Book Summary: Debunking Selfish Gene

Blithering Genius

2023 November 27

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1 Inrtoduction

In this essay, I will explain the core error in Richard Dawkins' notion of the selfish gene, and explain how it is related to group selection theory.

This is about biological purpose: what it is, and what has it. I will compare and contrast three theories of biological purpose:

- Phenocentric Theory: The organism (more precisely, the reproducing unit) is the locus of biological purpose.

The purpose of life is to reproduce. An organism is a reproducing machine.

- Species-centric Theory: The species is the locus of biological purpose.

The purpose of life is to perpetuate the species. An organism is a species-perpetuation machine.

- Genocentric Theory: The gene (nucleotide sequence) is the locus of biological purpose.

The purpose of life is to perpetuate genes. An organism is a gene-perpetuation machine.

The selfish gene concept is part of the genocentric theory, which is Dawkins' view. He believes that organisms are gene-survival machines.

The species-centric theory is often called "group selection theory". Dawkins correctly rejects it. However, the genocentric theory is based on a very similar misconception.

In this essay, I will argue that the phenocentric theory is correct, and the other two theories are incorrect.

2 Biological Relationships

There is an important distinction between part-whole relationships and instance-type relationships.

	Whole	Part
Type	Human body	Human hand
Instance	My body	My hand

A type is a category of objects with a common form. The human body is a type. Every human is an instance of that type. The human hand is also a type. An individual hand, such as my hand, is an instance of that type. Types are abstract. They consist only of information: the form that is actualized by the instances.

To be clear, type and form are essentially the same. A type is a category of instances that have a common form.

A whole is a form or object that is composed of different parts that are spatially, temporally and causally related. The human body is a whole, and the human hand is part of that whole. Likewise, my body is a whole, and my hand is part of my body. If the whole is an object, then it has an independent existence from other objects of the same type. By contrast, a part of a whole can only exist within the whole. One human body can exist without another. A human hand can only exist as part of a human body.

The species-centric and genocentric theories involve a confusion between instance-type and part-whole relationships. Both view an instance-type relationship as a part-whole relationship.

3 The Phenocentric Theory

In this section, I will briefly present the phenocentric theory of biological purpose. In the next two sections, I will explain the errors of the other two theories.

The phenocentric theory makes the part-whole and instance-type relationships clear. It locates purpose in the intersection of biological whole and instance, which is the organism.

	Whole	Part
Type	Abstract purpose	Abstract function
Instance	Actual purpose	Actual function

A type can have an abstract purpose, but not an actual purpose. The human body has an abstract purpose: to reproduce. This means that all of its instances have that actual purpose. The purpose of an individual human body is an instance of the abstract purpose. The purpose of an individual human body is to reproduce: to generate offspring.

Reproduction is not just creating, or helping to create, other human beings. It is generating your own offspring.

Parts of a whole have functions relative to the purpose of the whole. The human hand has an abstract function within the human body: to grasp and hold objects. This abstract function is

instrumental to the abstract purpose of reproduction. An instance of the human hand has the actual function of grasping and holding objects, and is instrumental to the actual purpose of its body. An actual purpose/function is an instance of an abstract purpose/function.

The function of a part is instrumental to the purpose of the whole. Instrumentality is a relation between part and whole, not instance and type. The instance is not instrumental to the type in any way.

My hand does not serve the "interests" of the abstract human hand, of which it is an instance. It serves the interests of my body, of which it is a part.

Every part of the body is instrumental to the purpose of the body. Those parts inherit their forms and functions by reproduction, just as the body inherits its form and purpose by reproduction.

My purpose of reproduction is not your purpose of reproduction, nor anyone else's. It is not just to create new instances of the human type. It is to produce my own offspring. Your purpose is to produce your own offspring. We each inherited an individual version of the abstract purpose.

Reproduction is the basis of natural selection, because it is the event through which biological forms are copied, and by which biological entities (organisms) are created.

A new mutation must be multiplied by reproduction to become frequent. To persist, a biological form must be copied by reproduction. Thus, biological forms are selected to be instrumental to reproduction.

