# Structural Holes

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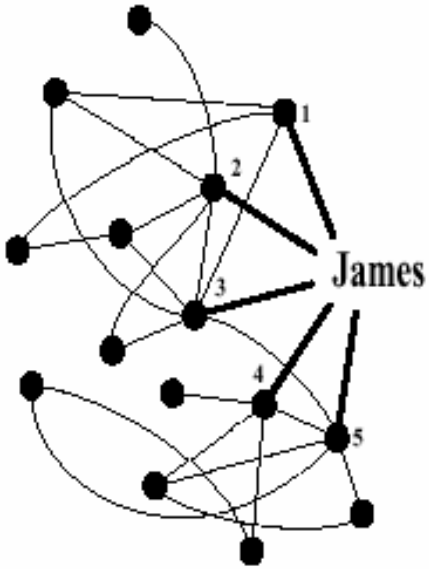
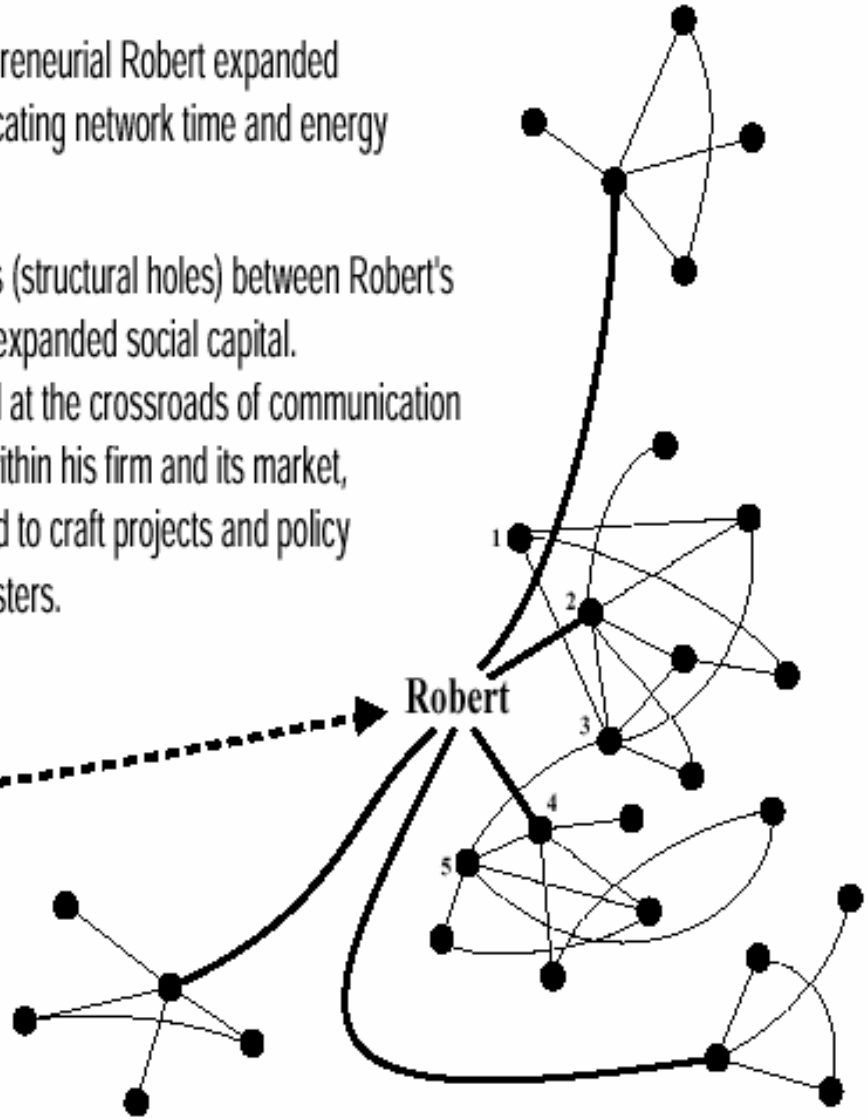



Robert took over James' job. Entrepreneurial Robert expanded the social capital of the job by reallocating network time and energy to more diverse contacts.

