

Review of André et al.'s *From Evolutionary Biology to Economics and Back: Parallels and Crossings between Economics and Evolution*. Cham: Springer, 2022, xi + 186 pp.

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Plenty of introductory books have explored the concepts and methods of evolutionary biology and economics (e.g., Sterelny & Griffiths 2012; Reiss 2013), but few have explored how those concepts and methods are shared and traded between the two disciplines. *From Evolutionary Biology to Economics and Back* helps fill this gap. The book's project, as one of its authors puts it, is to present a systematic study of the "economics/evolutionary biology interplay" that's marked much of the two disciplines' histories (2). All those oft-cited moments—from Darwin's inspired borrowings of Malthusian ideas to the interdisciplinary construction of evolutionary game theory—seemed to suggest deep similarities between the biological and economic domains and the ways in which researchers conceptualized each. Thanks to André et al.'s contribution, scholars now have an accessible introduction through which they can start to make sense of those similarities.

The authors anchor their study to a set of key concepts that both evolutionary biology and economics seem to share. The concepts are shared either in the sense of being picked out by the same linguistic term or in the sense of being made to serve similar functions in each discipline (2). 'Competition' is an example of concepts shared in the former sense. While in evolutionary biology it might refer to organisms' relative degree of success in securing finite opportunities for survival and reproduction (48), in economics it can refer to rivalrous situations in which different agents try to trade with the same market participants (50). 'Fitness' and 'utility' are examples of concepts shared in the latter sense. Though distinct, the two concepts play similar roles in predicting things like phenotypes and choices when subjected to some "maximization principle" (2).

A lexicon-like list of twenty-five of these concepts makes up the bulk of the book (chapter 3). Each entry presents the same concept twice. First, one of the book's authors describes the concept as it appears in its biological context, and then another describes it as it appears in its economic

context. After that, the two presentations are ‘synthesized’: their respective contents are compared and contrasted. The collection of syntheses emerging out of these presentations gives us a sense of how evolutionary biology and economics overlap and diverge conceptually.

The entry on ‘altruism’ can help illustrate how these concepts are presented (25–30). The concept is first described as it appears in evolutionary biology. There, it refers to the expression of characteristics that diminish an acting individual’s chances of reproductive success, their ‘fitness’ (93), but improve those of another. Its paradoxical nature—*how could natural selection ever favor altruism if it reduces the fitness of the individuals expressing it?*—and its theoretical explanation—*it can favor altruism when the costs incurred by altruistic individuals are offset by the benefits conferred to their genetic relatives*—are discussed. Clarifications and elaborations then follow.

The concept is then described as it appears in economics. ‘Altruism’, there, refers to the expression of ‘social preferences’ that preserve or improve other people’s well-being at the expense of an acting agent (28). The concept is important because it captures experimental subjects’ tendencies to deviate from the narrow, traditional conception of rational agents as self-interested egoists. This deviation has motivated a rich literature that models and tests hypotheses about the different patterns with which people express social preferences and behave altruistically (28–29).

The two presentations are then synthesized (29–30). The biological and economic concepts of altruism are shown to be similar in capturing self-sacrificial behavior that benefits others at the expense of an acting individual. But the kinds of sacrifices made and benefits conferred differ in each case. In evolutionary biology they are interpreted in terms of fitness, while in economics they are interpreted in terms of well-being. The concepts also raise different investigative questions in each discipline. In evolutionary biology the most salient questions are those concerned with the origin and evolution of altruism; in economics they are those concerned with how and when agents’ preferences deviate from those of a rational egoist.

The twenty-five entries do an excellent job introducing readers to complicated concepts. Whenever relevant, the authors disentangle common sources of confusion and point out prevailing disagreements. In the case of ‘adaptation’, for instance, the entry quickly distinguishes between four different concepts the term picks out, which are all too frequently conflated with one another (20–22). In the case of ‘information’, the entry

warns readers that, though popular, biologists' metaphorical talk of genes 'coding' for or otherwise carrying information about phenotypes has been criticized for being overly simplistic and misleading (105). With careful clarifications and qualifications like these, readers are assured they are in reliable hands as they are guided through the complex, conceptual terrain lying at the intersections of evolutionary biology and economics.

But how are the entries related to one another? In chapters 2 and 4—both written by Bernard Walliser—they are said to be related by way of analogies. Not only do many of the concepts themselves resemble one another in certain respects, as we have seen, but researchers have historically recognized the concepts' resemblances and have sought to leverage them in their investigations. Those researchers would note similarities in how certain biological and economic phenomena were conceptualized and would infer, heuristically, that some other biological and economic phenomena might be conceptualized similarly too. This sort of analogy-making is clearest in the development of 'universal Darwinism' (Dawkins 1983; Dennett 1995)—the view that entities in many non-biological domains, economics included, undergo the same processes of variation, selection, and inheritance as entities in the biological domain. It is on the basis of such an analogy that some researchers have inferred that firms and their routines evolve through a Darwinian process of social selection (e.g., Hodgson and Knudsen 2004, 2010).