The reproducing unit is the locus of purpose. In most cases, it is what we view as the organism. Reproduction creates new organisms. An organism is a reproducing machine.

Now, let's consider the other two theories. This table shows the relevant relationships.

	Whole	Part
Type	Species	Abstract gene
Instance	Organism	Gene copy

4 The Species-centric Theory

In The Selfish Gene, Dawkins correctly rejects the species-centric theory: that natural selection is based on the perpetuation of the species.

The species-centric theory is based on a misconception about the relationship between the individual organism and the species. It views the relationship as part-whole, rather than instance-type. It views the species as a whole (entity) with an actual purpose, composed of organisms that are instrumental to that purpose.

The species is an abstract type, which consists only of information, and is somewhat in the eye of the beholder. It is just a type of organism. Organisms are not parts of the species, and they are not instrumental to the purpose of the species. The species does not have an actual purpose. It has an abstract purpose of reproduction, which means that each member of the species has the actual purpose of reproduction: generating its own offspring.

A simple thought experiment demonstrates that reproduction, not species-perpetuation, is the basis of selection. Suppose that a species contained some individuals who acted for the benefit of the species (defined as perpetuation or expansion) and some individuals who acted only toward

the creation of their own offspring. So, some individuals are reproductively altruistic toward other members of their species, while others are reproductively selfish. The selfish individuals would receive a reproductive benefit from the altruists, while the altruists would pay a reproductive cost. So, on average, the selfish trait would be reproduced more than the altruistic trait, eventually replacing it.

Only traits that are instrumental to reproduction can be selected for. Evolution creates reproducing machines, not species-perpetuation machines.

5 The Genocentric Theory

> I shall argue that the fundamental unit of selection, and therefore of self-interest, is not the species, nor the group, nor even, strictly, the individual. It is the gene, the unit of heredity. — Richard Dawkins, The Selfish Gene

Dawkins' notion of the selfish gene is that individual copies of an abstract gene will somehow "act" (inside organisms) for the "benefit" of the abstract gene. In this view, the abstract gene is the locus of purpose, and the purpose of an individual organism somehow derives from the purposes of its genes. Dawkins believes that an organism is a gene-survival machine.

The genocentric theory views the abstract gene as an entity with an actual purpose, composed of gene copies that are instrumental to that purpose. It views the relationship between the gene copy and the abstract gene as part-whole, rather than instance-type.

> What is the selfish gene? It is not just one single physical bit of DNA. Just as in the primeval soup, it is all replicas of a particular bit of DNA, distributed throughout the world. If we allow ourselves the licence of talking about genes as if they had conscious aims, always reassuring ourselves that we could translate our sloppy language back into respectable terms if we wanted to, we can ask the question, what is a single selfish gene trying to do? It is trying to get more numerous in the gene pool. Basically it does this by helping to program the bodies in which it finds itself to survive and to reproduce. But now we are emphasizing that 'it' is a distributed agency, existing in many different individuals at once. The key point of this chapter is that a gene might be able to assist replicas of itself that are sitting in other bodies. If so, this would appear as individual altruism but it would be brought about by gene selfishness. — Richard Dawkins, The Selfish Gene

First, Dawkins says that the selfish gene is "all replicas of a particular bit of DNA, distributed throughout the world". In other words, it is all instances of an abstract gene. That is a class of objects, not an object or entity. He describes it as "a distributed agency". But a class of objects has no agency, even metaphorically. When he talks about a gene doing something (assisting replicas of itself), he has switched to talking about a single instance as the metaphorical agent, instead of the abstract gene.

This is terribly confused.

There is a clear analogy between group selection theory and Dawkins' notion of the selfish gene. In group selection theory, the species is viewed as an entity with a purpose. The species is a distributed agency that "acts" through its instances (organisms). In Dawkins' view, the abstract gene is viewed as an entity with a purpose. The abstract gene is a distributed agency that acts through its instances (gene copies).

Both view a type as an entity with a purpose. Both view the instances of the type as parts of a whole, and instrumental to the purpose of the whole.

