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REVISTA DE LIBROS/BOOK REVIEW

Units of Selection, by JAVIER SUÁREZ AND ELISABETH LLOYD, CAMBRIDGE, CAMBRIDGE UNIVERSITY PRESS, 2023. 94 pp., €19.84.

Each branch of philosophy has its big philosophical problem that somehow overshadows other issues and receives the biggest attention among philosophers. If I were asked to choose one such problems in the philosophy of biology, I would say it is a debate on the units of selection. At first glance, it seems that the concept of units of selection is very clear and should not trigger any controversies. According to the classic “recipe” for the process of natural selection, famously presented by Richard Lewontin in 1970, natural selection occurs whenever there is a population that contains units that are (i) phenotypically different from one another; (ii) these differences influence their fitness and (iii) fitness is heritable. A unit of selection is simply a member of such a population.

The above conceptualization of the unit of selection sounds straightforward. However, it has triggered a massive debate over the nature of the units of selection, because we could ascribe such properties to different types of entity in a population and so different units can be considered as a unit of selection: genes, groups, individual organisms, ecosystems, or even the whole planet Earth, computer viruses, or, as Lee Smolin once suggested, universes! Such diversity within the category of unit of selection led people to question whether all those units can be considered units of selection. The big question therefore arrived: what is the nature of *the* unit of selection? Maybe to be considered a unit of selection a given entity should have some other properties. Over the years many proposals have been put forward to solve this issue. The book *Units of Selection* by Javier Suárez and Elisabeth Lloyd attempts to provide a novel approach to this problem. Their master argument is to state that the concept of the unit of selection is polysemic i.e. it has multiple meanings. The authors call this project the “Disambiguating project”. If the authors are right, the disagreement about units of selection could be par-

tially solved by accepting that people refer to different aspects of reality when they refer to units of selection and that there are at least three different meanings of that concept. The paragraphs below summarize the content of each chapter, after which I present my thoughts on three selected issues.

The book starts with a short introduction that presents the master argument and the content of the book. It is followed by the first chapter of the book entitled: “What Is a Unit of Selection and How Can We Identify It? The Disambiguating and the Unitary Projects”. It focuses on introducing the debate about the units of selection and presents the outline of the author’s framework. They contrast their Disambiguating Project (DP) with Unitary Project (UP) (represented by people like Lewontin or Godfrey-Smith), according to which the concept of a unit of selection has one meaning. To defend their view, Suárez and Lloyd present three meanings of the concept of unit of selection in this chapter. The first meaning refers to *interactors*, which are units that interact with the environment in such a way that replication or reproduction is differential. The second is *manifestor of adaptation/type-1 agent*, which are units where a selection process has acted consistently over time resulting in the accretion of a new mechanism or new process not seen before in the lineage, that is, in a tinkering/engineering or trans-temporally accumulated adaptation. The third one is *Replicator/reproducer/reconstitutor*. These get differentially copied (replicator), differentially transmitted through material overlap (reproducer), or differentially recreated in the absence of copy or material overlap (reconstitutor) across generations.

The second chapter is entitled: “How the Expression ‘Units of Selection’ Acquired Its Polysemic Meaning or Why the Disambiguating Project Started”. This section is devoted partially to historical analysis and partially to taking a certain philosophical stance and developing it. In the first part of the chapter, the authors focus on presenting how the concept of a unit of selection has gained its polysemic character over decades. They start with presenting the UP tradition which they trace back to Lewontin’s famous recipe which I mentioned before. Then they suggest that DP tradition could be traced back to the work of David Hull and Richard Dawkins who developed vehicle/interactor and replicator frameworks to emphasize that in the debate on the units of selection are two important questions to be asked and so to approach them we need to rely on different categories. The authors take a creative approach to DP tradition and they suggest that it is a correct approach, but has to be enriched by another category to capture all important ques-

tions. Therefore, they introduce a third meaning of the unit of selection - manifestor of adaptation/type-1 agent, which the original framework of both Hull and Dawkins lacked. Finally, they discuss the relationship between UP and DP. Interestingly, they do not argue that the former has to be discarded. Rather they take a novel approach and state that there is a strong relationship of some sort between the two of them. Mainly, those units that DP traditions distinguish such as interactor or replicator refer to certain aspects of the classic recipe for natural selection. So it might be said that what DP does is to individuate certain units from the UP framework and explain their role in the process of natural selection

The third chapter, “Two Sources of Misunderstanding in Past and Today’s Debates about Units” focuses on defending the DP. The authors make two main claims. According to the first one, neglecting the polysemic character of the term ‘unit of selection’ is not profitable from the scientific perspective, because when scientists do research the units of selection, they might be interested in different aspects of the world so they define the concept of unit of selection accordingly. For instance, according to authors, researchers interested in constructing genetic models of the group selection type need to rely on both the concept of a unit of selection as an interactor and as a replicator to carry on their research, while researchers focusing on the study of adaptations consider manifestor of adaptation/type-1 agent as the main unit of selection and their research depends on it. The second claim they make is to state that neglecting DP in favor of UP on philosophical grounds comes from the failure to appreciate the real nature, goals, effectiveness, and research program of the former. Overall, as I understand that the authors make a strong epistemological point in favor of the DP tradition over UP, for as they put it themselves on p. 42: “In this sense, we demonstrate the value of the tripartite version of the DP as an epistemological and methodological framework of research questions to study the different type of functional roles or subprocesses that the action of natural selection in different contexts and under different circumstances can give rise to.”

