

BOOK REVIEW

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# Can the science of Prosocial be a part of evolution education?

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## Abstract

We provide a brief overview of *Prosocial: Using Evolutionary Science to Build Productive, Equitable, and Collaborative Groups* by Paul Atkins, David Sloan Wilson, and Steven Hayes. The book offers a range of promising content for evolution education, and yet also highlights core conceptual challenges in modern evolution science discourse that educators and researchers aiming to improve evolution education may find beneficial to strategically engage with as a scientific community. We discuss these challenges and opportunities with a view towards implications for evolution education research and practice.

**Keywords:** Human evolution, Cultural evolution, Multilevel selection theory, Tragedy of the commons, Cooperation

## Introduction

Evolutionary anthropologists often describe humans as an ultra-social primate, a highly cooperative species with elaborated capacities to work together at scales of social organization beyond our direct genetic relatives. Despite this scientific perspective, we face the practical reality that many of the modern world's greatest challenges, from climate change to sustaining global democracies, are the result of a failure to cooperate across multiple levels of societal organization. The book *Prosocial: Using Evolutionary Science to Build Productive, Equitable, and Collaborative Groups* by Atkins et al. (2019) offers a unique mix of evolutionary theory combined with practical tools for strengthening cooperation in groups, offering a perspective that may have relevance to the teaching of evolution in general education. This review provides a brief overview of the content of this recent work, and frames some considerations of the challenges and opportunities it presents to the evolution education community.

A note on terminology used in this review: the term “prosocial” refers to a highly general concept in the

evolution and human behavioral sciences. In this review the capitalized term *Prosocial* refers to the conceptual framework and applied research processes outlined in the book of the same name. This is to say, *Prosocial* is more than a book, it is also an applied research program and research community that builds on foundational perspectives from evolutionary theory. The *Prosocial* book is merely the latest form of communication to emerge from these efforts, and for these reasons we will use the term *Prosocial* somewhat interchangeably to refer to both the content of the book and conceptual framework it seeks to communicate.

The *Prosocial* book is divided into two parts. Part one offers a conceptual clarification of how evolutionary theory relates to the everyday cooperation dynamics that modern humans live within. Part two then provides more detailed insights into a set of practical tools and principles for the analysis and influence of cooperation within modern human groups. The aim of this review, more than providing a short summary of the content, is to reflect on the potential relevance of the conceptualization of evolution science for evolution education. Thus, the following content summaries are intended only to contextualize the broader review.

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## Part 1: Concepts and principles

The first part of the book provides a very readable overview of the historical and conceptual issues that underpin the Prosocial methods. As will be discussed further in the concluding section of this review, the theoretical basis of Prosocial offers some unique challenges and opportunities for the evolution education community. The summary here will provide a roadmap to the relevant issues discussed further below in the section on relevance to evolution education.

### Multilevel and multidimensional evolution

The authors have adopted and articulated a very specific conception of evolution that may require some translation and reflection for many in the field of evolution education. Drawing on diverse yet interrelated fields of evolutionary anthropology, organizational psychology, and contextual behavioral sciences, *Prosocial* integrates current theoretical developments in both biological evolution and cultural evolution. This is framed as a multilevel and multidimensional approach to evolutionary analysis (Atkins et al. 2019, p. 10).

By multilevel, the authors mean that evolutionary processes occur at multiple scales of biological and socio-cultural organization, from the genome to multi-group populations. This perspective suggests that evolutionary analyses must therefore include tools for identifying and weighing which levels are most relevant within a particular context. This perspective is mostly derived from David Sloan Wilson's work advancing Multilevel Selection Theory as a particular accounting scheme for previous conceptions of group selection, kin selection, and related approaches that aim, among others, to explain the existence of altruistic or prosocial behaviors in the biological world (Atkins et al. 2019, p. 12). Evolution educators familiar with the group selection controversy may find this book lacking an extensively detailed discussion of the conceptual issues underlying such on-going discourse. However, the authors do include an accurate if concise narrative of the history of such thinking from Darwin through today's formalized models, and use research examples to accessibly illustrate this otherwise complex theoretical construct of key importance to evolutionary theory.

