



**DELIS**

Dynamically Evolving, Large-scale Information Systems



# You are all social scientists: you just don't know it yet

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SASO 2007, Cambridge. Mass.



Information Society  
Technologies



- Lot work in SASO draws on “biological inspiration”
- Less claims “social inspiration”
- Yet many of the problems we are addressing are strongly related to highly researched topics within the social sciences:
  - Tragedy of the commons (free riding, fairness)
  - Emergent Social networks
  - Exchange of resources
  - Maintaining robust and functional social structures
  - Micro-Macro AND Macro-Micro link
- Even more interestingly, many social scientists are using (agent-based) simulation to express their theories
- These guys are producing distributed self-organising algorithms!
- If you have stereotypes and prejudices about social “science” then maybe it’s time to put them aside and take a look at this new so-called “computational social science”



- BitTorrent very widely deployed p2p filesharing protocol (10m's)
- Estimates suggest large proportion of internet traffic is BT
- Employs tit-for-tat (TFT) approach to produce sharing incentives
- Original designer of BT (Brahm Cohen) cites work by Robert Axelrod (Michigan) directly as inspiration
- Axelrod is a *Political Scientist* who ran a computer tournament in the early 80's asking people to send him algorithms that implemented strategies in a simple game that captures notions of cooperative interactions (the Prisoner's Dilemma)
- The winner of those tournaments was TFT
- Axelrod wrote a book "the evolution of cooperation" discussing the results of the tournaments and their implications for *social systems* – including a theory of how "peace" broke out during trench warfare in WWII



- There's a lot bad social science (for our uses):
  - Unreconstructed classical game theory approaches are rarely of use. Don't be fooled by the nice mathematical proofs. The assumptions are too unrealistic / unconst. Even economists think it's out of date now.
  - Speculative rhetorical stuff or pure politics
  - Endless methodological and definitional debates
  - Postmodernism (good for architecture, useless social science)
- So what is good?
  - Stuff with algorithms describing behaviours of agents
  - Evolutionary economics / game theory (not old style game theory)
  - Bounded rationality models (Herbert Simon)
  - Behavioural economics
- Where to start?
  - Easy place is online free access journal JASSS (10 years back issues)
  - CMOT Journal (not free)
  - ESSA, NACSOS, PAAA conferences, associations, Unified WCSS.



- Self-Organizing networks emerge structures / functions from **bottom up** using local information and generally simple rules (e.g. pure P2P system)
- Self-Adaptive networks employ monitoring, collecting non-local information and intentionally adapting structure **top down** (e.g. net admin tools that auto-shutdown failed / defective servers, botnets)
- SO useful when centralised control is not possible
- SA useful when it is but human operators are not cheap or fast enough
- If an emergent property is truly surprising the the best we can do is exploit it or cope with it. Opportunistic behaviour. This is what we all do every day in human society. Successful individuals are opportunistic, agile and rapidly adapt to new social conditions that nobody intended or designed
- For example, BitTorrent will take advantage of altruism not produced by the tit-for-tat strategy and make effective use of it