

In his book The Selfish Gene¹, Richard Dawkins' theoretical model of Natural Selection in Evolution is based on the premise that it is particulate genes which are being selected for as opposed to individual organisms or groups of species. It can be argued that this genocentric approach to Evolution is tautological in that it assumes that Natural Selection based on genetic programming is a sufficient explanation of and for the theory of Evolution. Working with a model which logically justifies itself simply as a result of its context within a prior assumption, which itself may or may not be justifiable, is an unscientific method of theorizing. Dawkins' theory, while impressive in its internal logic, becomes flawed by virtue of the fact that it is so exclusive and can be shown to be inadequate when reviewed in the light of Susan Oyama's essay, *Ontogeny and the Central Dogma*. Oyama shows that it is possible to appreciate and uphold Evolutionary theory without subscribing to the concept of genetic programming, which describes phenotypes as resulting from a one-way transmission of information from the genotype. Oyama realizes that the terminology that has been in place in Biology and Behaviorism has been largely responsible for these two fields being unable to synthesize their findings into a coherent understanding of development. She therefore addresses the need to redefine the key terms in such a way as to eliminate the dualities which are inherent in the traditional perspectives. Once it becomes apparent that these dualities need not exist, theories on which they are based such as Dawkins' "selfish gene", become glaringly reductionistic and deficient.

Dawkins' argument postulates that genes are particulate and "selfish" inasmuch as they are each the programmer of specific behaviors or traits which are designed for the purpose, or with the result, of ensuring the replication of the essential DNA of that particular gene. It is just those traits therefore, which are successful at assisting in the survival of the very gene by which they were programmed, which will be passed on to successive generations. In Dawkins' view, the organism with its manifestation of traits is nothing more than a "survival machine" for each gene that finds itself inside a given body. An individual body is comprised of the effects of a unique combination of the genes inherited from its parents, and many Evolutionists believe that it is these combinations of genes which

are selected for or against by their varying capacity to survive and reproduce and that therefore this selection process takes place at the level of the organism or even of an entire species. Dawkins is convinced that the above perspective is the result of distractions by the secondary and superficial effects of a selection that actually occurs at the genetic level. Although it may be valid up to a point, the problem with Dawkins' theory is that it is only a partial explanation of phenomena which are far more complex than his schema is able to encompass.

According to Oyama's argument, Dawkins is limited by his reliance on the concept of genetic programming. She calls this the "Central Dogma"; the view that information in the form of genetic messages flows in a singularly outward direction from genome to phenome. While it may be the case that effects sustained at the phenotypic level do not translate back as an effect on the genes themselves, this does not at all imply that there is no form of external influence flowing from the environmental to the biological level. In fact such influences can be felt on every level of the development of an organism, from the intracellular to the extracellular environment. Examples of these are the motion and interaction of parts of the genome; the cell structure and intracellular chemicals; the extracellular matrix of hormones; energies and mechanisms; the prenatal effects of parental physiology and behavior; self-stimulation by the organism; post-natal abundance or lack of food source; members of other species with which the organism interacts regularly; ecological and other 'natural environment' influences (p.27). This long list which Oyama offers in her essay makes it difficult to deny that there is more to development than can be grasped by the '*either genetic or environmental*' causation perspectives which arise out of the Central Dogma.

The mistake which Dawkins and other genetic imperialists make is to confuse or ignore the various levels at which development takes place. Oyama asserts that the Central Dogma of genocentricity has colored their ability to understand how an organism's interaction with its environment can influence the process of maturation and thereby the manifestation of traits. Such perspectives have had to maintain a dualism between two main aspects of development, the 'innate' and the 'learned'.

Because everything which is not genetically transmitted has been seen as attributable to the environment, there has been an obsession with trying to determine which traits are inherited and which are not, with those that are not being seen as somehow less valid or at least less fundamental to the organism. Although 'Inclusionists' have tried to overcome this dualism by admitting that characteristics cannot be solely attributed to 'nature' or 'nurture', Oyama sees this attempt as inadequate in that it does not address the problems with a "model which equates nature with the genes and nurture with experience" (p.4) and makes it possible to see "innate vs. learned" as synonymous with "genes vs. environment".

In order to appreciate the flaw in Dawkins' argument, it is necessary to understand how Oyama sees both genes and the environment as "mutual interactants in a developmental system". As Oyama points out, "Evolution is only partly a matter of changing gene pools. It is also a matter of changing developmental contexts and one cannot be understood without the other" (p.28). By redefining the terms 'nature' and 'nurture' in such a way as to alter their relationship to each other, Oyama allows us to understand Evolution as "the derivational history of developmental systems" (p.5). Oyama sees *nature* not as a transmitted genetic program but as a constructed phenotypic product of development. While *nurture* she defines as a multi-leveled process of developmental interactions. Thus nature is in fact the product of nurture and these are not two alternative sources of influence in development but rather are both aspects of the developmental process and both subject to the contextual system in which the development takes place. When a developmental system is understood as a dynamic, contingent process of interaction between biological and environmental co-operants, it is possible to see just how facile and inadequate Dawkins' model really is. Dawkins even attempts to extend the application of his model, through analogous logic, to encompass higher-level aspects of human nature including the Evolution of Culture. From his dualistic perspective, he believes he can explain every phenotypic development from its genetic point of view, since every phenotype of a survival machine must in some way serve the selfish gene.

When Dawkins attempts such an application, in his chapter on "Memes", it becomes obvious that his model cannot account for the effects of Oyama's bi-directionality of information flow within a developmental system. For instance, how would Dawkins account for the fact that it is possible for individuals to generate ideas which, although they have undoubtedly been thought of by others before, are original to the person who thinks them up for themselves without ever having been introduced to them? This developmental capacity of ideas (or 'memes', to use Dawkins' term) to be generated by original thought and to generate further ideas as a result of previous ones, and of the overall climate of ideas at any given time in a given culture, is clear evidence of the fact that Dawkins is mistaken when he proposes that the transmission of memes is solely a result of imitation and indoctrination. If this were really the case then one would be able to presume, as Dawkins apparently does, that just as genes are selected by their survival value in terms of 'fitness', so too are ideas selected for their fitness. Such a presumption implies that there is a preferential hierarchy of cultural ideas; a concept which most of us would find not only distasteful but glaringly false.

I would argue that Oyama is correct in her understanding of the developmental system in which information is not transmitted one-way, from genome to phenome, but two-ways, with the phenotypic environment created and experienced during the various stages reciprocally informing the genome throughout an organism's life cycle. Oyama's perspective, when applied to higher levels of reality such as human Culture, can account for the ways in which Culture is involved in the formation of memes equally as much as memes inform Culture. It is this kind of inclusive, holistic thinking which better encompasses the complexity of human nature and makes it possible to envision models which respect natural creatures as not mere products of Evolution, but as creative participants in the Evolutionary process.

¹ New Edition © Richard Dawkins. Oxford University Press, 1989. (First Published 1976).