

# Behavioral Experiments on a Network Formation Game

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--- Presenting by

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# Introduction

- ~~Random Network~~
- Purposefulness
  - Like LinkedIn --- Career benefit
- Network formation games:
  - Cost to form a link
  - Overall payoff= Benefit – Cost
- People's performance on an endogenous network

# Experimental Design

- Three sessions with 36 subjects each
- 1 min each experiment
- Subjects sat at network workstation separated by physical partitions
- The only communication allowed is through the system
- Red or Blue

# Experimental Design

- Financial incentives but with different color incentive
- Get paid only if Global consistent is reached
- Fixed cost of purchase links
- The players must collectively purchase enough links to establish some minimal global connectivity
- Link purchases are unilateral

# Experimental Design

- Immediate neighbors' current color
- Two pieces of information about non-neighbor:
  - Current degree
  - Current shortest-path distance
- Start with either Seed or unseeded network

Randomly  
connected (no  
cost)

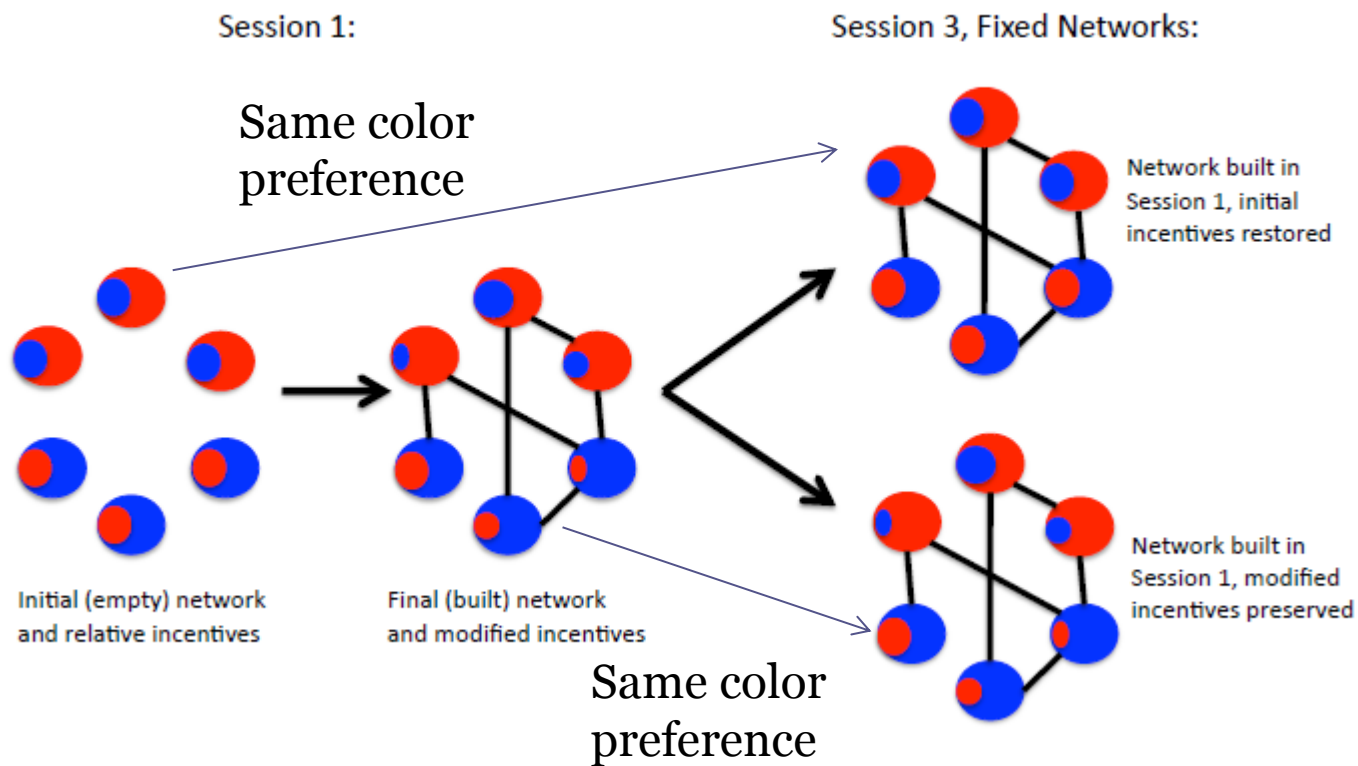
Empty network



# Overall Performance

- Session 1: 99 experiments with 63 unseeded  
47% success rate
- Session 2: 72 experiments with 27 unseeded  
39% success rate
- Bad performance compare to 88%(fixed network)
- Two possible explanation --- Not enough time  
and Stubbornness