The fourth chapter is entitled “The Framework of the Evolutionary Transitions in Individuality: A Challenge to the Disambiguating Project”. The chapter focuses on presenting how the DP could be used for the study of the evolutionary transition of individuality (ETI). ETI attempts to explain the emergence of new levels of reproductive hierarchy and tackles questions like how it happened that single cells capable of independent reproduction ‘merged’ into multicellular units that are capable of reproduction only as a whole. As the authors note, the DP seems to

be problematic for the ETI research program as the DP assumes the existence of the hierarchy of life, while ETI aims to explain its origin. The authors present problems that ETI poses for DP and how Griesemer and Godfrey-Smith tried to handle it. The former adopted DP but developed it by expanding the concept of replicator into the reproducer, while the latter rejected the DP and introduced the concept of the Darwinian individual as the only unit of selection. The authors then argue that it would be a mistake to discard the DP framework and reduce all questions about units of selection to questions about the evolution of the hierarchy of reproduction. Suárez and Lloyd show throughout the section that DP can be applied to study ETI and that there are many more questions about the unit of selection than ETI postulates, providing a rationale for the existence of the DP framework. The section is followed by conclusions.

I can move now to some of my thoughts about Suárez and Lloyd's book. Let me say that this book is an outstanding contribution to the debate on the units of selection by being a well-elaborated development of the DP framework in many different ways and it is a must-read for anyone interested in the subject. First of all, it makes a conceptual expansion. Traditionally DP was based on the distinction of vehicles/interactors and replicators as outlined in seminal works of Richard Dawkins and David Hull. However, throughout the book, the authors convincingly argue that there is a need to introduce another unit, namely, the manifestor of adaptation/type-1 agent, as in many cases it is necessary to make a distinction between interactors and manifestors of adaptation/type-1 agents. Therefore, the book marks a good case for the transition from a bipartite DP framework to a tripartite DP framework. It provides a much bigger, more nuanced, and more detailed framework for pluralists about the units of selection by showing that there is a need to introduce a third category.

The transition from a bipartite DP framework to a tripartite DP framework is not just based on the author's subjective view. Rather, their tripartite framework is based on careful analysis of scientific practice. Suárez and Lloyd review many research studies to understand what people mean under the term unit of selection. Based on that, they conclude that researchers are, actually, pluralists about the term and mean something different when they study adaptation and when they study how populations change over time. In other words, the term unit of selection is, according to the authors, deeply embedded in the scientific practice and has multiple meanings that depend on the scientific practice.

Another contribution of the authors to the debate about the nature of units which is especially worth mentioning is their analysis of very different concepts related to units of selection. In the last decades, many scholars tried to come up with their own concept to capture the very nature of the unit of selection. As a result, there is a plurality of concepts that are somehow related to evolution, somehow to the debate on units of selection, but there is a bit of chaos when we want to clearly understand the relationship between them. Just list a few: MLS1/MLS2, unit of cooperation, target of selection, fitness-centered models. Lloyd and Suárez undertook titanic work to analyze them and classify them in the context of the DP tripartite framework. They argued that each of those concepts that are in the scientific circulation could be reduced to one of the basic entities that are present in their framework: interactor, replicator/reproducer/reconstitution or manifestor of adaptation/type-1 agent. This an outstanding discovery as it shows that a lot of new concepts that have been developed in evolutionary biology seem to be just re-discovering the wheel. Therefore, I think a good piece of advice one can take from the book in question is to check whether the new concept you are developing is not just an old and good interactor but just defined with different words.

In the end, I want to move to the most controversial part of the work. The authors argue that we should be pluralists about the concept of the unit of selection because that's how scientists handle it in their daily research. On the one hand, philosophers who believe biology should base its ontology on scientific practice will be happy with this assumption, insofar as Suárez and Lloyd examine the scientific practice to understand how scientists understand the concept of the unit of selection and based on that provide a defense of the tripartite DP framework. On the other hand, those philosophers who are not very enthusiastic about grounding ontology in scientific practice would be less happy with the main message of the book. I think scientific practice should be taken into account when we think about the unit of selection, but should not be deciding. Scientists might be pluralists about the units of selection, but this does not mean that "mother nature" is itself necessarily pluralist too. I think there is some truth in the view of proponents of UP that authors criticize. I think a unit of selection is some sort of entity that possesses certain properties that make it visible for natural selection. The whole entity is selected, or it is not. And that's a unit of selection. I think that, ontologically, I am a monist. But I agree that pluralism might work for scientific practice. To sum up, I believe more discussion about the

ontological commitments would be welcome to understand whether the authors put divide between ontology and scientific practice.

Overall, I think this book is an excellent position for those who study the units of selection. It reviews the debates, classifies certain positions, and expands the classic framework. Even though I might disagree with authors about certain ontological commitments, I believe *Units of selection* will become an important part of the future discussion about the nature of evolution and units of selection. If you want to understand the nature of the debate, *Units of Selection* by Lloyd and Suárez is must-read for you.

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