How Can Theoretical Computer Science Inform Social Computing?

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Why Should TCS Impact Social Computing?

- Social Computing: Any computational system with a human in the loop
- Computer science enabled the building of modern social computing systems
  - e.g. Facebook, Twitter, Stack Overflow, …
  - To build better systems we need to understand how humans behave in these systems
- Have the opportunity to study human behavior at unprecedented scale and contribute to social science

Theoretical Computer Science: Competitive Advantage

- Theoretical computer scientists are really good at modeling
  - Value of regularization, parsimony
  - Out of sample prediction
  - Model comparison
  - e.g. Leyton-Brown & Wright

- Proposal: Use modeling prowess to impact social computing

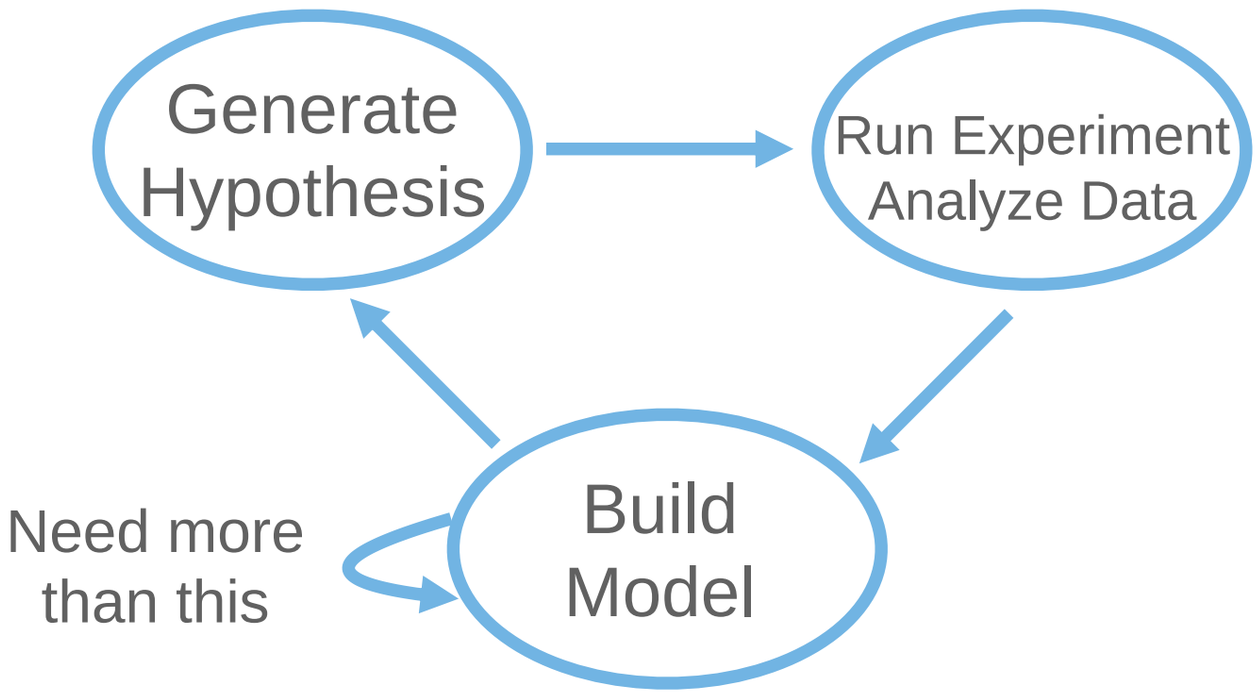
Why Build Models?

- What is the value of modeling?
  - To generalize, to abstract, to simplify
  - To make predictions

- Process models can be used to make predictions in settings that are difficult to experiment
  - Concussions
  - Rajiv Sethi’s work on crime & race

A Proposed Goal

- Goal: Build valid and generalizable models of human behavior in social systems
- How?
  - Broaden the scope of what theorists consider their work



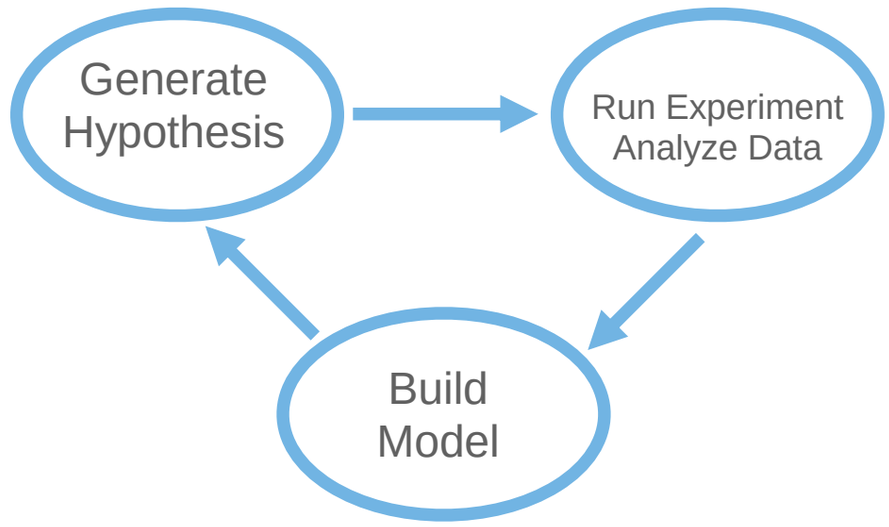
Where Has this Approach Helped in the Past?

- David Reiley:
  - Theory said two types of auctions are supposed to be revenue equivalent.
  - An experiment showed they were not.

- Mason & Watts:
  - Two opposing theories on how to arrange agent based models in a network to find the peak of a fitness landscape
  - Experiments showed which theory was correct

Open Directions

- Areas to apply
  - Cooperation, reciprocity, trust
  - Human learning in games
  - Biases, heuristics
  - Emergent Dynamics
  - Complex Problem Solving



Conclusion

- If the goal is to develop valid and generalizable models of human behavior
- Need to broaden the scope of our work
  - Use data analysis and experimentation to verify model assumptions and model predictions