Creativity & Innovation

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MB709

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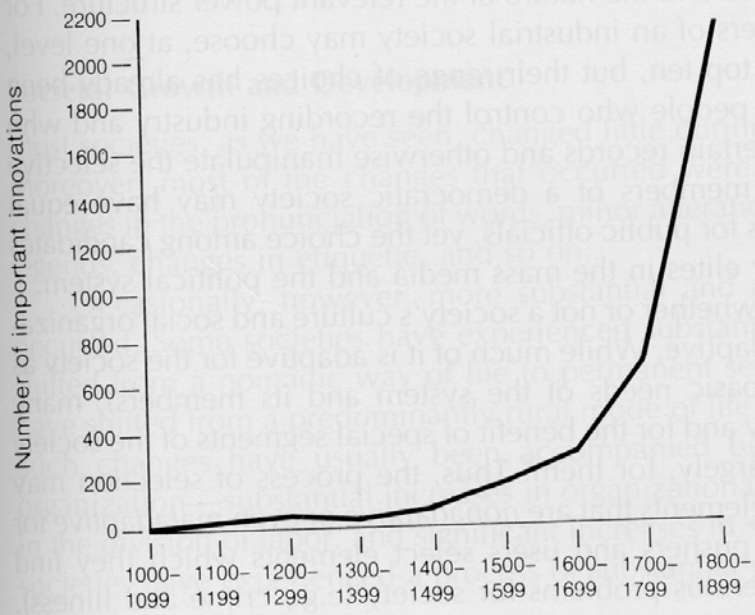
Societal Change Over Time

FIGURE 3.6 The number of important technological innovations by century, 1000 to 1900 A.D. Technological innovations tend to occur at an accelerating rate, because each new element increases the probability of acquiring more.



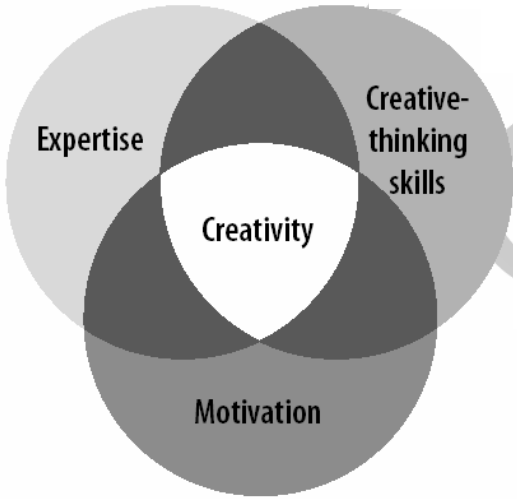
- Note exponential growth

The Individualist View

THE THREE COMPONENTS OF CREATIVITY

Within every individual, creativity is a function of three components: expertise, creative-thinking skills, and motivation. Can managers influence these components? The answer is an emphatic yes – for better or for worse – through workplace practices and conditions.

Expertise is, in a word, knowledge – technical, procedural, and intellectual.



Creative-thinking skills determine how flexibly and imaginatively people approach problems. Do their solutions upend the status quo? Do they persevere through dry spells?

