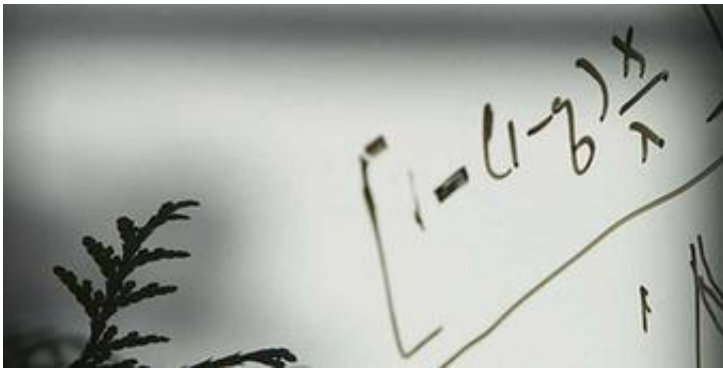


# The utility of mathematical models in evolutionary biology

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Despite their important role as "proof-of-concept" tests in evolutionary research, mathematical models are commonly misunderstood in the biology research community.

In PLoS Biology, a paper co-authored by SFI Omidyar Fellow Caitlin Stern and former Omidyar Fellow Jeremy Van Cleve explores the role of mathematical modeling in [evolutionary biology](#).

The role of abstract mathematical models, they argue, is to test the logical validity of verbal hypotheses. These hypotheses have long been used in evolutionary biology to describe processes that operate across varied species and long timescales—Darwin's theory of natural selection is the best-known example.

The authors argue that mathematically framing a verbal model helps clarify the initial assumptions and offers an opportunity for critical analysis of the model's logical results. They also maintain that a rigorous analysis by a [mathematical model](#) can test a verbal hypothesis just as well as an elegant experiment. The paper describes significant contributions mathematical models have made to understanding sex and speciation, and also addresses some common criticisms proof-of-concept models receive, such as how they can be "empirically tested."

Because evolutionary biology studies complex processes occurring over long time scales, breakthroughs in the field often require an "all hands on deck" approach that combines observation, experiment, and mathematical modeling, the authors write. It is imperative that researchers understand the scope and purpose of mathematical models, which are becoming ever-more integral to the scientific method, they say.

**More information:** Servedio MR, Brandvain Y, Dhole S, Fitzpatrick CL, Goldberg EE, et al. (2014) "Not Just a Theory—The Utility of Mathematical Models in Evolutionary Biology." *PLoS Biol* 12(12): e1002017. [DOI: 10.1371/journal.pbio.1002017](https://doi.org/10.1371/journal.pbio.1002017)

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