It is the weak connections (structural holes) between Robert's contacts that provide his expanded social capital. Robert is more positioned at the crossroads of communication between social clusters within his firm and its market, and so is better positioned to craft projects and policy that add value across clusters.

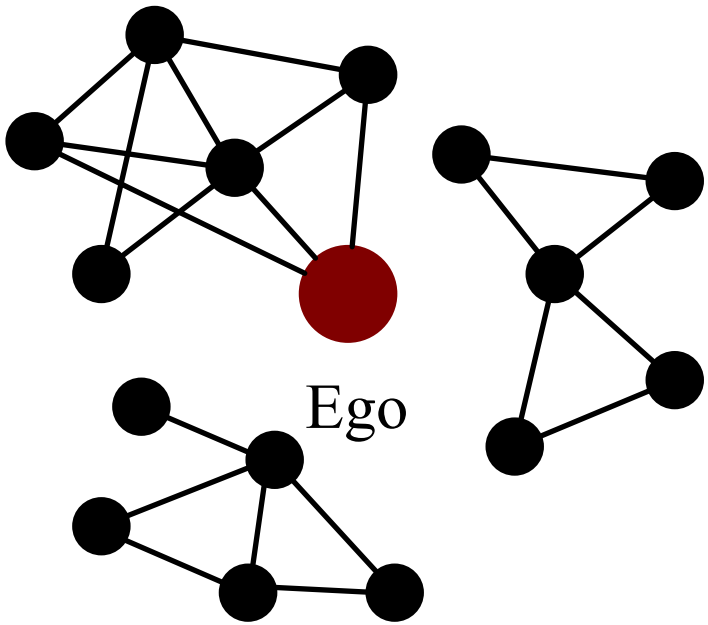



Research shows that people like Robert, better positioned for entrepreneurial opportunity, are the key to integrating across functions and across the people of increasingly diverse backgrounds in today's flatter organizations. In research comparisons between managers like James and Robert, it is the people like Robert who get promoted faster, earn higher compensation, receive better performance evaluations, and perform more successfully on teams.

