Modelling Handedness as a Function of Cooperation and Competition

Or: How I Learned to Bow Down to My Left-Handed Overlords

Meridith Bartley John Ensley

Department of Statistics
The Pennsylvania State University

STAT 590 Presentation, December 2, 2014

PENNSTATE

Outline

History of Handedness

- 10% of population is left-handed.
- Why hasn't this percentage reached equilibrium in populations at either:
  - 50%-50% between left and right-handedness
  - 100% either left or right handed
  - Some other handedness ratio
- This paper proposes that hand preference may be influenced by costs and benefits of cooperation and competition during human evolution.

Building the Model

- We want to model l, the proportion of lefties, over time

$$\frac{dl}{dt} = (1 - l)P_{RL}(l) - lP_{LR}(l)$$

- Assume P_{RL} and P_{LR} are symmetric

$$\frac{dl}{dt} = (1 - l)P_{RL}(l) - lP_{RL}(1 - l) \tag{1}$$

- Break $P_{RL}(l)$ into increasing and decreasing components

$$P_{RL}(l) = cP_{RL}^{\text{coop}}(l) + (1 - c)P_{RL}^{\text{comp}}(l) \tag{2}$$

Video

Summary

- The first main message of your talk in one or two lines.
- The second main message of your talk in one or two lines.
- Perhaps a third message, but not more than that.

- Outlook
  - Something you haven't solved.
  - Something else you haven't solved.

For Further Reading I


A. Author.
Handbook of Everything.
Some Press, 1990.


S. Someone.
On this and that.
Journal of This and That, 2(1):50–100, 2000.