

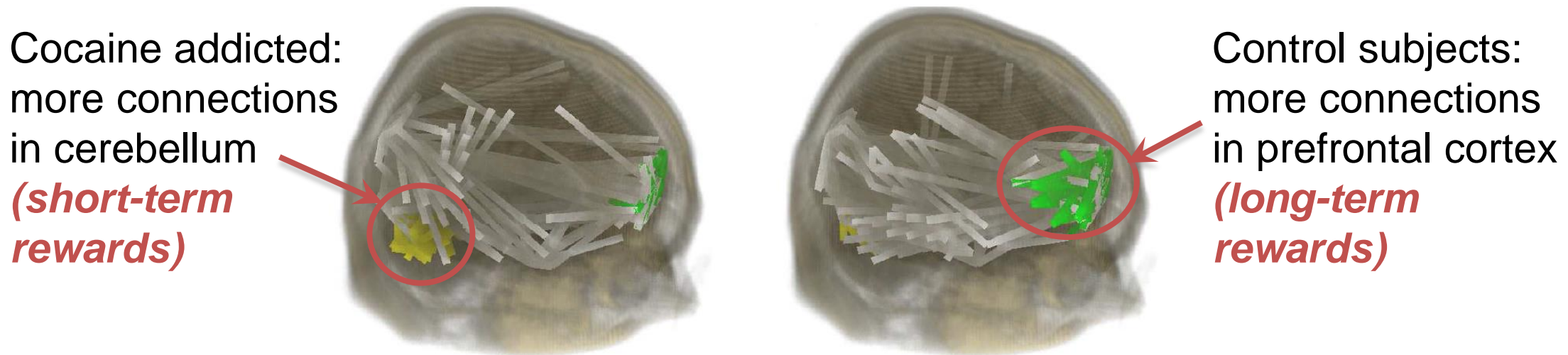
Graphs, Game Theory, Big Data

Jean Honorio

Neuroscience: cocaine addiction

- **Goal: learn graphs for interpretation**

- cocaine addiction affects brain function (even after stopping consumption)



- **Prediction**

- predict if a person is cocaine addicted or control: 84.6%

Political science: congressional voting



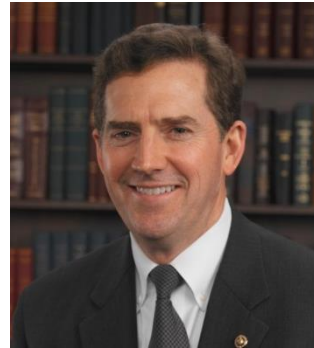
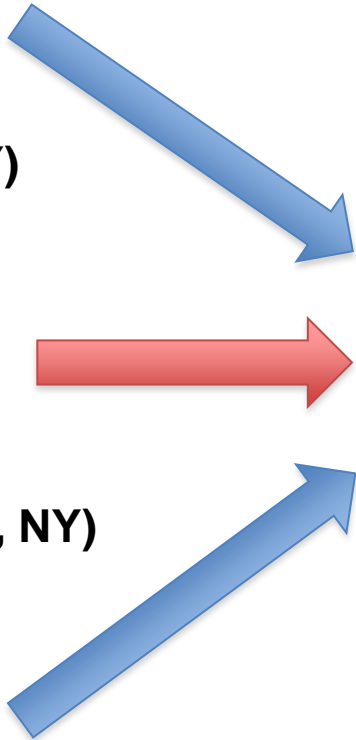
Paul (R, KY)