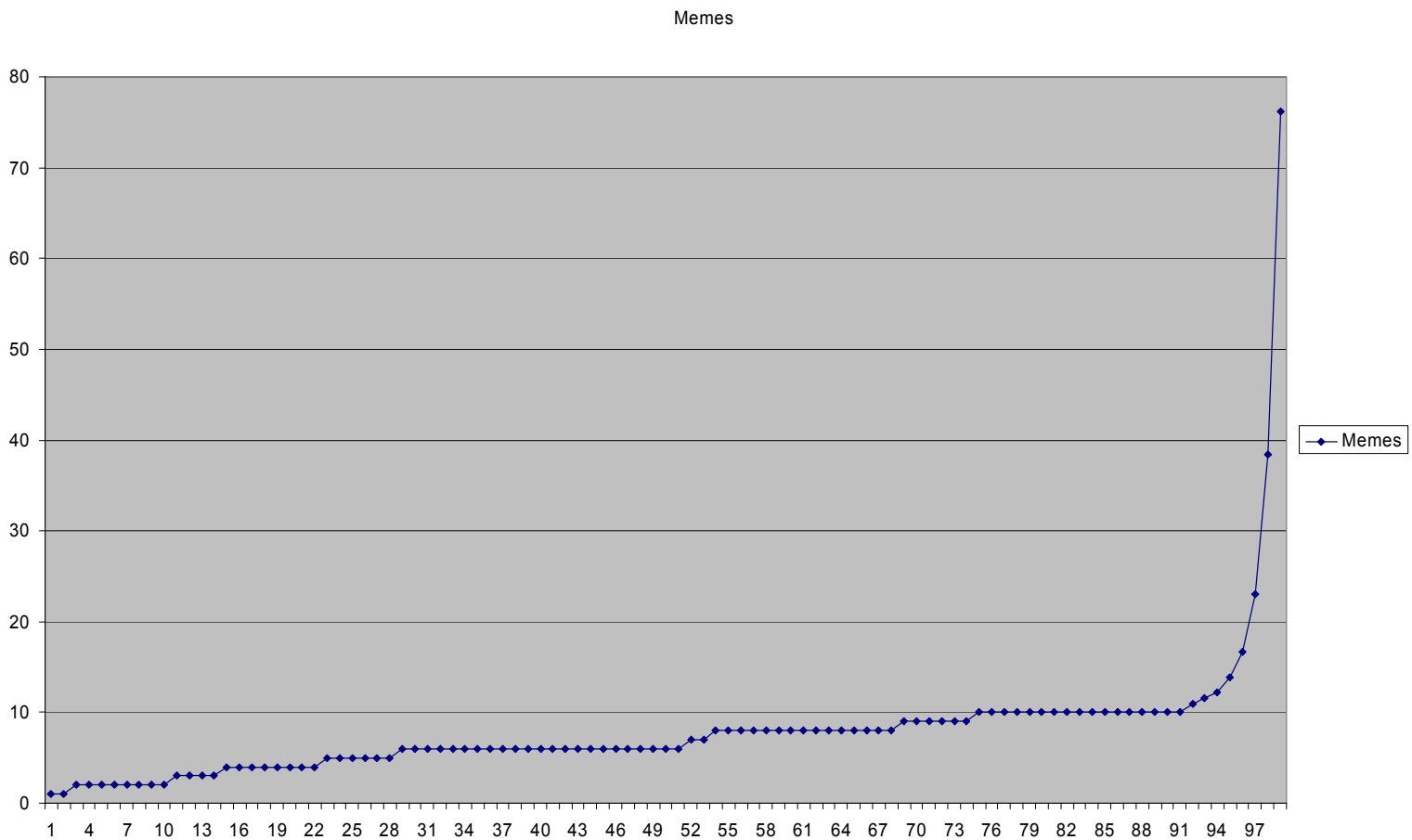
Not all **motivation** is created equal. An inner passion to solve the problem at hand leads to solutions far more creative than do external rewards, such as money. This component – called *intrinsic motivation* – is the one that can be most immediately influenced by the work environment.

Explaining Change

$$m_t = k(m_{t-1})! + e$$

- m_t = number of memes at time t
- k = proportion of combinations that are useful (say, 1 in 100,000,000,000)
- $m_{t-1}!$ = number of combinations of m_{t-1} memes
- e = number of innovations due to exogenous sources (like mutation in genetics). (e.g., prob(e>0) < 0.005)

