Social Simulation and Explaining Religion

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Outline

• Modelling and Simulation in Scientific Explanation

• Examples of Evidence from ABM Pertaining to Religion
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Explanation in Science

• Science never gives perfect certainty.

• Approach the truth by showing which explanations (theories) are more likely.
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  • Approach the truth by showing which explanations (theories) are more likely.

• Biology: all explanation rooted in evolution.
  • Ultimate: why nature selects a trait.
  • Proximate: how a trait works.
Simulations as Scientific Explanation

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- Thesis specified so completely it can be run on a computer.
- Consequences of model assessed by sampling.
- Model behaviour compared to target system’s using standard hypothesis testing.

Simulations as Good Science

• The output of a model is not data about the world!

• Data about the hypothesis.

• Predictions of the hypothesis.

Modelling as Science

• Simulations are one form of modelling.

• Other forms of modelling have been around longer, e.g. differential equations.

• Excellent text on this: Kokko (2007), Modelling for Field Biologists, CUP.

• “We use models because our brains aren’t big enough to understand all the consequences of our theories.”
Agent-Based Modelling

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• See if the consequences of individuals acting in an environment are what you predicted.
• (Examples later.)
Science with ABM

• As with any theory, be as general as you can be and still get the behavior you are trying to explain.

• If two models both predict data equally well, the simplest model wins.
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  - In fact, may start at level of intuition, then simplify.
- “If two models both predict data equally well, the simplest model wins.”
  - Simplicity/accuracy tradeoff can be tricky.
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“If two models both predict data equally well, the simplest model wins.”

Simplicity/accuracy tradeoff can be tricky.
• If you match the world in more ways than you predicted, then this is convergent evidence for your theory.

• Just trying to build the model may make you realise there were things you didn’t know about your target system.

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The altruistic communication of knowledge is adaptive...

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- Some prevalent traits of religion may address this problem, e.g. oscillations.

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- Population density may be a proximate explanation for religion.

• Future rewards are less certain so we tend to discount them, even if they would be great.

• If future generations share our evolved traits, we should discount social rewards less (Sozou 2009).

• Ancestor worship may facilitate a concern for successful descendants.

...and of considering future generations.

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Ultimate explanation for ancestor worship: it’s a proximate mechanism for increasing inclusive fitness.

Summary

• Science is about finding the most likely explanation.

• Simulations check the logical consequences of explanations; they provide data about theories (not the world).

• Simulations support a theory by demonstrating its mechanisms, and provide predictions that can be tested against data.
• Data about patterns of variation in religious ritual across cultures.

• Experimental evidence for explaining some of these patterns.

• More detailed descriptions of simulations accounting for the evolution of these patterns.