VE444: Networks

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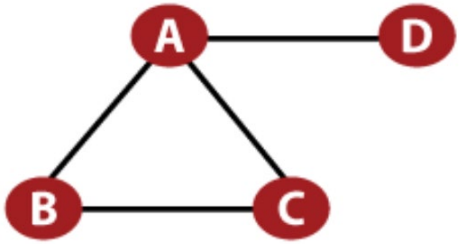
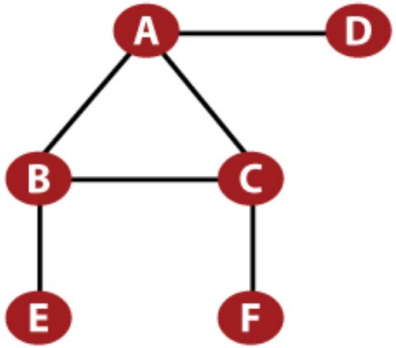
Social experiments



- One dollar
- One exchange rule
- Which node will have the most power?
- Which node will have the least?

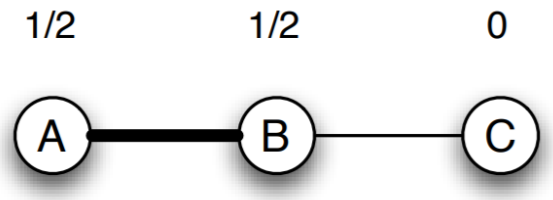
Social experiments

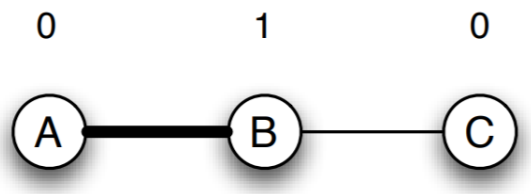


- Power of Node A, B, C, D?
- In the balanced outcome, nodes A, B, and C will have the same value: 1, 2/3, 1/2, or 1/3?

Mathematical framework

- Given a exchange graph
- Outcome = (matching, values)
- Stable outcome: no node X can propose an offer to some other node Y that makes both X and Y better off

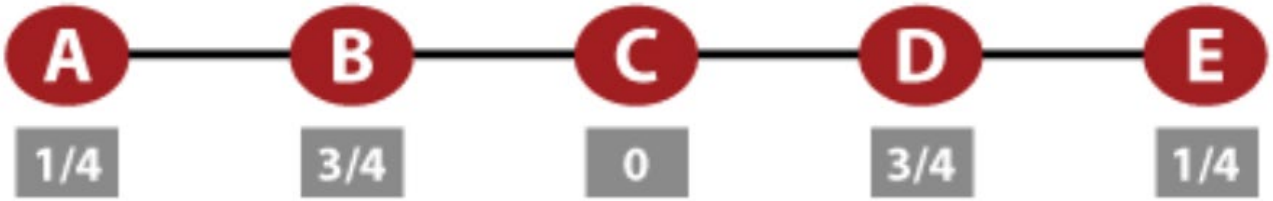




Instability: Given an outcome consisting of a matching and values for the nodes, an instability in this outcome is an edge not in the matching, joining two nodes X and Y , such that the sum of X's value and Y 's value is less than 1.\

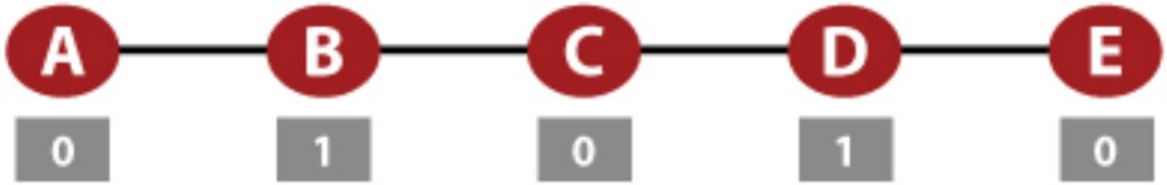
Opportunity + incentive -> unstable

Instability



- Network exchange experiment on five-node path
- One dollar
- One exchange rule
- Is the outcome stable?

Instability



- Network exchange experiment on five-node path
- One dollar
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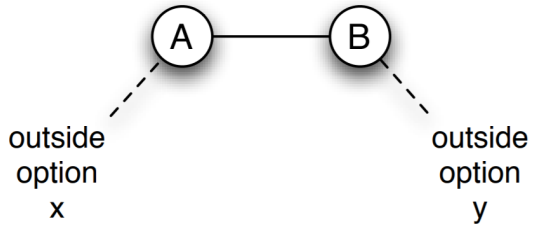
- Is the outcome stable?

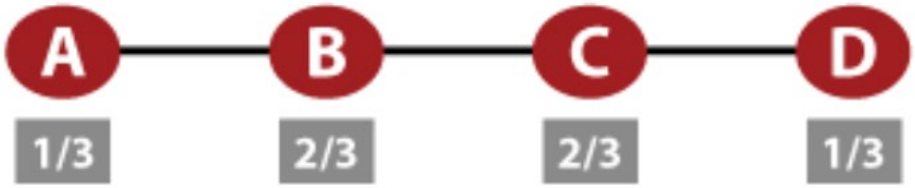
Two-person Nash Bargaining

- Nash Bargaining Solution: When A and B negotiate over splitting a dollar, with an outside option of x for A and an outside option of y for B (and x + y ≤ 1), the Nash bargaining outcome is
  - $x+\frac{1}{2}s=\frac{x+1-y}{2}$ to A, and
  - $y+\frac{1}{2}s=\frac{y+1-x}{2}$ to B

- Surplus: s = 1-x-y



Nash Bargaining Solution



- Network exchange experiment on four-node path
- One dollar
- One exchange rule
- Is the outcome consistent with Nash Bargaining?