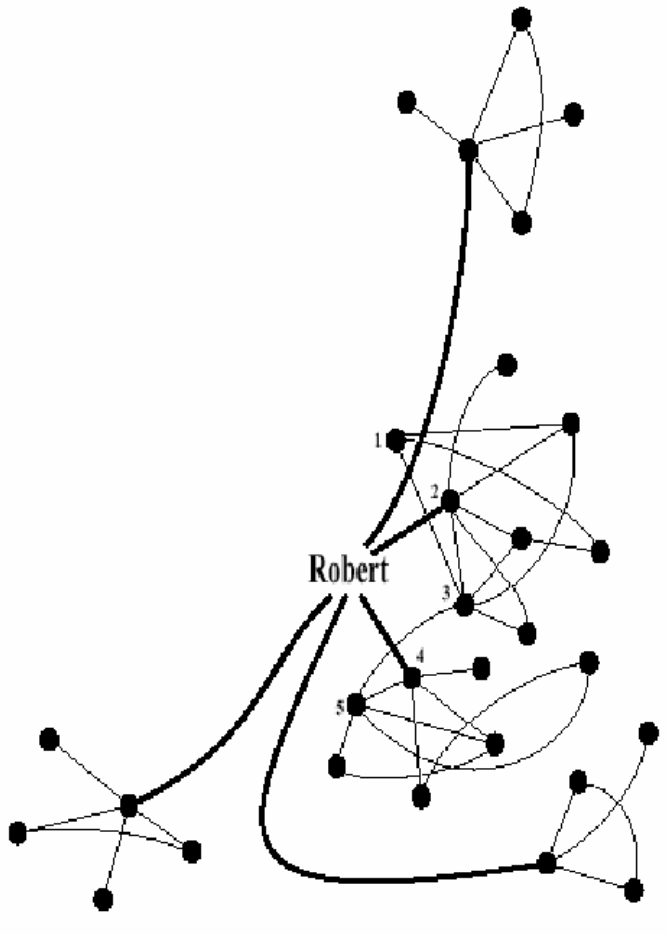
Results of Simulation



K = 1/1,000,000; prob(e > 0) = 0.05

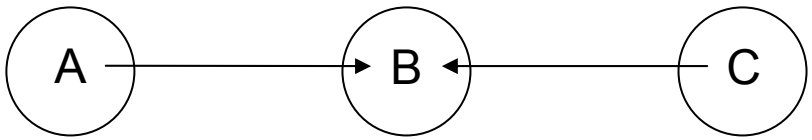
Diversity of Inputs

- Network size
  - More ties = more diversity
- Weak ties
  - More weak ties = more dive
- Structural holes
  - More non-redundant ties = r diversity

