

expected so much, but I was well prepared for a biological, or at least sociological history of evil, a definite answer as to what evil really is, and perhaps several hypotheses about where evil originated. Alas, this was not in the cards for this book, and I wonder had it been, how much more satisfying would the work have been to those of us in the world who are looking for concretes, not just socio-biological hypotheses.

## THE EXTENDED PHENOTYPE: THE GENE AS THE UNIT OF SELECTION RICHARD DAWKINS, 1982

*Reviewed by Sarah Ferguson  
Department of Anthropology  
Wichita State University*

“The Extended Phenotype” is written as a sequel to “The Selfish Gene.” Dawkins says that it is written for people with a knowledge of evolutionary biology, which is very true. If a person has little knowledge of the terminology, then they will never decipher what he is trying to say. He begins his book by stating that, “The phenomena that I shall consider—co-evolution, arms races, manipulation of hosts by parasites, manipulation of the inanimate world by living things, economic ‘strategies’ for minimizing costs and maximizing costs and maximizing benefits.” (2)

One of the first ideas that he addresses is that scientists often speak of adaptation being “for the benefit of something,” but it usually is best not seen as an individual organism. He says that it is best to think in terms of genes, which he calls the “germ-line replicator.” Although, he says, “it is convenient to think of these phenotypic effects as being packaged together in discrete ‘vehicles’ such as individual organisms, this is not fundamentally necessary.” (4) He says that the replicator should be thought of instead of as of having “*extended phenotypic effects*.” Dawkins says that that effect should be thought of in terms of its effect on its whole environment rather than on itself only.

For this, he uses an analogy of a Necker Cube. He illustrates that when a person draws a Necker Cube on a piece of paper, one can see it from two perspectives. Dawkins says that he sees the replicator in the same way.

He says to begin by picturing a group of interacting organisms. “We know that they contain smaller units, and we know that they are, in turn, parts of larger composite units, but we fix our gaze on the whole organisms. Then suddenly the image flips. The individual bodies are still there; they have not moved, but they seem to have gone transparent. We see through them to the replicating fragments of DNA within, and we see the wider world as an arena in which these genetic fragments play out their tournaments of manipulative skill.” (4-5) Dawkins goes on to say that genes manipulate the world, because they cause an organism to change according to its own fitness. Organisms work to “maximize their own reproductive success.” (5) He says that his hopes for this book is expressed through the Necker Cube analogy. The genetic replicators “preserving themselves by means of their extended phenotypes” is an example of all organisms striving for fitness and for survival, which is the basis for the book. Dawkins writes of the way that genes select and how they replicate.

Dawkins goes on to state that he uses the term replicator in a vague manner, because it can refer to many things. Some people might think of it in terms of a gene pool, but he prefers to look at it in many ways. He says that a replicator can be any portion of a chromosome. He says that natural selection is the survival of any given replicator relative to an allele. “If we look at a portion of chromosome five cistrons long, its alleles are the alternative sets of five cistrons that exist at the homologous loci of all the chromosomes in the population.” (87) He goes on to state that any stretch of DNA can be considered to be competing for an area on the chromosome. Dawkins chose a random piece of chromosome to analyze. He chose an area with twenty-six codons to test to see if it is a replicator. Dawkins states that it must have a “minimum degree of longevity/fecundity and fidelity.” (87) This means that it lasts a long period of time through making copies of itself. He goes on to illustrate how different forms of replicators exist and shows what is not considered a replicator. He goes into an immense amount of detail and attempts to make his description very clear in case the reader is not an expert.

Dawkins goes on to illustrate how organisms tend to do what is best for its own survival. He compares animals to computers by saying that the animal seems to have a program that it uses as it does things in a certain manner every time. However, the program is not a written one, natural selection has weeded out certain characteristics that would deviate from a pattern that is best for the animal’s survival. Dawkins explains that while there are replicators that improve itself for the betterment of the generation, there are others that promote its self, while harming the remainder of the genome. He calls them

“outlaws.” He gives two kinds of outlaws, the “allelic” and the “laterally spreading outlaw.” These two replicators that are outlaws don’t often exist, because the alleles that survive are the ones that promote the survival of the organism as a whole.

Dawkins goes on to explain that the term “fitness” is a confusing one. People often use it in terms of comparison to Darwin and Spencer’s *Survival of the Fittest*. And many people who use the term make it sound like the organism chooses whether it changes or survives. Dawkins says that it pains him to write about the term fitness, because even Biologists get confused. He says, “gene survival is what matters; what is the minimum change we have to make to our old view of what individuals must do, in order that we may cling on to our ideas of the individual as the unit of action? The result—inclusive fitness—was technically correct, but complicated and easy to misunderstand.” (194) He went on to say that he would not use that term again, so that his book will be easier to understand.

*The Extended Phenotype* is relatively easy to understand. However, unless one is a Biologist they will not grasp the whole concept behind the book. Yes, one might get the general idea, because the author does not often use biological terms without explaining in great detail what they mean, but for those who are not Biologists, it will be as clear as mud. If you are beginning in the field, the book does help to generate thought and a desire to want to know more, but unless well versed in Biological issues and genetics, one will not walk away with the underlying knowledge that Dawkins intends to pass along.

*The Extended Phenotype* is an interesting read. If one is going into Biology or is already working in the field, then this book is something that one might want to read. It is an interesting way to interpret natural selection.