Justin Garson, A Critical Overview of Biological Functions

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promoting more open immigration policies in rich Western countries that benefit from the resource trade. This reform would acknowledge the more short-term considerations of concrete individuals that are owed duties of justice. Furthermore, it would sidestep direct intervention in the internal affairs of countries that severely violate human rights.

Many of the possible worries to these policies are raised and addressed in the book: worries about measures or standards proposed (293); interference in internal affairs of regimes (294–295); compatibility with WTO rules (297), some negative effects on countries banned from trade and on worst-off in both export and import countries (298–300); readiness of people for change (300–302); effects on energy supplies for importing countries; climate change (302–305), and others. *Beyond Blood Oil: Philosophy, Policy and The Future*, published in 2018 presents some additional criticism and answers provided by Wenar. Even with these issues taken into account, this book is a great contribution to the field of international resource trade. It systemises considerable body of literature and gives detailed analysis of the current praxis, with special consideration given to the contextualising of and to historical perspective on the issues. Wenar's writing is clear, revealing and accessible both to professionals and general public. His moral argument is compelling, inviting, and is built on widely shared values. More just international trade system is not merely an ideal, but the goal we should strive for and work on, as Wenar is doing—not just by his careful and precise writing, but also by other more practical activities he engages in.

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Justin Garson, A Critical Overview of Biological Functions*, New York: Springer, 113 pp.*

In the book entitled *A Critical Overview of Biological Functions*, Justin Garson provides an accessible overview of the functions debate and delineates three canonical theories in the debate—the *selected effects theory*, the *fitness-contribution theory* and the *causal role theory*—and their specific ramifications, such as the *goal-contribution theory* and the *"weak" etiological theory*. In this critical overview, Garson also includes his preferred theory termed the *generalized selected effects theory*.

In the first chapter, entitled "What Is a Theory of Function Supposed to Do?", Garson emphasizes the important role that the notion of function plays in biology, philosophy, medicine, psychiatry, and ecology. An important philosophical task is to develop a theory which will best accommodate the notion of function in each of those disciplines. In line with this task, the author spells out three desiderata that every theory of biological function should satisfy. These desiderata are as follows: first, a theory should be able to distinguish a function of a trait from its accidental byproducts. For instance, "the function of my nose is to help me to breathe, but not to hold up my glasses, despite the fact that it does both and both are good for me, the latter is just a lucky accident." (4). Second, it should accommodate the explanatory dimension, i.e., "when we attribute a function to a trait, we purport to explain why the trait is there, that is, why organisms possess the

trait" (4). Third, the normative dimension of functional statements, that is, the logical possibility for a trait token to have a function that it cannot, in fact, perform (5). According to these desiderata, Garson evaluates prominent theories of biological functions.

In the second chapter, entitled "Goals and Functions", Garson starts with a historical overview of debates on the notions of purposefulness and goal-directedness related to the functioning of cybernetic machines in the 1920s and 1930s. He proceeds to the contemporary philosophical debates regarding biological functions that have started in the 1970s. In this chapter Garson provides an informative overview of theories preceding modern conceptualizations of biological functions, and lays out the foundation for following approaches, namely the selected effects theory, causal role theory, etc.

In the third chapter, entitled "Function and Selection", Garson examines selected effects theories. Here, the author shows how "the theory (*selected effects*) plausibly accounts for the explanatory and normative aspects of function" (33, italics added). The theory roughly states that a function of a trait is whatever it was selected for by natural selection or *some* natural process of selection. According to Garson, selected effects theory meets all three desiderata that the theory of functions should satisfy. Firstly, it can distinguish between a function and a lucky accident because a function of a trait is based on natural selection, hence it is not a mere accident. Secondly, this kind of theory provides an explanatory aspect of function because when one attributes a function to a trait, one offers a causal explanation for why the trait currently exists. Thirdly, a normative aspect of a function is met since a trait can *mal*function. In other words, it is possible for the trait not to perform its selected or "designed" function.

After laying out the main criticisms of the selected effects theory, Garson concludes this chapter with an exposition of his own preferred selected effects theory—the generalized selected effects theory. One of the important criticisms of the traditional selected effect views is that they do not apply to entities that do not reproduce. The generalized selected effects account can accommodate this problem. According to this view, entities can acquire functions in virtue of their differential persistence. To illustrate, Garson uses an example from neuroscience. He considers the formation of the mature synaptic structure of the human brain. Garson explains that formation of synapses and their pruning (which can be seen as a type of selection) can give rise to new functions in the brain even though there is no differential replication. According to Garson, the function of a trait consists in the activity that led to its differential *reinforcement* or its differential *reproduction* in a biological population. The first part of the definition of a generalized selected effects theory intends to cover various forms of processes of neural selection where there is no replication, and the second part of the definition covers the traditional part of the selected effects theory—natural selection (56–61). The third part of the definition, namely the one that refers to biological population, is meant to exclude some of the counterexamples for a selected effects theory (e.g. examples with clay crystals). Garson's own version of selected effects theory nicely addresses difficulties posed by critics towards the selected effects theory. By generalizing the definition, he tries to capture also the entities that do not reproduce, and by doing that, in a way, he advances the selected effect theory.