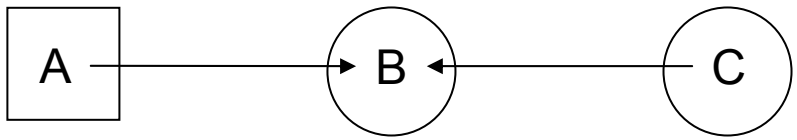


Alter Attributes

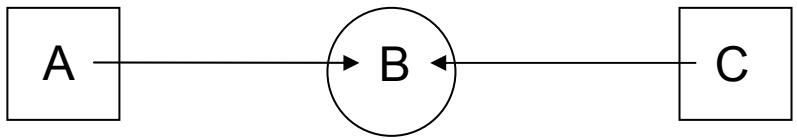
A,B,C all from same group



Internal

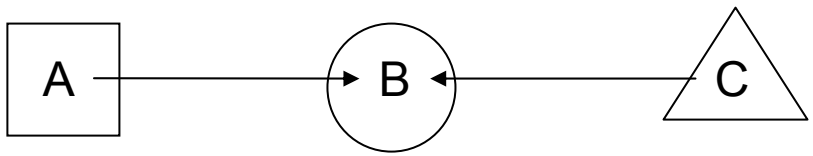


Translator



Consultant

A,B,C all from different groups

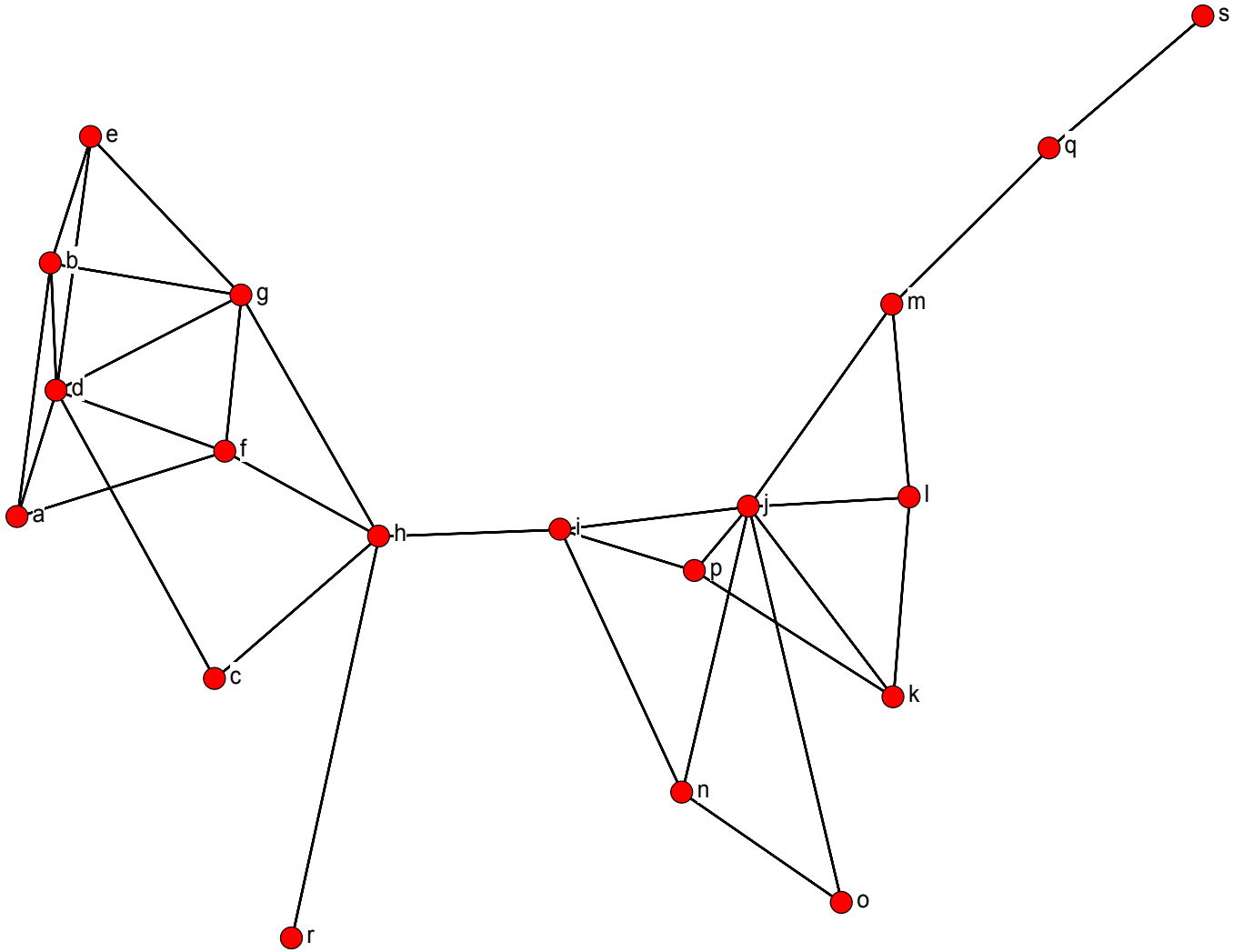


Liaison

diversity

Consider the diversity of inputs to middle person B.

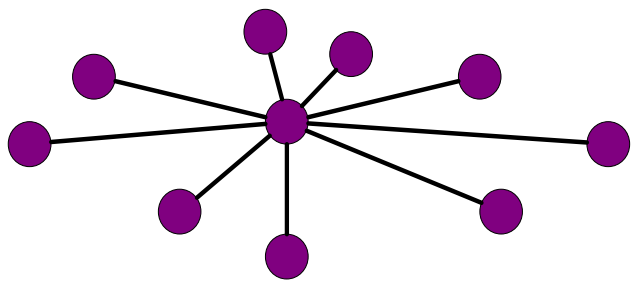
Betweenness



Network Structures for Innovation

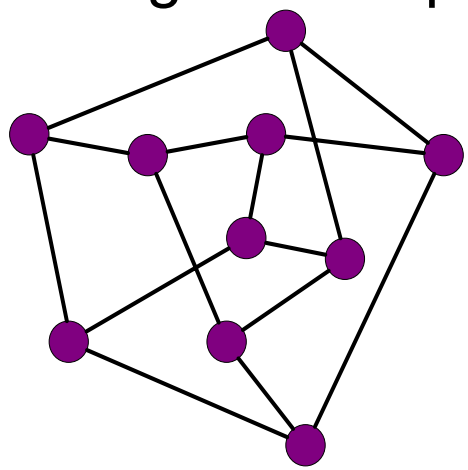
EFFICIENCY vs. INNOVATION

- Centralized networks
  - efficient coordination of routine tasks
  - Diffusion of approved practices



Centralized

- Decentralized nets
  - Complex, non-obvious tasks
  - Co-construction of ideas via interaction among diverse parties