# Session 3





# Effects of Seed Network

- Session 1 and 2 seed network
- Whether seed network facilitate communication and coordination at no cost
- In Fixed network, the minority impose its preference against the majority's. 89% success rate and 0% of the successful experiment end up with majority preference
- 61% success rate and 35% of the successful experiment end up with majority preference
- Link purchase allows the majority players to better realize they are in the majority

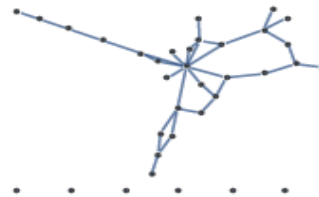
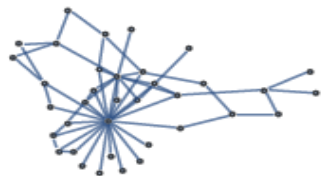
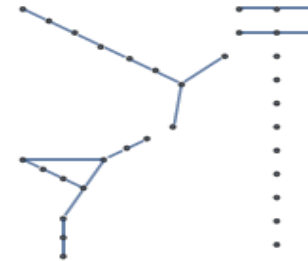
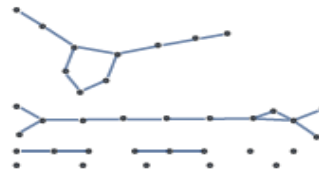
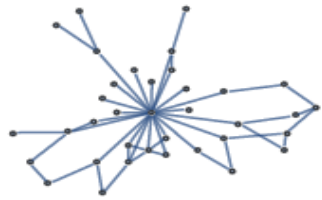
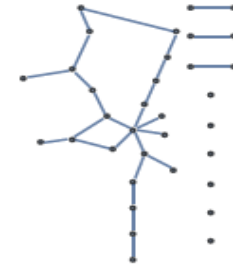
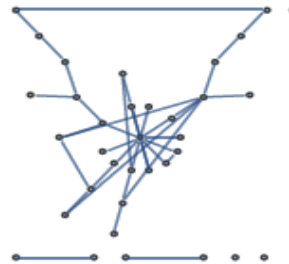
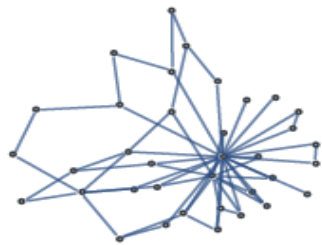
# Effects of Link Costs and Incentive

- Low cost \$0.01 67% 64% people purchased links
- Medium cost \$0.1 38% 42%
- High cost \$0.25 14% 59%
- Cost per link has a strong effect on collective performance and network density
- Color preference: 58% no color preference  
53% weak preference  
17% strong preference

# Network Structure and Centrality

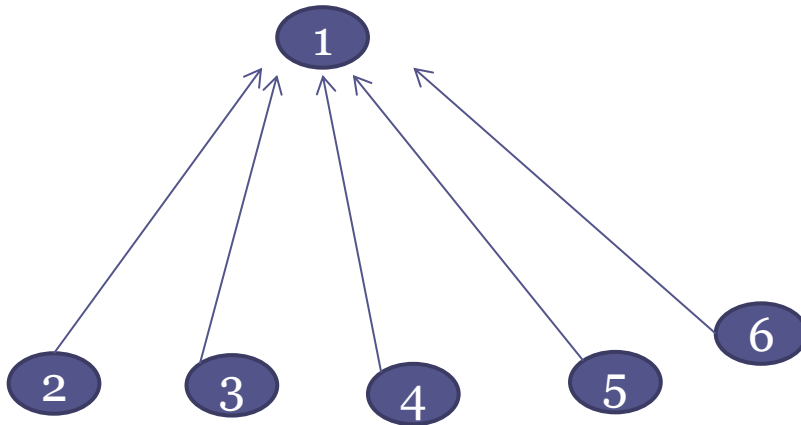
## Skewness

- Unseeded network: never two or more disconnected components
- Small diameters: 1.32 low cost 1.87 medium cost 2.38 high cost
- “Connectors” --- High degree nodes