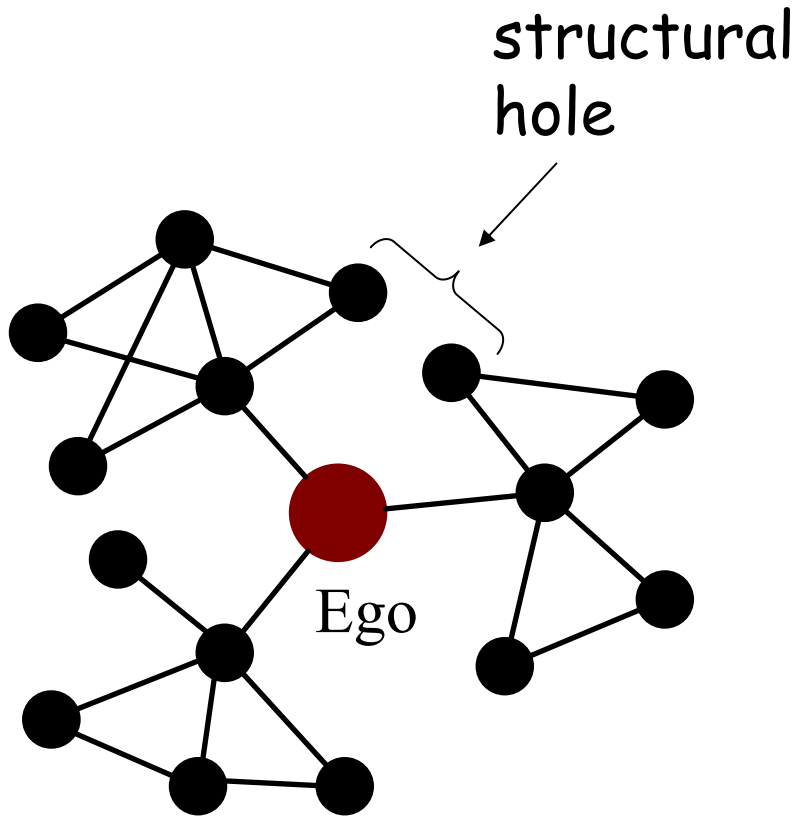
Slide from Ron Burt

# Structural Holes

- local betweenness

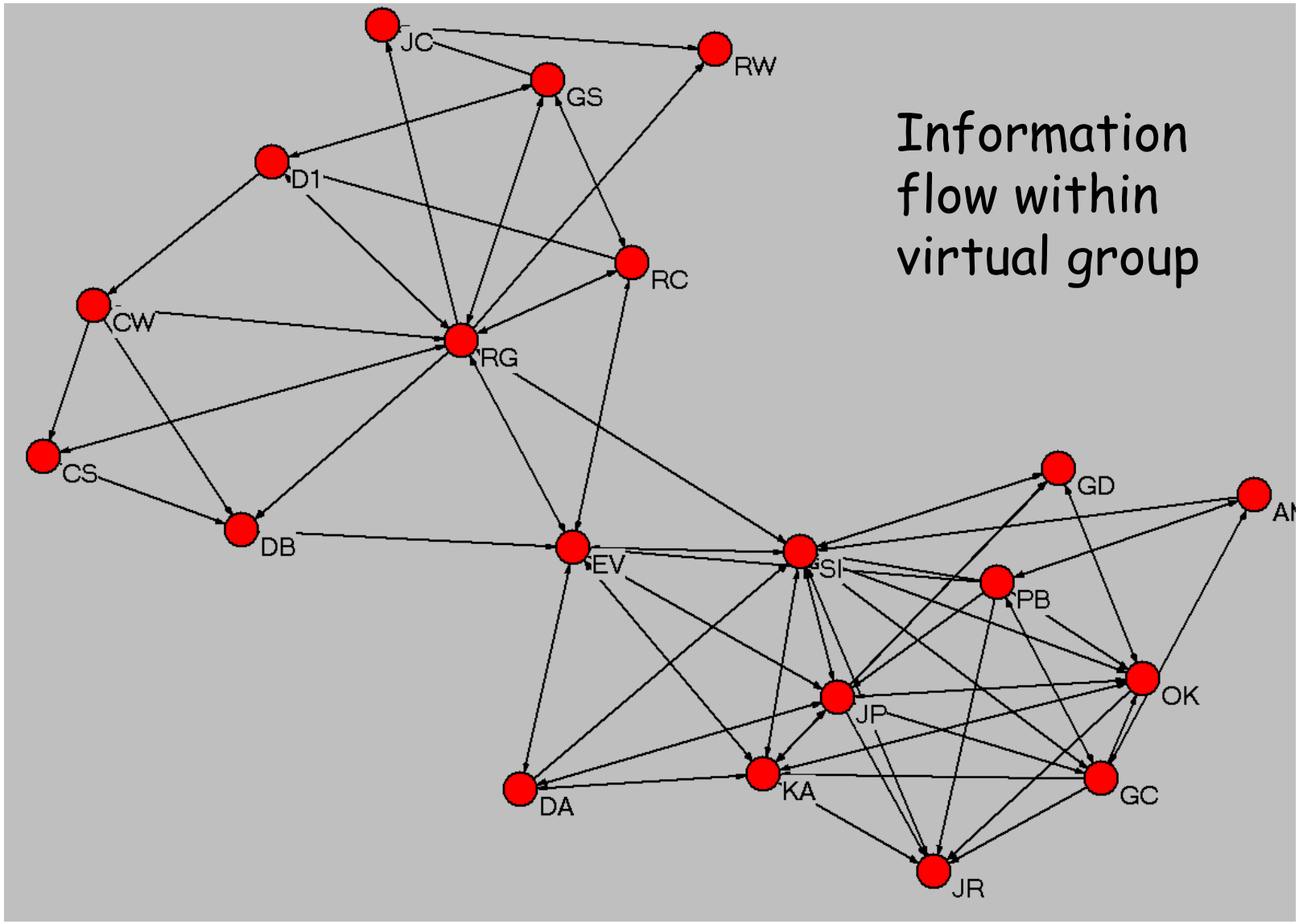



Few structural holes



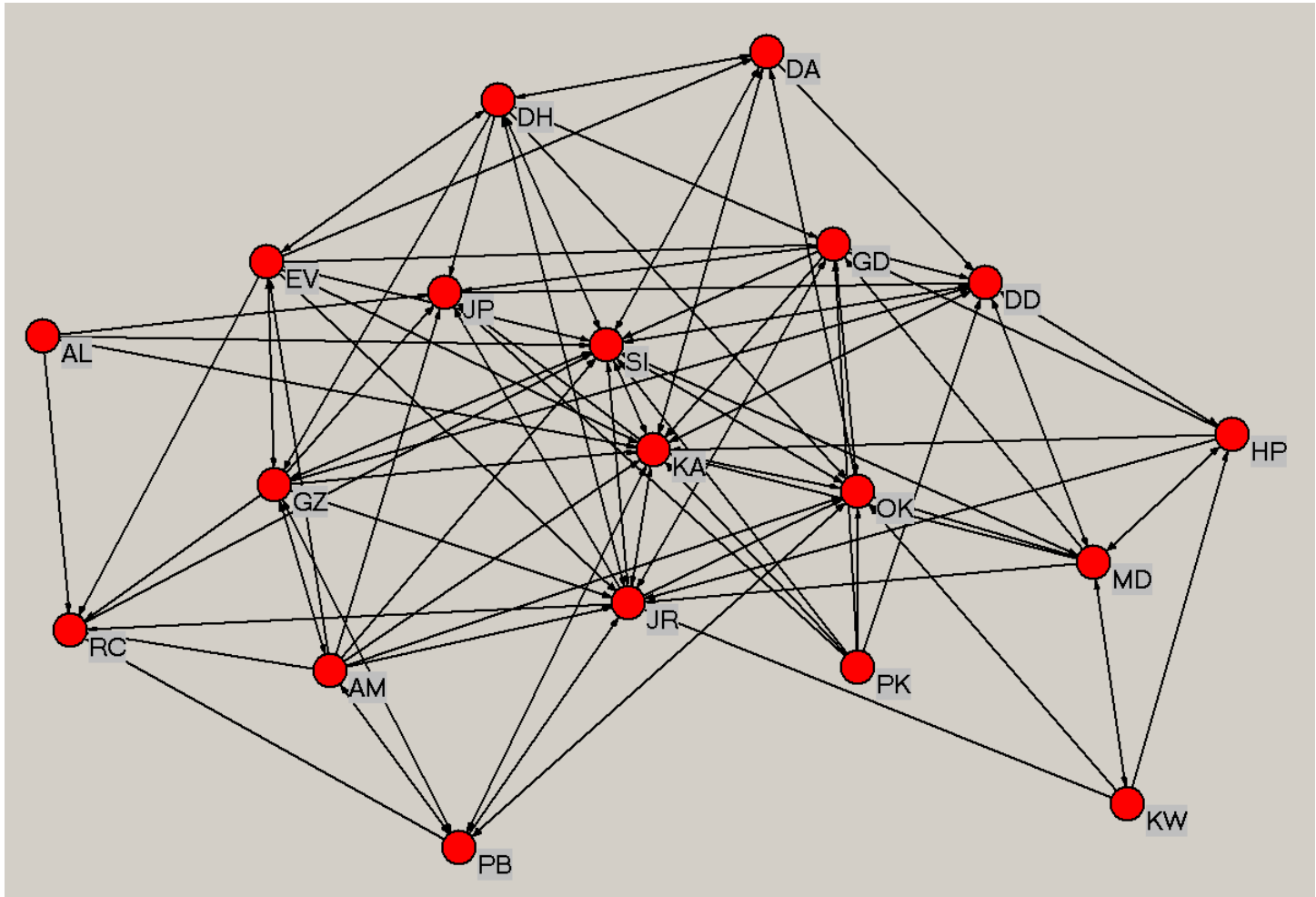

Many structural holes:
- power, info, freedom

# Local Gain is Global Pain




Cross, Parker, & Borgatti, 2002. Making Invisible Work Visible. *California Management Review*. 44(2): 25-46