Where multilevel evolution expands our conception of selection, the authors argue that a multidimensional perspective can expand our notions of inheritance. Often in evolution education we make a sharp dichotomy between gene and environment, with heritable genetic information being selected by environmental conditions. This is not inaccurate, but only incomplete (Atkins et al. 2019, p. 16). Building on work from evolutionary biologists within the broader discourse on the Extended Evolutionary

Synthesis (c.f. Jablonka and Lamb 2006; Uller and Laland 2019), the authors argue that well-rounded evolutionary analyses should account for the interactions among multiple streams of inheritance; genetic and epigenetic, as well as individual and cultural learning. The authors take aim at more traditional gene-centric models of evolutionary change in which evolutionary change is reduced to change in gene frequency, rather than trait frequency. This is a potentially contentious stance for the evolution education community which we take up in the concluding section of this review.

### Homo economicus and the tragedy of the commons

Shifting from foundational biological sciences into more interdisciplinary thinking about socio-economic organization of human societies, the authors bring in several core concepts that are equally contentious in mainstream social science discourse and yet are likely to be of central importance for teachers and students wishing to develop a coherent conception of how our understanding of the human condition relates to how we shape our societies and cultures.

In chapter two, the story of Elinor Ostrom, the first woman to win the Nobel Prize in economics, is presented with the broader history of the *Tragedy of the Commons* and economic models of human behavior. Through cross-cultural studies and a multiple methods approach (see Poteete et al. 2010), Ostrom and colleagues demonstrated that humans do have the capacity for sustainable, democratic governance of shared natural resources (i.e. common-pool resources), but only under certain conditions. Ostrom's model revealed eight *Core Design Principles* (see Fig. 1) for which groups that are successful in managing shared resources tend to have developed effective mechanisms for their implementation.

The authors reflect on Ostrom's work in comparison with the out of date economic model of human behavior often called *Homo economicus*, describing the *rational economic man*, as if he were a species in his own right (Atkins et al. 2019, p. 26). *Homo economicus* is self-interested and calculates his behavior around this self-interest, whereas *Homo sapiens*, it is pointed out, acts much more like the actors within the common-pool resource contexts that Ostrom studied. The implications of these two models of human behavior is significant in current human science discourse, and may be equally significant for the aims and concepts framed under evolution education.

### Evolution and behavioral sciences

This part of the book concludes with a deeper dive into core concepts linking evolution and behavioral sciences. For educators or academics who may think of

Within Group Cooperation	<b>1 Clear group identity and shared sense of purpose</b> It is clear who belongs to a group, and all members have a shared sense of common goals and identity.
	<b>2 Fair distribution of costs and benefits</b> The costs incurred by members for cooperation are distributed in proportion to their benefits from the cooperation.
	<b>3 Inclusive decision-making</b> Most individuals in the group can participate in decisions that affect them, set or change the rules of the game.
	<b>4 Monitoring progress towards goals</b> The community observes and monitors whether everyone behaves according to the rules, and to what degree common goals are achieved.
	<b>5 Appropriate feedback to helpful and unhelpful behavior</b> Rewards for valued behaviors and punishments for misbehaviors start at a low level (e.g. friendly discussion), and are increased in proportion to how helpful or unhelpful the behavior is.
	<b>6 Fast and fair conflict resolution</b> The group has mechanisms for resolving of conflicts among members or with other groups in ways that are fast (efficient) and perceived as fair by those involved.
Between Group Cooperation	<b>7 Recognition of group and member autonomy</b> The group has a minimum of rights and the freedom to set its own rules, recognizing the autonomy of individuals or sub-groups within the larger unit in relation to different spheres of shared interests.
	<b>8 Appropriate relations with other groups</b> Groups exist on many nested levels, with appropriate relations between levels of organization. Principles 1-7 apply to every scale of human social organization.

**Fig. 1** Core Design Principles for the Cooperation of Groups (adapted from Atkins et al. 2019)

“behaviorism” as an outdated science focused on coercive manipulation of rats in cages, the section offers a novel and more nuanced view into current thinking in the behavioral sciences. Far from coercive, the authors frame the emerging perspectives from the ‘third wave’ of behavioral science as a view of humans firmly grounded in evolutionary anthropology and focused on our species’ elaborated capacity for enlarging the scale of social

cooperation through psychological flexibility in relation to identified values, at both the individual and small group levels of organization.