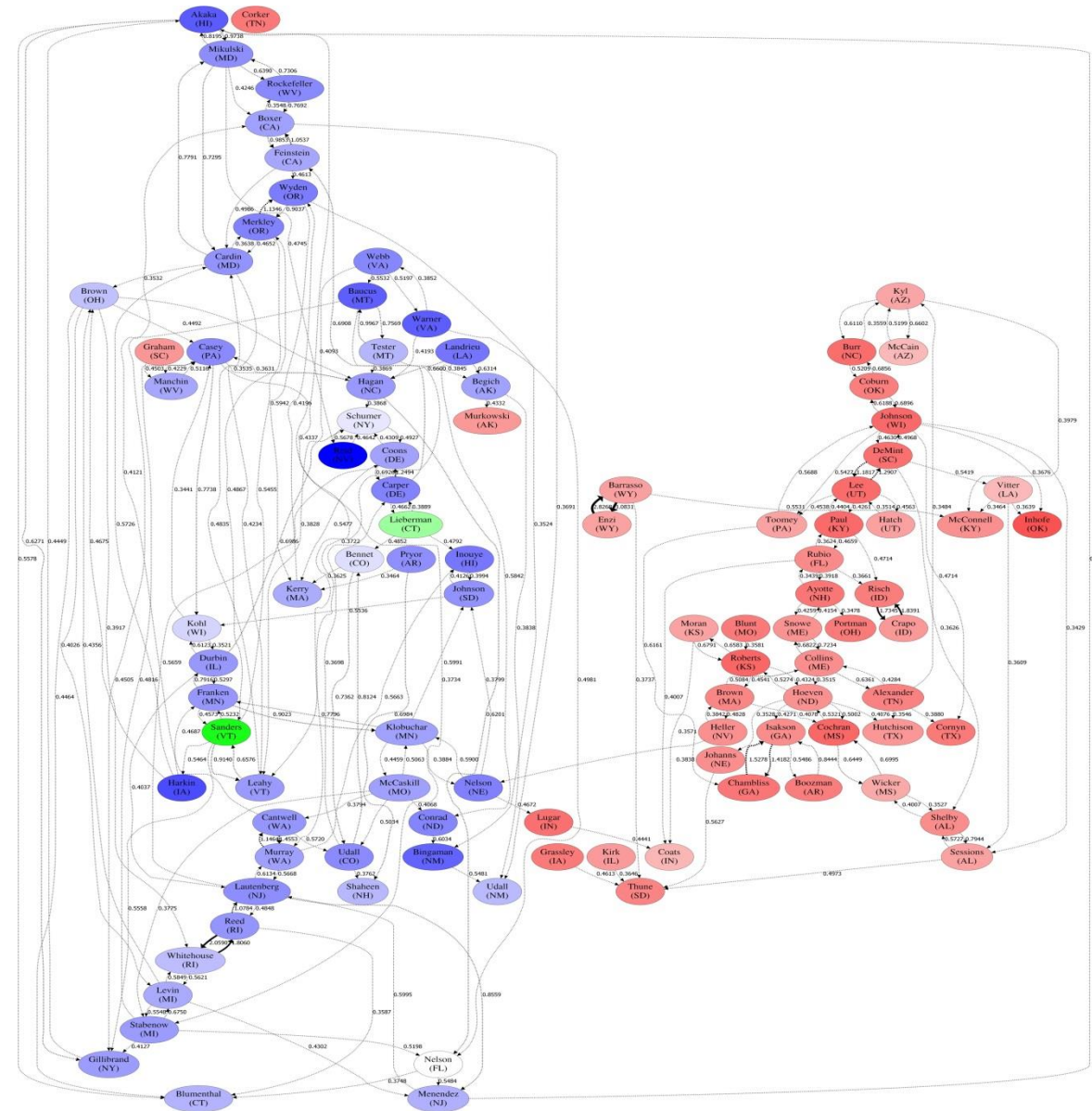
Schumer (D, NY)



Johnson (R, WI)



DeMint (R, SC)