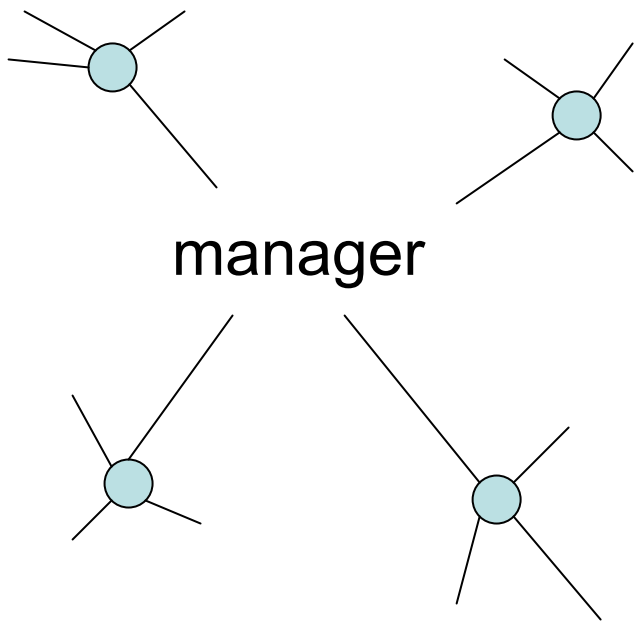
# 9 Months Later




Data collected by Cross & Borgatti

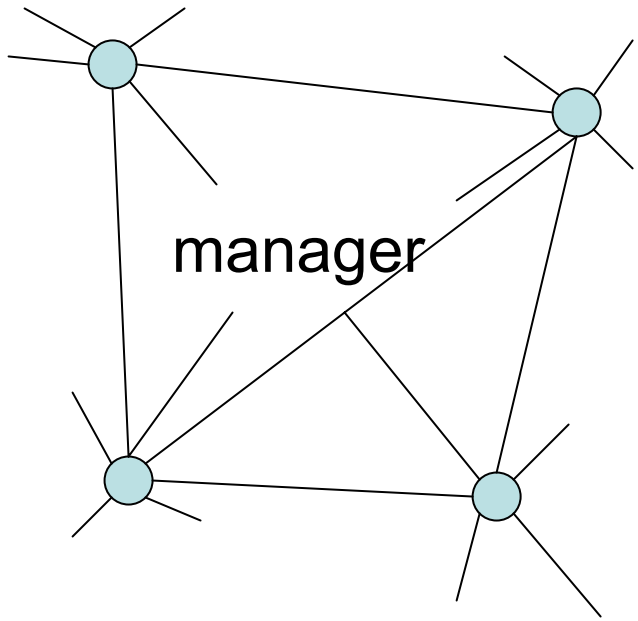
# Entrepreneurial Network

- sparse, flat structure
- independent relations, sustained by manager
- structural holes, low redundancy provides info & control benefits
- associated with successful managers