## Part 2: Prosocial methods

This section builds on the theoretical perspectives from part one and offers more detailed insights and practical tools to engage real-world groups in reflective analysis

and collaborative design of the social dynamics in their own groups.

### Tools for psychological flexibility

The section begins by going into depth on the practical use of the *Prosocial Matrix* (Fig. 2), a tool for individuals and groups to notice and reflect on values and the behavioral variations that move us toward or away from these identified values. Importantly, this tool is grounded in foundational perspectives on the evolutionary origins of organismal behavior (see LeDoux 2019 for a current discussion from a congruent perspective), as well as the evolution of humans as a species with an elaborated capacity for symbolic verbal behaviors (Polk et al 2016). As the authors describe, “All animals will move toward food, warmth, and other experiences that sustain life and away from experiences of danger and pain that threaten life. Humans are no different in that respect, except that language and cognition make these toward and away processes much more complex” (Atkins et al. 2019, p. 74). The Prosocial Matrix is a tool that helps individuals and groups to reflect on their everyday experience in light of that complexity. The Prosocial Matrix is a tool that is in use in social-emotional learning programs in schools around the world, yet students are unlikely to get academic instruction on the evolution science that underpins this tool for cultivating psychological flexibility.

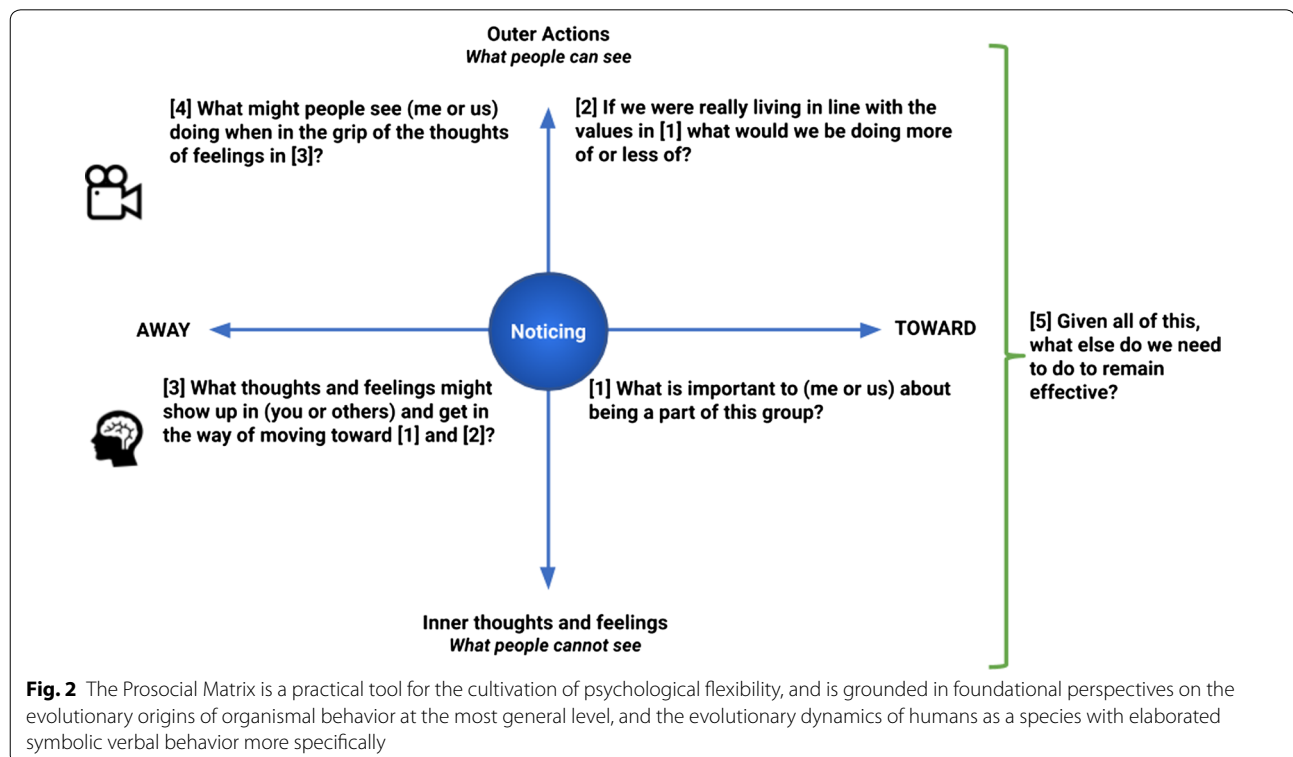
As will be discussed in the final section of this review, whether evolution educators will agree on exactly how evolution science provides a scientific foundation for the Prosocial Matrix remains a very open question.