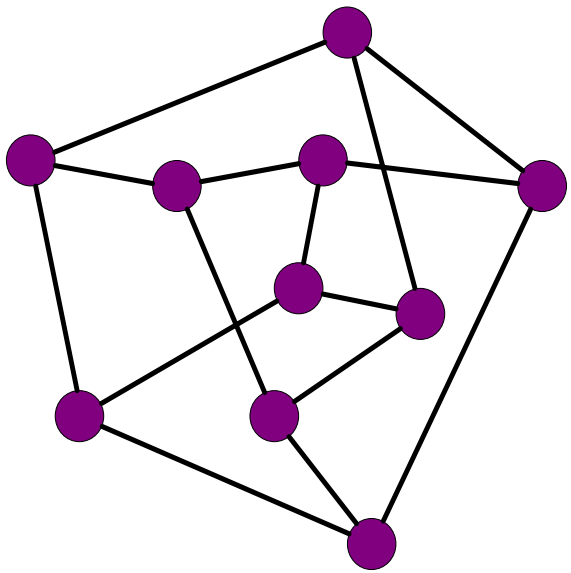


Decentralized

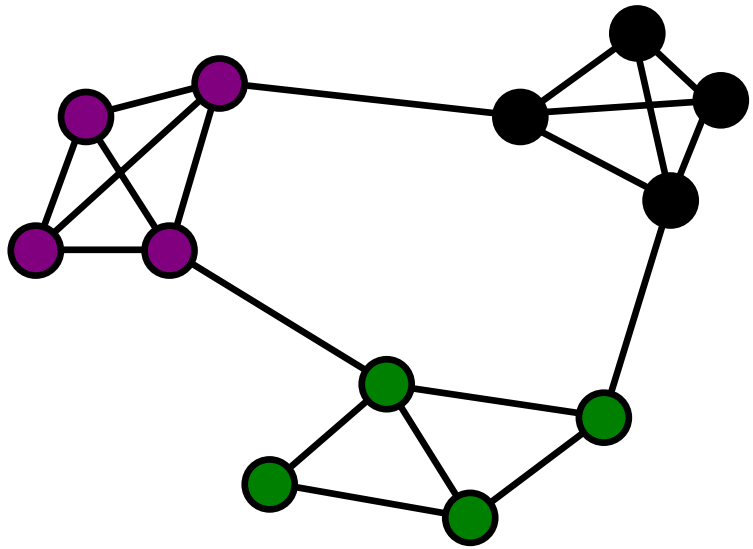
TYPES OF INNOVATION: INCREMENTAL IMPROVEMENT VS RADICAL TRANSFORMATION

"I would never have conceived my theory, let alone have made a great effort to verify it, if I had been more familiar with major developments in physics that were taking place. Moreover, my initial ignorance of the powerful, false objections that were raised against my ideas protected those ideas from being nipped in the bud."