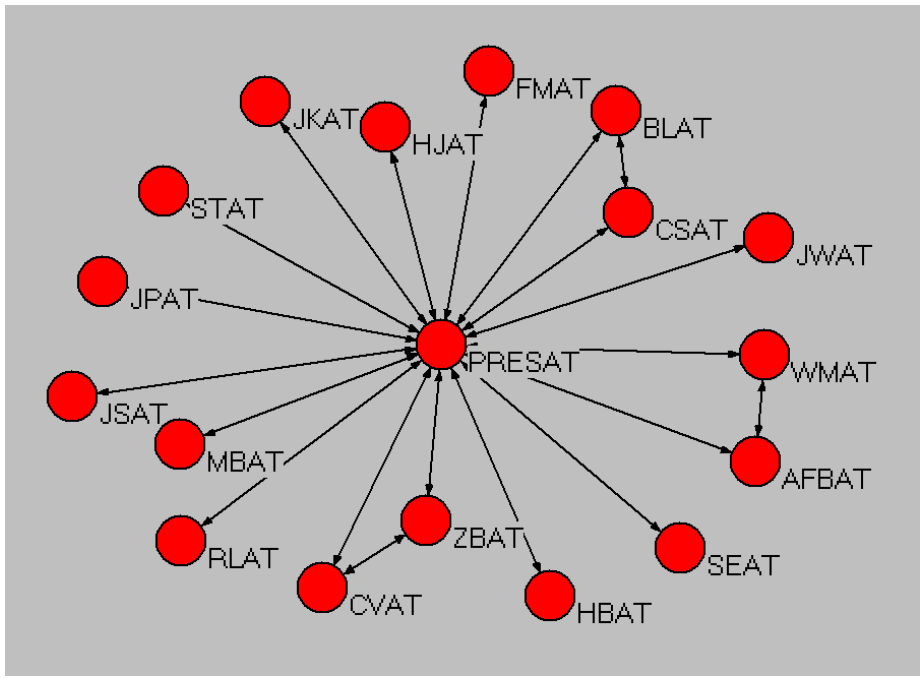
# Support Network

- dense, flat structure
- interdependent relations sustained by each other for manager
- few holes, high redundancy creates social support
- associated with unsuccessful managers

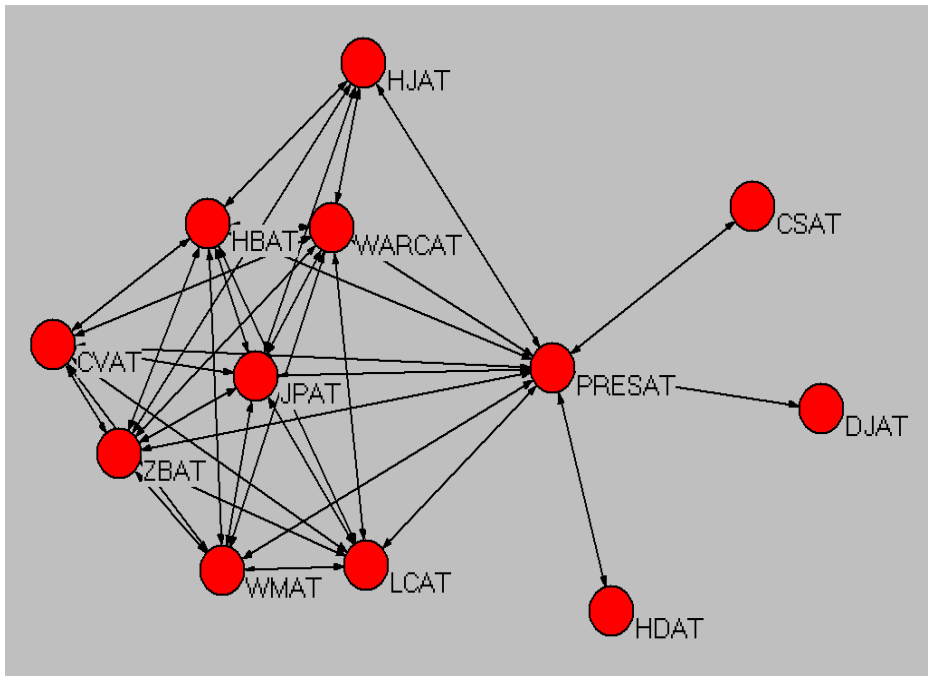


# Carter Administration

## White House Diary Data




Year 1




Year 4

Data courtesy of Michael Link

# Measures of Structural Holes

- Burt's effective size
- Burt's constraint
- Everett & Borgatti's ego betweenness