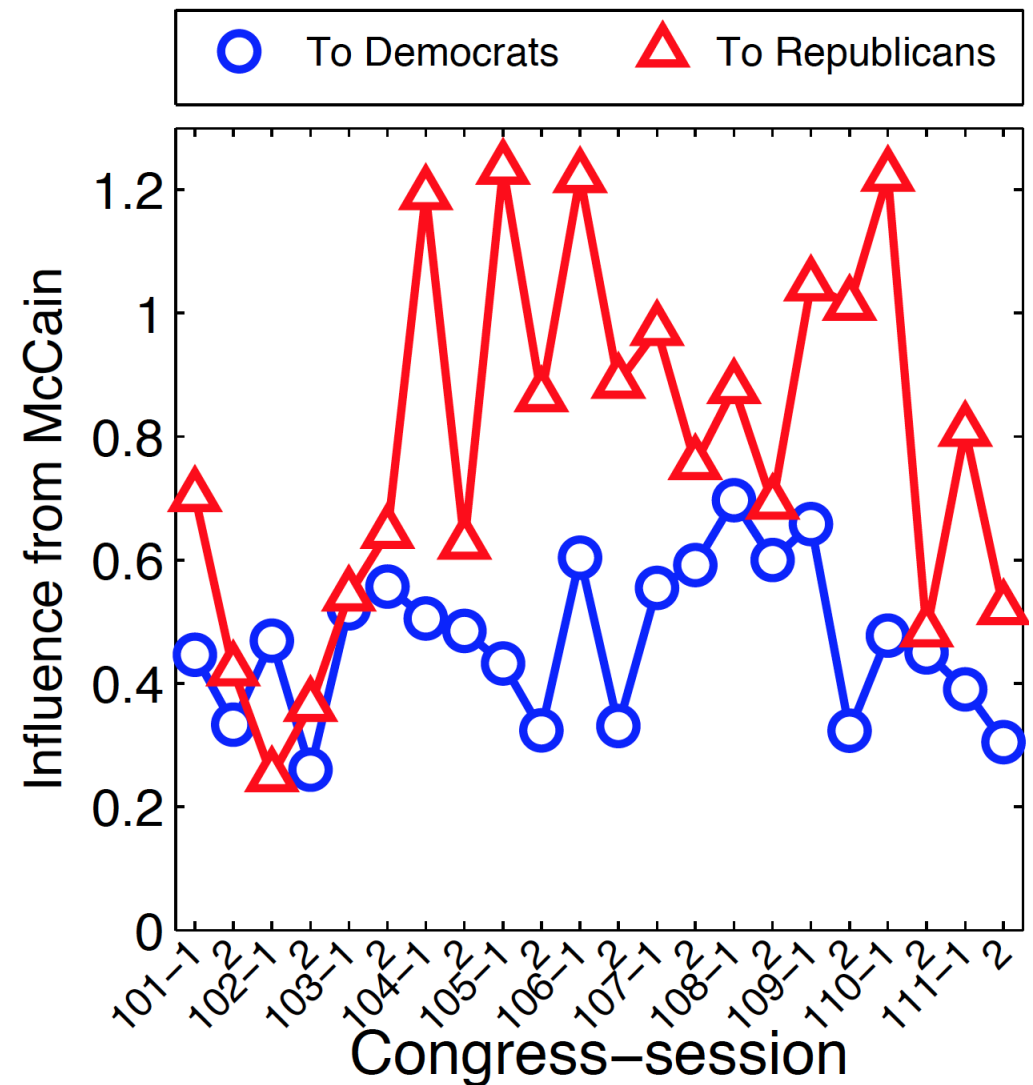
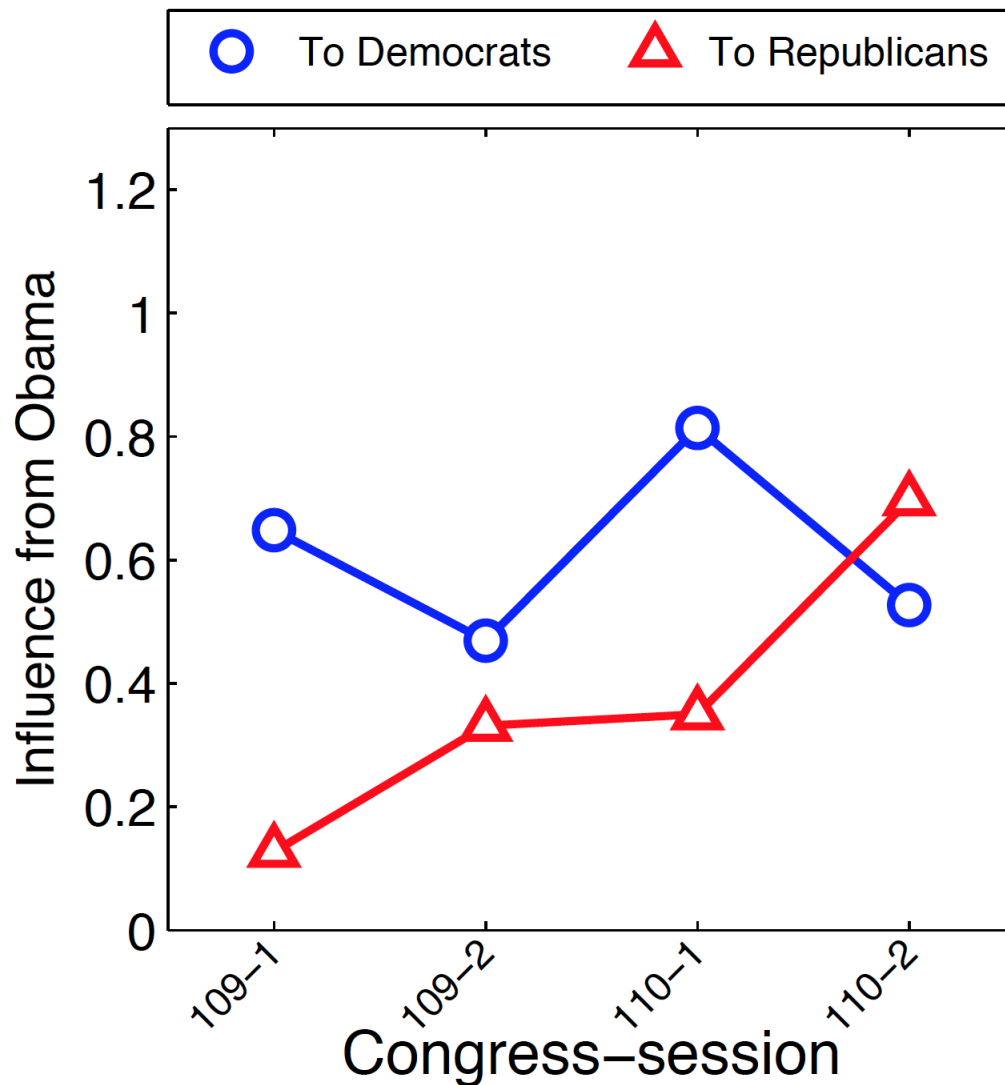


- Each agent maximizes his *payoff* noncooperatively
- Game theory models a *global* behavior

Influence from Obama and McCain

In last sessions: Direct influence from Obama to Republicans increased. Direct influence from McCain to both parties decreased.

Direct influence of player: sum of magnitude of its outgoing edges.



Most influential senators

Most influential agents. those whose collective behavior forces every other agent to a unique choice of behavior



Kerry (D, MA)



Inouye (D, HI)



Lautenberg (D, NJ)



Bennett (R, UT)



Enzi (R, WY)



Sessions (R, AL)

110th U.S. Congress 2007-2009

(Irfan'14)

Many other application areas!

- ***Genetics: cancer***
 - Similar gene-gene interaction network for 5 types of cancer
 - breast, colon, lung, brain/spine, ovarian cancer
- ***Networks for predicting***
 - NASDAQ stocks
 - World weather
- ***Reproducibility***
 - Theoretical research on
 - How much data do we really need?
 - How to preserve privacy?
- ***Revisiting hypothesis testing and clinical trials***