– Michael Polanyi (1963), on a contribution to physics



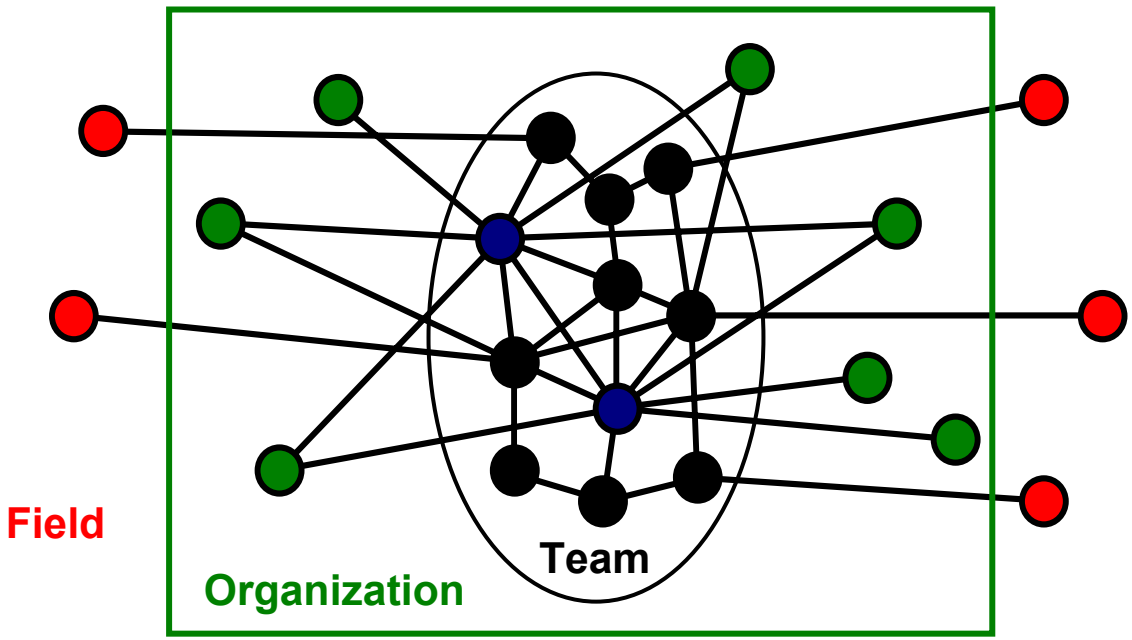
Diffuse structure



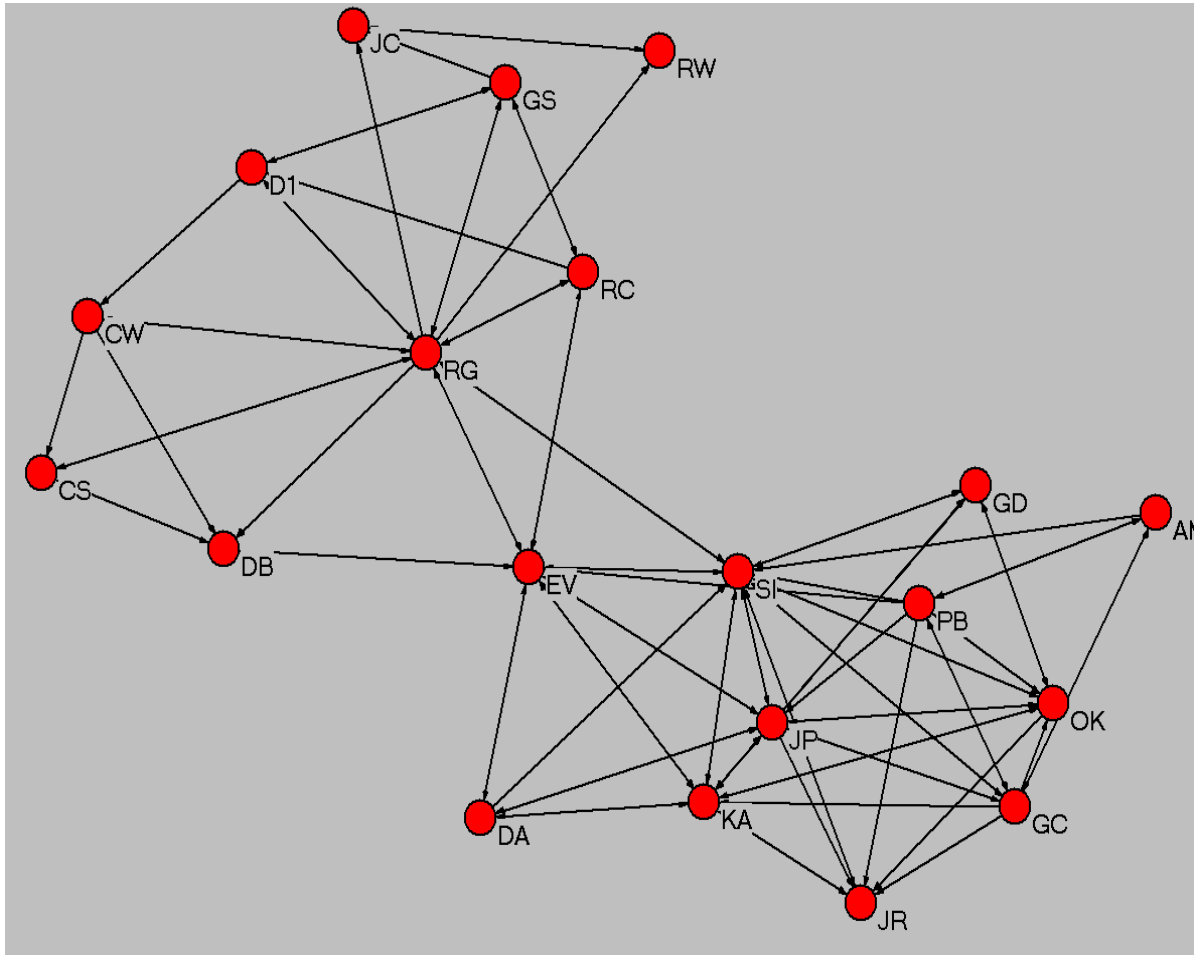
Clique structure

INCREMENTAL IMPROVEMENTS

- Communities of practice
- Need for communicators that can maintain inflow of latest advances and make different researchers work relevant to each other
- Need for ties with other organization members to enable procurement of needed resources



Group Pain vs. Local Gain



Exploration/Exploitation

- Trade-off between investing in exploration of new knowledge, and utilization of current knowledge
- Entities
  - Reality (environment)
  - Organizational code (conventional wisdom; org culture)
  - Individuals
- Individuals learn from the code (socialization)
- Organization learns from individuals whose beliefs match reality

Drawn from March, J.G. 1991. Exploration and exploitation in organizational learning. *Organization Science Vol 2*

Homogeneous learning rates

- If learning rates constant across individuals …
- Max knowledge at equilibrium occurs when the org code learns fast and people learn slow
  - When people are independent thinkers
  - Slow learning permits more exploration time, which increases prob of right answer

