Behavioral Experiments on Biased Voting in Networks

Main Presentation

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Motivation

• Tension between individual preferences and collective unity in networks

• Goal: understand how network structure and varying incentive schemes interact to influence individual and collective behavior and performance.
Experimental Design

• Two different categories:
  • **Cohesion** experiments (54 experiments)
  • **Minority Power** experiments (27 experiments)

• Design aspects that were varied include:
  • Connectivity
  • Financial incentive
  • Placement in a network
Cohesion Experiments

- Connectivity varied:
  - more connected to people with the same preference, different preference, or even mixture
  - Preferential attachment or Erdos-Renyi Process
- Goal: investigate how collective and individual performance and behavior varied with neighborhood diversity and the strength of preferences
Minority Power Experiments

• Connectivity:
  • Minority was always most connected
  • Preferential attachment

• Incentive structures:
  • Symmetric (I get $1.25 red and $0.75 blue while you get the opposite - weak, $1.50 red $0.50 blue - strong)
  • Asymmetric (I get 1.50 for red and .50 for blue while you get .75 for red and 1.25 for blue so I care more)

• Goal: investigate the influence that a small but well-connected set of individuals could have on collective decision making.
Visualization of Network and Incentive Structures

A particular person’s actual preference

preferences of connected neighbors
Visualization of Network and Incentive Structures
Results
Collective Behavior

• 55/81 ended in global consensus

• The Cohesion experiments (31/54 solved) were considerably harder for the subjects than the Minority Power experiments (24/27 solved).

• Preferential attachment connectivity may generally be easier for subjects than Erdos–Renyi connectivity (44/54 solved versus 11/27 solved).

• Across all network structures, asymmetric incentives yielded the strongest collective performance
• Y-axis : Majority color minus the number of players choosing the opposite color.

• X-axis : Time
• Much of the variation in wealth is due to random assignment

• ‘Stubbornness’ is positively correlated with wealth.

• The number of color changes made by subjects in the opening seconds is strongly negatively correlated with wealth.
Findings

• **Interesting result:** Minority Power - all 24 of the minority power experiments consensus was to minority preference!

• **Cohesion** - strongest performance came from networks in which most subjects preferred a color different from the majority of their neighbors.

• People are good at a wide range of tasks on topologies.

• Consensus can depend on the network structure.
Thoughts for Discussion

• Did they see any emergent strategies that the majority could use to reduce the influence of the well-connected minority?

• What do the findings about the influence of well-connected minorities say about politics?

• Does it bother you that these networks were just imposed onto the subjects? Does that seem artificial? Should these networks be self-organized?