In the fourth chapter, entitled "Function and Fitness", Garson explains the fitness-contribution theory of function. He provides an overview of all the relevant theories that construe a function as a "contribution to the fitness of the organism that possesses it" (67). Some of the influential proponents of such a view are Christopher Boorse, Michael Ruse, and John Bigelow and Robert Pargetter. According to Garson, these theories can clearly meet only the first desideratum. We can distinguish between a function and an accidental effect since we can see the difference in the contribution of an effect on fitness (e.g. the function of the nose is to help us breathe and not hold up glasses because only the former effect is contributing to fitness, that is, it raises one's probability to survive and reproduce). However, Garson proceeds to claim that the second desideratum (the explanatory dimension) and the third desideratum (normativity) are not clearly met in the fitness-contribution theory of function.

In the fifth chapter, entitled "Function and Causal Roles", Garson discusses the causal role theories of biological functions. Garson explains: "According to this view, roughly, a function of a part of a system consists in its contribution to some system-level effect…" (81). The original causal role theory was developed by Robert Cummins. Cummins' causal role theory does not include a causal explanation of how a trait came about. For instance, it does not provide an explanation for the existence of a heart. Instead, causal role theory explains functions in terms of its contribution to a system in which it operates. Also, Cummins' view was further developed by Carl Craver and Paul Sheldon Davies. Their contribution to the development of the causal role theory includes utilizing the mechanistic framework to explain functions. Garson expounds two major problems for the causal role theory. The first problem is that the theory assigns a function to items that are intuitively non-functional. For instance, it is implausible to say that the function of a heart is to make beating sounds, but, proponents of the causal role theory must admit that in some contexts (depending on which effect of a trait we are interested in) this can be a function of the heart. The second problem is about distinguishing function and dysfunction. In some cases, causal role theory can ascribe a function to a trait that is clearly malfunctioning. For instance, if we are interested in how myelin degeneration causes paralysis, then on the present account, we would be forced to say that in this research context, myelin degeneration is functioning normally because it causes the effect under investigation (namely, paralysis).

Furthermore, Garson discusses function pluralism, which is motivated by the fact that biologists use both selected effects and causal role theories to assign functions to items, and, consequently, distinguishes two forms of pluralism. Function pluralism gained popularity due to its ability to capture different practices of ascribing functions. When biologists assign functions to items, in some cases they purport to causally explain why the item is there (selected effects theory), while in other cases, they purport to describe how the item contributes to a greater system (the causal role theory). Thus, according to pluralism, selected effects theory accommodates functions that are more prominent in evolutionary sciences (e.g. evolutionary biology) and the causal role theory captures functions in disciplines that do not rely on evolutionary explanations (e.g. physiology). This more "popular" version of pluralism Garson calls the *between-discipline* pluralism; different theories

of function are appropriate for different scientific disciplines. Garson also provides a new version of pluralism, the *within-discipline* pluralism. He emphasizes that it is possible that in one discipline scientists can use both theories in order to ascribe functions. For instance, even though a biologist does not explicitly appeal to selection when attributing functions to traits, she can do so implicitly. So, different concepts of a function can coexist within the same discipline, hence the name "within-discipline" pluralism.

In the sixth chapter, entitled "Alternative Accounts of Function", Garson expounds contemporary alternatives to classical theories of biological functions. Here Garson explains David Buller's "weak" etiological account, the family of systems-theoretic functions ("organizational view") and the modal theory of functions developed by Bence Nanay. Weak etiological theory defines function in terms of inheritance and past contribution of that function to fitness, thus, "a trait token in an organism has a function so long as that kind of trait contributed to the fitness of that organism's ancestor and it is inherited" (97). The family of systems-theoretic theories is "based on the idea that a trait token can acquire a function by virtue of the way that very token contributes to a complex, organized, system, and thereby to its own continued persistence, as a token." (97). The modal theory of functions says, roughly, that "the function of a trait token has to do with the behavior of that token in certain possible worlds." (97).

In the last chapter, entitled "Conclusion: What Next?", the author concludes the ideas developed in this book. Garson provides three main conclusions: (1) there are no viable alternatives to the selected effects theory since none other theory meets all desiderata; (2) if we accept pluralism it should be the "within-discipline" pluralism; and (3) he advocates his specific version of the selected effects theory—the generalized selected effects theory that is explained in the third chapter of the book.

To sum up, Garson's book provides a profound insight into the function debate. Through many informative examples, he illustrates and explains all relevant theories regarding biological function. In addition to explaining all three canonical theories and their misgivings, Garson also provides his own critical stance on the function debate, namely by introducing the generalized selected effects theory. His version of the selected effects theory is innovative in so far that it widens the scope of selected effects theory and, thus, provides new insights on the traditional debate. Garson's own approach belongs to the family of selected effects theories and, therefore, meets all the required desiderata that a biological function theory should meet. Furthermore, it should be emphasized that Garson introduces a new form of pluralism (the within-discipline pluralism) as a plausible position in the discussion about the nature of biological functions. Surely, this book provides a great impetus to philosophers and biologists to advance the debate on biological function.

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