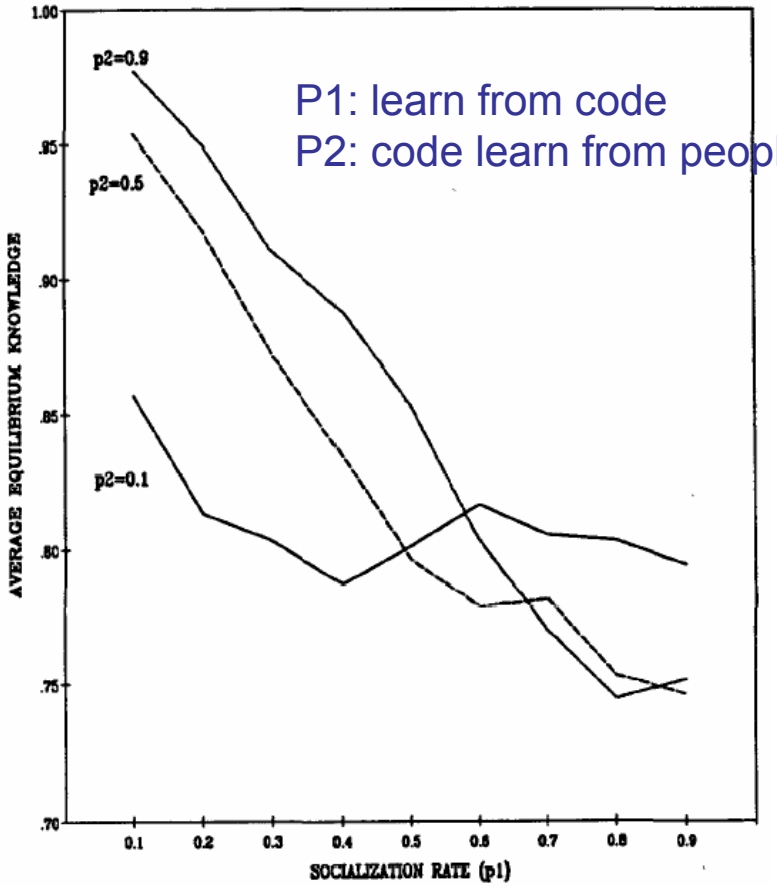


FIGURE 1. Effect of Learning Rates (p_1, p_2) on Equilibrium Knowledge. $M = 30$; $N = 50$; 80 Iterations.

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Heterogeneous Learning Rates

- A mix of slow and fast learning individuals always beats a homogeneous set of medium individuals
  - But a homogeneous set of slow learners is even better

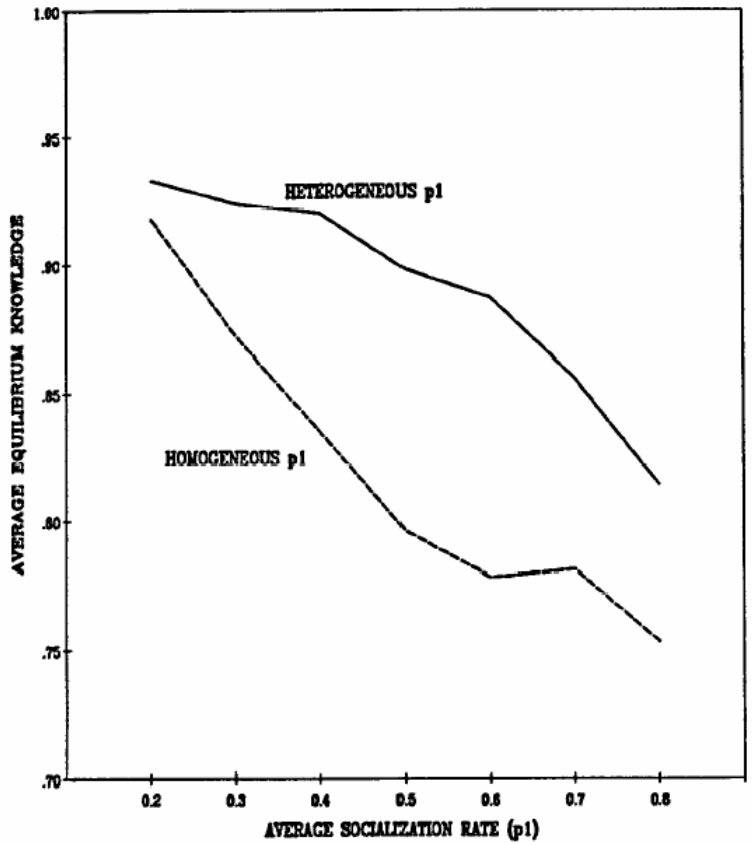

FIGURE 2. Effect of Heterogeneous Socialization Rates ($p_1 = 0.1, 0.9$) on Equilibrium Knowledge. $M = 30$; $N = 50$; $p_2 = 0.5$; 80 Iterations.