In the first chapter on analogies (chapter 2), Walliser introduces a three-piece typology meant to capture the conceptual similarities between evolutionary biology and economics (8–14). The strongest analogies are 'integral'. They are grounded in the claim that models not only have "equivalent structure[s]" and "comparable interpretation[s]" but also apply to the same material domain (e.g., the biological domain) (8). 'Substantial' analogies are weaker. They are the sort of analogies grounded in the claim that models have equivalent structures and a likeness in interpretation, though they apply to distinct domains (e.g., the biological and economic domains). The weakest analogies are purely 'formal'. They are grounded only in the claim that models have equivalent structures, regardless of how they are interpreted or where they apply.

Walliser then uses this typology to examine how the concepts in the entries might be brought together to better understand the analogous ways in which biologists and economists conceptualize phenomena (chapter 4). He considers for instance how they conceptualize behavior—

of non-humans in the case of biologists, of humans in the case of economists. Both depict their entities as maximizing some ‘objective-function’ in the presence of some constraint (169). Here, the concept of ‘optimization’ (120–126), which essentially refers to this pattern of maximization, helps us capture an important formal analogy: both disciplines conceptualize their entities as exhibiting optimizing behavior.

Walliser also shows that we can make this analogy substantial if we consider the processes by which non-humans and humans come to behave optimally. Both non-humans and humans might be interpreted as engaging in comparable but ultimately distinct processes of deliberation. Walliser consults another concept—that of ‘trade-offs’, which designates an “area of possible combinations [of alternatives] and the solution” in this area that will be selected by the optimization procedure (58)—to clarify the similarities and differences between them. Though both biologists and economists might interpret their target entities as engaging in some kind of deliberation about trade-offs, Walliser tells us, biologists take their entities to be performing “mechanical responses to external stimuli” while economists take theirs to be making calculations on the basis of beliefs and preferences (169). With the concept of trade-offs in hand, we can make out a substantial analogy between the deliberations taking place in the separate domains of biology and economics.

Walliser’s application of this typology shows it to be a useful tool for classifying the analogous conceptual spaces of evolutionary biology and economics. But his use of it, at times, can be contentious. For example, he argues that “no integral analogy can be stated between biology and social science fields like economics because of the emergence of ‘thought’ during the evolution process” (171). This implies that humans and their economic affairs are just far too distinct to be conceptualized as belonging to the same domain as purely biological phenomena. As for universal Darwinism’s famous attempts at establishing integral analogies, Walliser writes that such attempts can only be “sustained [by making a] gross generalization which erases all the details” of relevant phenomena (15). Analogies lose their usefulness in cases like these because “they no longer [allow] the transfer of specific and testable properties” across contexts (15).

This is a harsh indictment of research programs that have been built around integral analogies. Hodgson and Knudsen’s (2010) brand of universal Darwinism—generalized Darwinism—is an obvious example of one such program. Like all universal Darwinists, Hodgson and Knudsen claim

that both biological and economic systems undergo processes of variation, selection, and inheritance. But there is more to their view than that. They argue that the fact that both kinds of systems undergo those processes implies that they belong to the same general domain: that of ‘complex population systems’ (26).

Walliser’s assessment of integral analogies would have us reject Hodgson and Knudsen’s program outright. But generalized Darwinism can be heuristically valuable (see also Reydon 2021). Some of its components have found productive use in fields like management studies (Becker 2019). Its focus on habits and routines as social ‘generative’ structures—i.e., as conditional mechanisms that turn environmental signals into ‘developmental instructions’ (Hodgson & Knudsen 2010, 113)—has especially helped researchers develop models of organizational routines (e.g., Pentland et al. 2012) and flesh out new ontological accounts of firms (e.g., Chassagnon 2014). Examples like these should give us pause: it is at least possible for integral analogies to be useful when researchers employ them creatively. We should not be so quick to dismiss them.

In the last chapter of the book (chapter 5), Johannes Martens concludes with an overview of the most recent interactions that have taken place between evolutionary biology and economics. He notes several trends: the mainstreaming of evolutionary game theory, the decline of evolutionary economics, and the rise of behavioral evolutionary economics. The historical and future progressions of those trends are sure to be treasure troves of insights for those looking to learn more about how biologists and economists leverage analogies, trade conceptual tools, and more broadly engage in interdisciplinary research.

On the whole, André et al. have done a wonderful job with this book. By mapping out key conceptual similarities and articulating useful notions of analogies, *From Evolutionary Biology to Economics and Back* equips readers to dive into the rich conceptual space that brings together biological and economic science. For new entrants looking to explore this space, I can think of no better introduction with which they might begin.

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