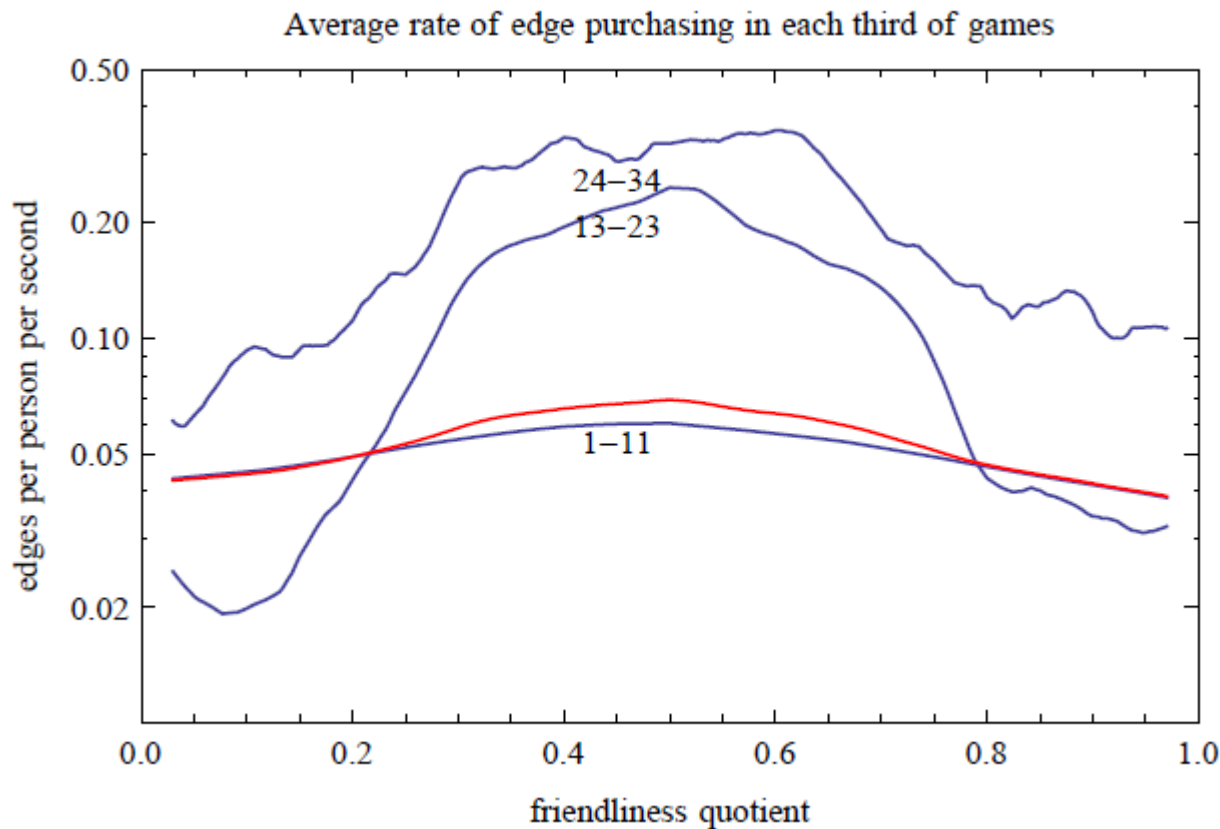
High centrality players may have implicitly used their position to influence outcome rather than coordinate behavior

# Free Riding



- Low and medium cost 50% people only contributed 10% of the total link expenses
- High cost these 50% people still only contributed 20% of the total link expenses

# Purchasing Behavior



There is a tendency that a player will buy an link if she finds herself with an approximately equal number of friends and enemies

# Conclusion

- Human subjects, given the opportunity and incentive to collectively build a network in service of a competitive coordination task, did so poorly, creating networks inherently difficult for the task. Not only because of the link purchase, but also the creation of social network is more difficult.