

Cultural Evolution Not the Same as Biological Evolution

By Brandon Keim  January 05, 2009 | 6:33:43 PM Categories: [Evolution](#)

Evolution may take place at many different scales — and it may work differently in every one.

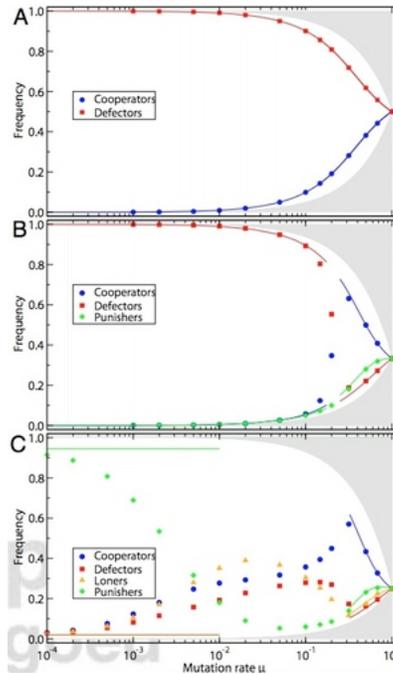
In biology, for instance, mutation and selection take place at the level of genes and organisms. But while cultural evolution also occurs at the individual level, the unit of selection — behavior — seems more susceptible to drastic change than a gene.

"In cultural evolution, small mutation rates are not the right choice," said Arne Traulsen, an evolutionary game theorist at the Max Planck Institute for Evolutionary Biology.

In a paper published Monday in the *Proceedings of the National Academy of Sciences*, Traulsen and colleagues modeled the effects of mutational variance in a standard game-theory model where individuals can be part of a community, steal from that community, or punish the thieves.

Most models of behavioral evolution, said Traulsen, assume that individuals will imitate their successful neighbors, with a minor allowance made for random variation — the cultural equivalent of heredity with minor mutations.

But in reality, people are unpredictable, prone to whimsical explorations and rash, seemingly irrational decisions. And when Traulsen reduced imitation and increased randomness, his simulations produced different end-states, with cooperation finally triumphing over thievery.



These results are not important to predicting human behavior, said Traulsen, but underscore the importance of selection parameters to outcomes in the still-embryonic science of cultural evolution.

"Genetic evolution as we see it in biology is only one aspect of evolution," he said. "Taking a genetic approach and putting it onto cultural evolution and saying the mathematics are the same is not smart."

But the field is still so ambiguous and sketchily understood — entomologist Paul Ehrlich's [chronicling of Polynesian canoe designs](#) was the first rigorous description of cultural evolution — that Traulsen's conclusions are highly tentative.

"It's possible that the mechanisms might differ, but it's just a gut feeling," said Manfred Milinski, a Max Planck Institute evolutionary biologist and cooperation theorist who was not involved in the research. "This is a great area, which will be harvested in coming years. There are many people who think that most of our behavior has come about from cultural evolution."

Citation: "Exploration dynamics in evolutionary games." By Arne Traulsen, Christoph Hauert, Hannelore Brandt, Martin A. Nowak, and Karl Sigmund. Proceedings of the National Academy of Sciences, Jan. 5, 2009.

Image: PNAS

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