# Effective Size

$m_{jq}$ = i's interaction with q divided by j's strongest relationship with anyone

$p_{iq}$ = proportion of i's energy invested in relationship with q

$$ES_i = \sum_j \left[ 1 - \sum_q p_{iq} m_{jq} \right], \quad q \neq i, j$$

$$ES_i = \sum_j 1 - \sum_j \sum_q p_{iq} m_{jq}, \quad q \neq i, j$$

- Effective size is network size (N) minus redundancy in network

# Effective Size in 1/0 Data

- $M_{jq}$ = i's interaction with q divided by j's strongest relationship with anyone
  - So this is always 1 if j has tie to q and 0 otherwise
- $P_{iq}$ = proportion of i's energy invested in relationship with q
  - So this is a constant 1/N where N is network size

$$ES_i = \sum_j \left[ 1 - \frac{1}{n} \sum_q m_{jq} \right], \quad q \neq i, j$$

$$ES_i = \sum_j 1 - \sum_j \frac{1}{n} \sum_q p_{iq} m_{jq}, \quad q \neq i, j$$

$$ES_i = n - \frac{1}{n} \sum_j \sum_q m_{jq}, \quad q \neq i, j$$

- Effective size is network size (N) minus redundancy in network
  - N – average degree of alters in the network not including ego

# Constraint

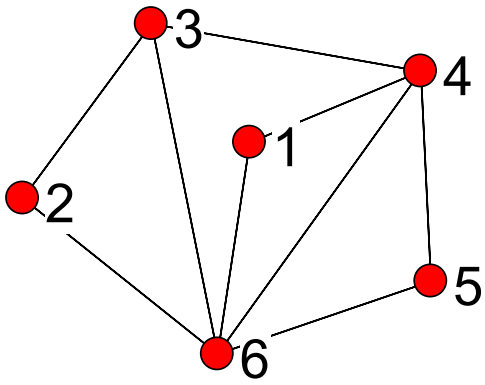
$M_{jq}$ = i's interaction with q divided by j's strongest relationship with anyone
So this is always 1 if j has tie to q and 0 otherwise

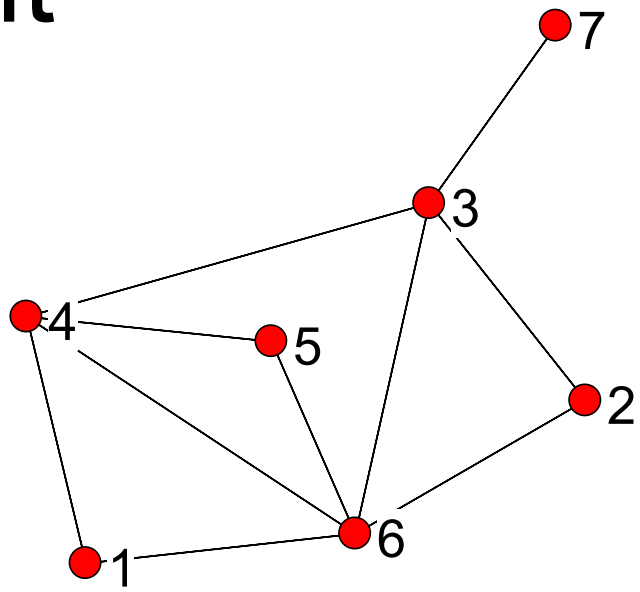
$P_{iq}$ = proportion of i's energy invested in relationship with q
So this is a constant 1/N where N is network size

$$c_{ij} = p_{ij} - \sum_{q} p_{iq} m_{qj}, \quad q \neq i, j$$

- Alter j constrains i to the extent that
  - i has invested in j
  - j has few structural holes
- Even if i withdraws from j, everyone else in i's network is still invested in j

# Constraint




- On left, node 2 is more constrained than 1 and 5
- On right, node 2 is less constrained than 1 and 5