### Evolving effective core design principles

Having outlined the basic toolkit for cultivating psychological flexibility, the authors take a deeper dive into each of the eight *Core Design Principles* generalized from the work of Elinor Ostrom. These sections include a wealth of interdisciplinary research in the human sciences that inform the relationship between the human universal aspects of the core design principles, and the expected cultural diversity found in communities around the world. This relationship between what may be universal to humans, and where healthy diversity can be expected in human behavior, cognition, and culture, is key to understanding the evolution of humans as an ultra-social primate. In this way, the explorations of each principle provide a well-rounded overview of key aspects of human behavior, cognition, and culture that have been important drivers over our phylogenetic history and are equally relevant for our everyday lives in modern society.

### A better world is possible?

Some in the evolution education world may bristle at the notion of using evolutionary theory to strengthen





cooperation within and between communities, yet many may still appreciate the concluding call to action from the authors for moving towards “the more beautiful world our hearts know is possible” (Eisenstein 2013). Here, the authors sketch the future of the Prosocial research program and invite the readers to take an active role in using the science and practices outlined in the book to strengthen the communities we care most about. Whether evolution science ultimately can contribute making the world a better place is the question we argue evolution education should better engage with.

### Considerations for evolution educators and education researchers

As Leigh Jr. (2019) points out in his review of David Sloan Wilson’s other recent book, *This View of Life: Completing the Darwinian Revolution*, some of Wilson’s language and claims regarding the causes and future of human cooperation may strike some readers as unhelpful or even incorrect. Leigh’s criticisms are well founded, and indeed Wilson has a strong contingent of both supporters and detractors across evolutionary biology and the human sciences. Our point here is not to take sides for or against Wilson’s view of evolution, simply to advocate that the existence of controversy at the level of respected scientific communities should not block the potential for productive discourse around the core conceptual claims as they pertain to evolution education. A full treatment of the educational implications of *Prosocial* is beyond the scope of this short review. Instead, we wish to highlight two questions we see as central to the value this work could offer educators and researchers in our field.

We argue that *Prosocial* opens questions that are currently under-addressed within evolution education discourse, and that working to engage current scientific discourse in these areas could strengthen the capacity to teach evolution as an interdisciplinary science relevant to the lives of students and school communities more globally. Specifically, engaging *Prosocial* within the evolution classroom requires addressing questions about the multi-level and multidimensional models of evolution utilized in this research program. Secondly, evolution education requires further clarification as to the appropriateness and the role of human behavior as subject matter within the evolution curriculum. Here, we do not intend to provide answers, rather only to frame questions for further exploration.

#### What is at the center of evolutionary analysis?

The multilevel and multidimensional view of evolution offered within *Prosocial* reflects a particular line of thinking steeped in historical debates about causation in biology and the relationship between biology, cognition, and

culture in the causes of human behavior. Again, it is far beyond the scope of this article to resolve or even explore with any depth the nuances of this discourse, rather we aim to offer a frame for the potential value of deeper discussion within the evolution education community on these issues.

*Prosocial* frames a clear contrast between gene-centered individualistic views of evolution and the multilevel multidimensional model adopted by the authors. While these models remain the subject of debate among the evolution and human sciences, they are not fringe theories, and their relative prominence at the level of scientific discourse (c.f. Jablonka and Lamb 2006; Uller and Laland 2019) compared with evolution education discourse (c.f. Deniz and Borgerding 2018) is worth noting. Put simply, these concepts reflect a significant scientific discourse in evolutionary biology and anthropology that is barely, if at all, engaged within the evolution education community.

