Skinner said) and that discordance between an organism's internal cognitive structure and its sensory inputs can lead, through accom-

modation, to new cognitive structures. By accommodating conflict, more harmony can arise in cognition. I rediscovered this Piagetian cycle in my studies of evolutionary transitions.

When I was a student studying biology I learned in my classes and readings that cooperation was generally not that important in evolution, even though it was important for certain species: our own species, our primate relatives, social insects, and some other lineages. All this has changed with the interest in understanding the origins of different levels of biological complexity and the major transitions in individuality. The world is a very social place: what we call individuals are really societies (Fig. 1). I have learned that cooperation underlies this biological complexity, and drives the emergence of new kinds of individuals during the evolutionary process. Cooperation just does not happen, however; certain conditions must be satisfied and there is often a short-term temptation to be selfish. This temptation to be selfish must be mediated or resolved, and, if that happens, cooperation can be maintained and even enhanced. In time, the group may evolve into a new kind of evolutionary individual. It is this cycle of cooperation, conflict, and conflict resolution that has created the major levels in the hierarchy of life.

I learned much from Ernst and the Thursday evening discussion group that he nurtured. Most important, however, were not the ideas but the example he set in the life he lived (not that he was ever trying to be an example of anything!). His life was the embodiment of the creative life and showed that education is a life-long process of discovery and not a degree. As a young Ph.D student, I was surprised that someone as creative and knowledgeable as Ernst did not have a Ph.D. But now, after many years of serving on Ph.D committees and advising students, I see how it all can interfere with creativity – something that Ernst had in full.

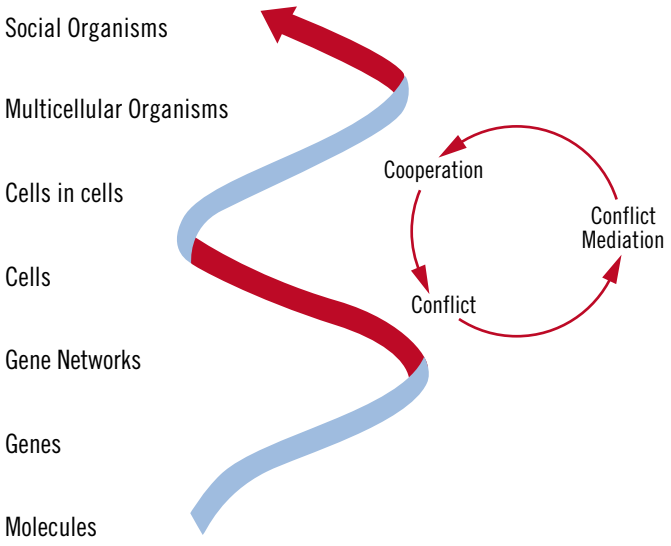

Figure 1: Cooperation, conflict and conflict mediation drives complexity and evolutionary transitions in individuality. Although there is no progress in evolution, there can, under certain conditions, be increases in the level of complexity, especially during an evolutionary transition in individuality. Higher level individuals are more complex as they contain the properties of lower level individuals along with new properties.

Reference

Glasersfeld E. von (1980) Viability and the concept of selection. American Psychologist 35(11): 970–974. Available at http://www.vonglasersfeld.com/060

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