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Turnover

- Alternate way of maintaining diversity
- The greater the turnover, the less the avg socialization time, so the less the overall knowledge
- If people learn quickly, then some turnover is very beneficial to prevent groupthink

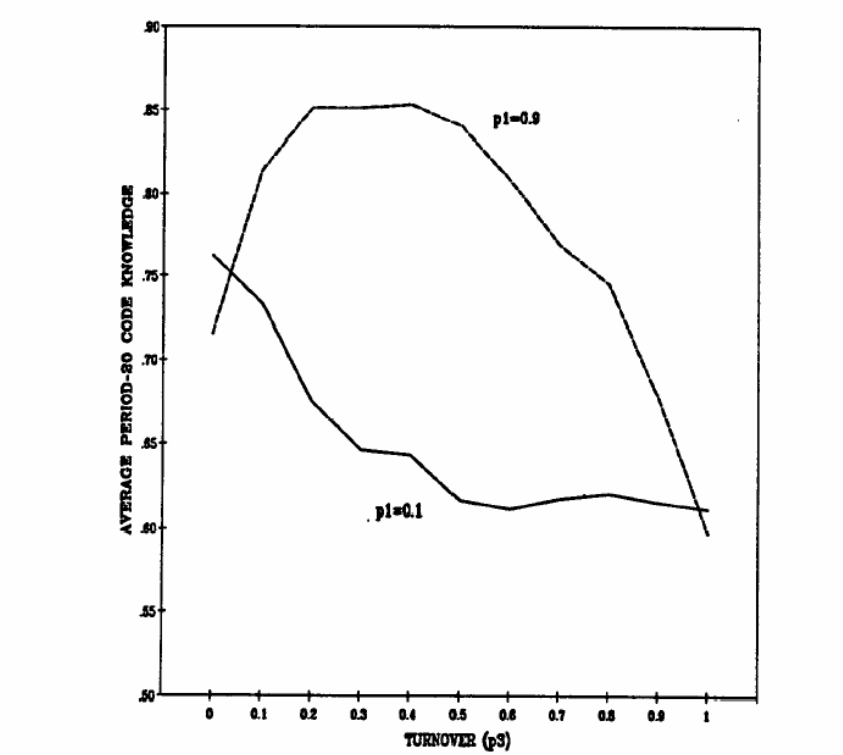

FIGURE 4. Effect of Turnover (p_3) and Socialization Rate (p_1) on Period-20 Code Knowledge. $M = 30$; $N = 50$; $p_2 = 0.5$; 80 Iterations.

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Turbulence

- Changes in reality
- Equilibrium means no more change, so adaptation falls
- This is avoided through turnover

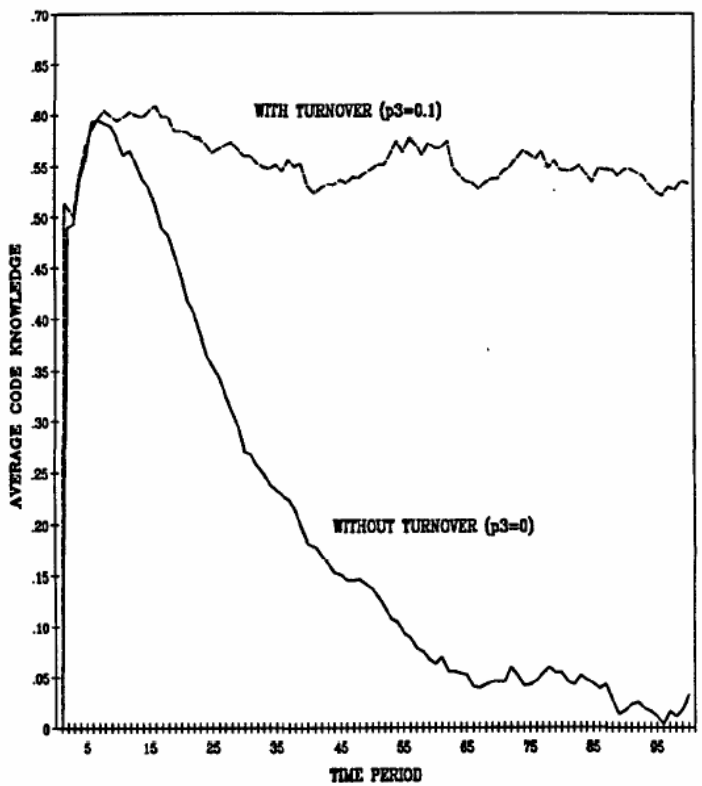

FIGURE 5. Effect of Turbulence (p_4) on Code Knowledge over Time with and Without Turnover (p_3). $M = 30$; $N = 50$; $p_1 = 0.5$; $p_2 = 0.5$; $p_4 = 0.02$; 80 Iterations.

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