Evolutionary social science needs programmatic training in how models work

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Evolutionary processes have been—and continue to be—fundamental in shaping our minds, our behaviors, and our cultures. Evolutionary thinking is therefore essential for a complete science of human behavior, and evolutionary social scientists have reason to feel pride in adopting an approach that explicitly engages with an understanding of humans as a biologically and culturally evolved species. Barrett makes an excellent case for why we shouldn't get too cocky, though. Social science is both historically young and tackling systems of immense complexity. As the field coalesces into one guided by increasingly standardized institutions, we should be wary of getting trapped on a local maximum on the fitness landscape of scientific approaches. Slowing down and loosening up seem like good recommendations.

I want to focus on the problem of *theory worship*---the uncritical adoption of theory. In psychology and related fields, there have been increasing calls for more focus on formal theory (Gigerenzer 1998; Jolly & Chang 2019; Muthukrishna & Henrich 2019; Smaldino 2019; Gervais 2020; van Rooij & Baggio 2020). The evolutionary social sciences have been ahead of the curve, adopting cumulative theoretical frameworks that build on Darwinian principles such as behavioral ecology and dual inheritance theory. Yet we risk canonizing particular theories, and the sorts of research questions they implicitly emphasize, at the cost of excluding alternative theoretical lenses. We risk making a mistake similar to one made by twentieth-century economics, which for decades lionized models based on unscrutinized, impossible assumptions about human behavior and cognition (Thaler 2015). Barrett is right to call attention to these problems. It is my goal here to briefly lay out what I think is the best way to alleviate them.

The solution, I think, comes from separating a reverence for *theory*, which serves as a necessary guide to any good empirical research program, from a reverence for *specific* theories, which can blind us to the implicit assumptions those theories make and the limit the ways in which we parse the world.

We need theory, which in the best scenarios is integrated with formal modeling. We therefore need our disciplinary education to include training in models. The problems Barrett highlights arise when theories become canonized into the core dogma of a field. One of two things usually arises from such a canonization. Either people dismiss models out of hand for being unrealistic or for failing to accommodate assumptions they deem important, or they stick tenaciously to an overly broad interpretation of the models' conclusions. Neither outcome is epistemically optimal.

I propose that training in the evolutionary social science should include not only education *about* the classic models that form some the field's core foundations—including, but not

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limited to models of altruism, foraging, social learning, and signaling—but also education on *how to model.* We need a philosophically-informed training program in which burgeoning evolutionary social scientists come to understand what models do and how they work. Where practitioners not only understand how the classic models work and what they show, but understand how models *in general* work to formalize assumptions and examine the consequences thereof. Where practitioners understand the classic theories but also learn how to incorporate their own ideas to extend and even supplant those theories. I propose that this is how we get to what Barrett calls *theoretical openness.* Doing so might even shorten the cycle between normal and revolutionary science in the Kuhnian sense, by allowing theory to turn over more regularly, thereby accelerating the pace of innovation.

The road to such a training program becoming widespread is a probably a long one, and the relevant infrastructure for it is still being built (Muthukrishna & Henrich 2019; Smaldino 2017; 2019; 2020a). But loosening up our approach to formal theory can only be done properly within a field that is deeply comfortable with models.

Consider Barrett's question about whether "our theories might be biasing us to look at only some aspects of human nature, and perhaps to look at them in ways that lead to a skewed or incomplete understanding." Mature theories are built around formal models, and models necessarily bias our thinking in just the way implied by the Einstein quotation in the epigraph of Barrett's essay: "It is the theory which decides what we can observe." This is because a model is, at its core, a particular way of slicing up a system into a set of parts and relationships. There is no one right way to do this, only ways that are better or worse at helping us answer particular questions (Kauffman 1971; Smaldino 2020b). Getting stuck on one set of models necessarily restricts our ability to look at the world in other ways. The solution is not to eschew models, but to become ecumenical in our approach to models.

Finally, the charge to "loosen up" our approach to theory in evolutionary social science should come with a caveat. The old ways carry valuable lessons, and we shouldn't ignore them. There are also potential benefits to the coordination that having a shared theoretical foundation facilitates. The ability to rely on colleagues to have certain background training can allow for the development of specialized language, rapid convergence on well-defined problems, and faster progress in solving those problems. The path forward is therefore likely to be a middle path that runs in between reverence for canon on one side and boundless exploration on the other.

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