
Revisiting fitness: Trait-based Fitness

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Abstract

The notion of fitness, although fundamental in evolutionary theory, is not a unified concept. Several authors have even concluded that looking for a general concept of fitness is doomed to failure. I disagree with these conclusions. In the vast philosophical literature on fitness, two approaches have been put forward. On the one hand, under the *statistical* interpretation of the concept, fitness is the per capita rate of increase of a given type and does not play any causal role in evolutionary changes. On the other hand, under the ecological approach of the concept, fitness is a property of organisms (or more generally entities) forming a population in a given environment and it plays a causal role in evolutionary changes. While both approaches have some advantages over one another they also come with many drawbacks. In this paper, I propose a concept of fitness which takes the advantages of both approaches while eliminating their problems. I start by detailing different problem cases for each approach and propose "local" solutions for each of them. I then show that each solution can be integrated in a more general concept of fitness, yet consistent both with the idea that fitness is a property of entities and that it causally affects their evolutionary fate in the context of natural selection. I call this concept *trait-based fitness*. Further on, I show that trait-based fitness is perfectly equivalent to the notions of fitness used in classical evolutionary disciplines with the advantage of being more general.

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