

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

March's Exploration & Exploitation Paper

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Exploration/Exploitation

- Trade-off between investing in exploration of new knowledge, and utilization of current knowledge
- Organizations learn from their members, just as members learn from their organizations
- Reality (the market) determines which beliefs are right (or useful)
- Entities
 - Reality (environment)
 - Organizational code (conventional wisdom; org culture)
 - Individuals
- Individuals learn from the code (socialization)
- Organization learns from individuals whose beliefs match reality

Simulation

- Entities
 - Reality
 - the organization's environment; the market
 - Truth is represented by a string of 1s and -1s
 - Organizational code
 - conventional wisdom; org culture
 - Code represented by string of 1s, 0s (no opinion) and -1s
 - Individuals
 - The organization's members, who vary in knowledge
 - Person's knowledge represented by a string of 1s, 0s, -1s
- Individuals learn from the organizational code
 - i.e., socialization – the group's influence on the individual
 - At each time period, if individual's belief differs from org code, then individual adopts org belief with probability p_1
 - If org code is 0, then it has no effect on individuals
- Organization learns from individuals whose beliefs match reality
 - Takes the best ideas and makes them into std practice
 - If total agreement between an individual and reality is higher than org's agreement with reality, then the org learns from the dominant view with probability p_2

Simulation Process

- Start
 - Reality is set to random string of 1s and -1s
 - Org code is set to all 0s
 - Individual beliefs set to random strings of 1s, 0s, -1s
- At each point in time ..
 - Individual beliefs are updated by the org code w/ prob p_1 (individual learning rate)
 - Low p_1 means people are independent thinkers
 - High p_1 means people converge quickly on received wisdom (which is likely to be wrong)
 - Org code is updated by the smarter individuals w/ prob p_2 (organizational learning rate)

Homogeneous learning rates

- If learning rates (p_1) constant across individuals ...
- High p_1 is good for individuals but bad for org code
- Max org knowledge at equilibrium occurs when the org code learns fast and people learn slow
 - i.e., people are independent thinkers
 - Slow individual learning permits more exploration time, which increases prob of right answer