The implications of this disconnect are not merely theoretical, but also practical. While it could seem reasonable to believe we should ‘start with the basics’ and therefore, “teach genetics first” (Mead et al. 2017), in fact the evidence is less than clear on this (c.f. Buchan et al. 2019), especially given the curriculum level directive to teach evolution early and often (c.f. Kelemen et al. 2014; EvoKids 2015), and the science behind *Prosocial* may suggest other logical possibilities. *Prosocial* has been used in school professional development efforts in Australia, including among primary school educators adapting the core design principles into democratic classroom management tools for students. Such early work suggests the appropriateness of engaging students in reflecting on the behavioral and cultural variation that pervades their everyday lives, and provides a logical developmental pathway for conceptual understanding of more complex and evolutionary causal models of such everyday experiences. Our own efforts in international teacher development and curriculum design have offered early suggestions for Design-Based Implementation Research in this direction (Hanisch and Eirdosh 2019), but far more work is needed. Engaging the details of both conceptual clarification and teaching materials development will first require more clarity within the evolution education community on the role of human behavior as subject matter within the evolution curriculum.

#### Is human behavior a practical focus for evolution education?

Human behaviors, especially the kinds of social behaviors explored within *Prosocial*, are at the center of our everyday experience as humans, and have been key

drivers of evolutionary change over our phylogenetic history. How students develop an understanding of the diversity of the human condition and our relative capacities of open-ended flexible adaptation to novel conditions is likely to be influential on their broader views of social organization and public policies affecting the sustainability of our species and the planet as we know it. The relevance of engaging students in scientific perspectives on human behavior is not so much in doubt, as much as there is simply a dearth of well-designed teaching tools or communities of practice focused on doing so within the context of evolution education (c.f. Eirdosh and Hanisch 2019; Hanisch and Eirdosh 2019). This is, in part, due to the complex historical, and current, sociology of scientific understandings or beliefs about the theoretical space for integrating evolutionary biology and human behavior (Wilson 2015). Prosocial situates itself within a very specific part of this theoretical space, as a knowledge synthesis project bridging evolutionary anthropology and multiple fields of applied behavioral sciences (Atkins et al. 2019). For some, this direction may appear highly problematic given the history of so-called “social darwinism” and popular conceptions of behavioral science as a tool of top-down or coercive control. In contrast, Prosocial is oriented around a reflection on human values from the individual to global levels and focuses on resolving potential conflicts between individual and collective interest at each level of organization. As Leigh Jr. (2019) points out, readers may view Wilson’s core metaphor of a “multicellular society” as implying that individuals should become mere cogs in a larger machine, yet Prosocial makes clear that the intended transfer from this metaphor is the relative scope of lower level autonomy and higher level coordination around multiple spheres of shared interests. It is precisely this apparent conflict, between autonomy and coordination, individual and collective interests, that Prosocial provides tools for resolving and reflecting upon within a coherent body of evolutionary theory that is informed by current perspectives across the human sciences. For example, the notion that cooperation necessarily must come at the expense of individual interests and autonomy can be seen to imply a *zero-sum* mindset, rather than an understanding that social interactions can be, and for humans often are, *non-zero-sum* in nature (see e.g. Wright 2000), whereby the fate and interests of individuals in a group are aligned rather than opposed to each other. Against this view, the Wilsonian metaphor of a ‘multicellular society’ is about the need and potential to resolve these dialectical tensions

rather than a suggestion to make individual interests wholly subservient to the society.

## Conclusion

We suggest that while legitimate theoretical differences exist between gene-centered individualistic accounts of evolutionary change and the multilevel multidimensional accounts of Prosocial, the relevance to students’ everyday lives and potential for productive clarification of core concepts in the evolution science curriculum indicate a strong potential for valuable engagement with these models of social change.

*Prosocial* is not a panacea for all the world’s problems, but it does offer a range of practical tools grounded in a uniquely structured theoretical framework that aims to bridge current discourse in evolutionary biology and interdisciplinary human sciences. For this aim, the authors have done a laudable job at clearly communicating both the theory and practice of this applied research program. If and how the evolution education community can engage this work remains a very open question, yet we suggest there may be significant opportunity in doing so.

## Acknowledgements

We thank the members of the Prosocial research network for the development of a novel method for improving human cooperation rooted in evolution science.

## Authors’ contributions

The first author took the lead in the development of the manuscript, the second author provided substantive revisions and conceptual improvements. All authors read and approved the final manuscript.

## Funding

The authors received no funding for the classroom interventions reported in this manuscript nor for the preparation of the manuscript.

## Availability of data and materials

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

Received: 11 February 2020 Accepted: 6 March 2020

Published online: 26 March 2020

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