The abstract gene is a type, which consists only of information (a nucleotide sequence). It is less subjective than species, because it could be defined in very precise terms. But, like the species, the abstract gene is purely information. It is just a sequence of nucleotides that can exist in many different molecules and organisms.

Individual copies of a gene are not parts of the abstract gene, and they are not instrumental to its purpose. The abstract gene does not have an actual purpose or function. It has an abstract function within an abstract whole. A gene copy has an actual function within an organism, and that function is instrumental to the organism's purpose of reproduction.

The gene copy does not serve the purpose of the abstract gene, any more than the individual organism serves the purpose of the species. Instead, the gene copy is instrumental to the organism's purpose of reproduction. It is selected to contribute to reproduction.

It is hard to imagine a gene that, as an instance in an organism, somehow "acts" for the benefit of the abstract gene. Perhaps it would cause reproductive altruism toward other organisms with the same gene. But that is a very complex effect for a single gene to have, and almost impossible to arise as a single mutation.

For this imaginary gene, the scope of altruism would change over time. Initially, the gene would exist only as a single mutation. If it was replicated (by reproduction) enough times, then eventually it might exist in many individuals, perhaps in all members of a species, or even in the members of multiple species. How could it "act" to benefit its abstract type under all of those conditions?

If genes were selected to serve the interests of the abstract gene, then every gene would have its own purpose, and its own scope of altruism. Some genes are shared by all members of a species. Some are shared by all members of a genus. Some vary within a species. Some exist only in a few individuals. How could an organism be coherent if its genes had different purposes and scopes?

Genes are selected to contribute to reproduction. If a gene exists in many copies, that is because it has been copied many times by reproduction, and presumably contributes to reproduction. If a gene is perpetuated over time, that is because it continues to be copied by reproduction, and presumably contributes to reproduction.

Evolution creates reproducing machines, not gene-perpetuation machines.

But, But, But...

> But if a gene has the property of making itself more common, then it will become more common. So, genes are selected to become more common. — Someone on the internet

This is a fundamental misconception about evolution. The theory of evolution is not "a form that makes itself more common will be more common".

First, there is a conceptual error. A gene can't have the property of making itself more common. An abstract gene doesn't do anything. It is just information. Its instances have effects in organisms. Those effects can be summed up by us, but that aggregate effect is not the "action" of the abstract gene. It is just an aggregate of individual effects. For example, an increase in the frequency of a gene is just the aggregate effect of many individual acts of reproduction by organisms.

Second, the theory of evolution is not just a tautology. It is not just saying "if X perpetuates itself, then X will be perpetuated", or something like that. The theory of evolution describes the process that creates and maintains biological forms and their populations. Reproduction is the crux of that process. The theory of evolution explains how differential reproduction causes aggregate effects, such as the evolution of different species, and the distribution of species in an ecosystem.

Third, an abstract gene does not have the aggregate effect of becoming more common, most of the time. To be viewed as a gene, a mutation must have initially had that aggregate effect. Otherwise, it would not exist in multiple instances, and it would not be a type. So, if we view something as a gene (or allele of a gene), then it must have become common in the past. However, no gene increases in frequency forever. Eventually, it reaches a natural limit and stops increasing. Then it could have the aggregate effect of persisting for some time. Both of those aggregate effects are due to reproductive fitness. To become common and then persist for some time, a gene must positively contribute to the reproduction of individual organisms, because that is how it becomes common and persists.

Finally, if that argument were correct, then it would also apply to the species-centric theory. A species that has the aggregate effect of making itself more common (or perpetuating itself) would become more common (or perpetuate itself).

6 Conclusion

This essay was very short and somewhat incomplete. I left out a lot of details, arguments and explanations. For the complete version, see the book Debunking the Selfish Gene.

Life is complex, and perhaps you can think of some possible exceptions to what I have said. People might think of bees, for example, or altruism within families. I cover some of that complexity in blog posts (Bees are Not Social, Kin Selection Theory is Wrong) and also in the book. In this essay, I focused on the core issues, not with every possible objection or counter-argument that might come up.

If you found this essay interesting, then please take the time to read the book.