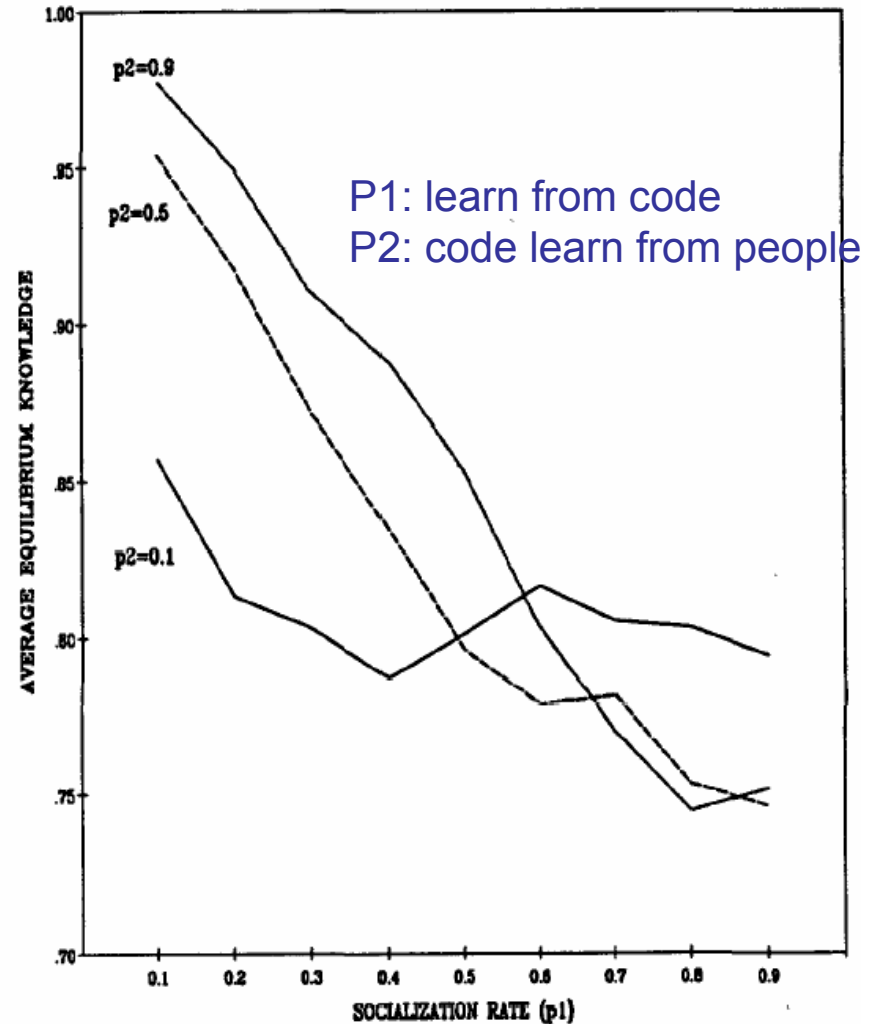
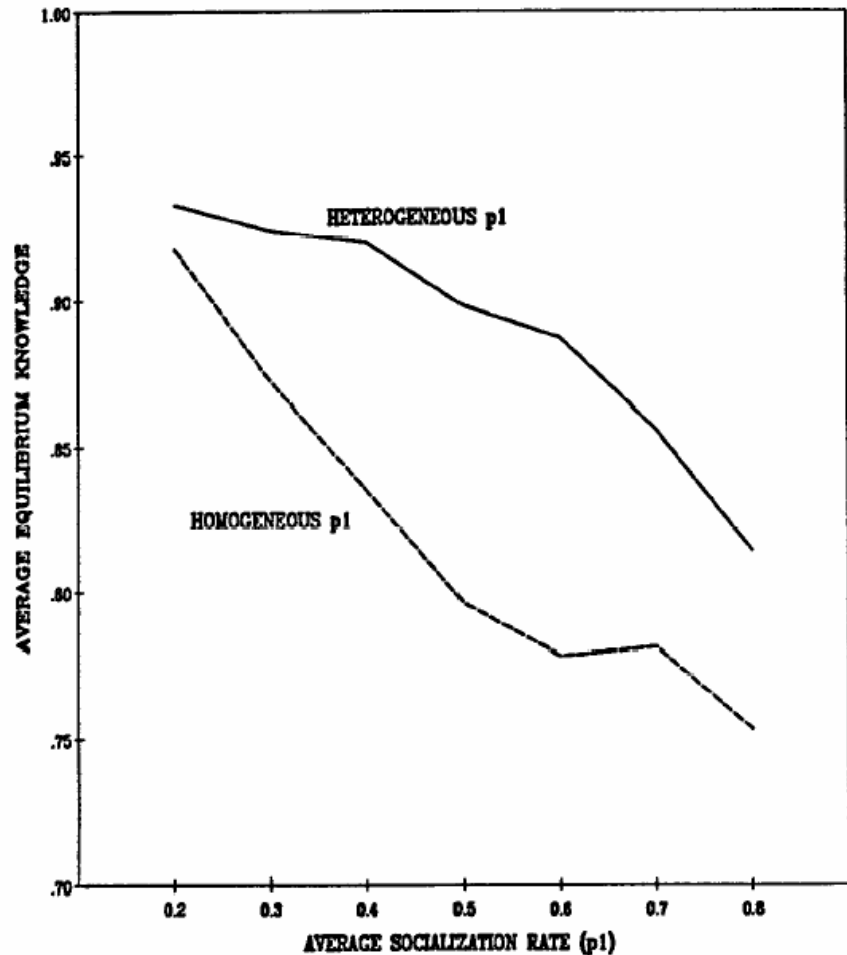


FIGURE 1. Effect of Learning Rates (p_1, p_2) on Equilibrium Knowledge.
 $M = 30; N = 50; 80$ Iterations.

Heterogeneous Learning Rates

- A mix of slow and fast learning individuals always beats a homogeneous set of medium individuals with same average rate

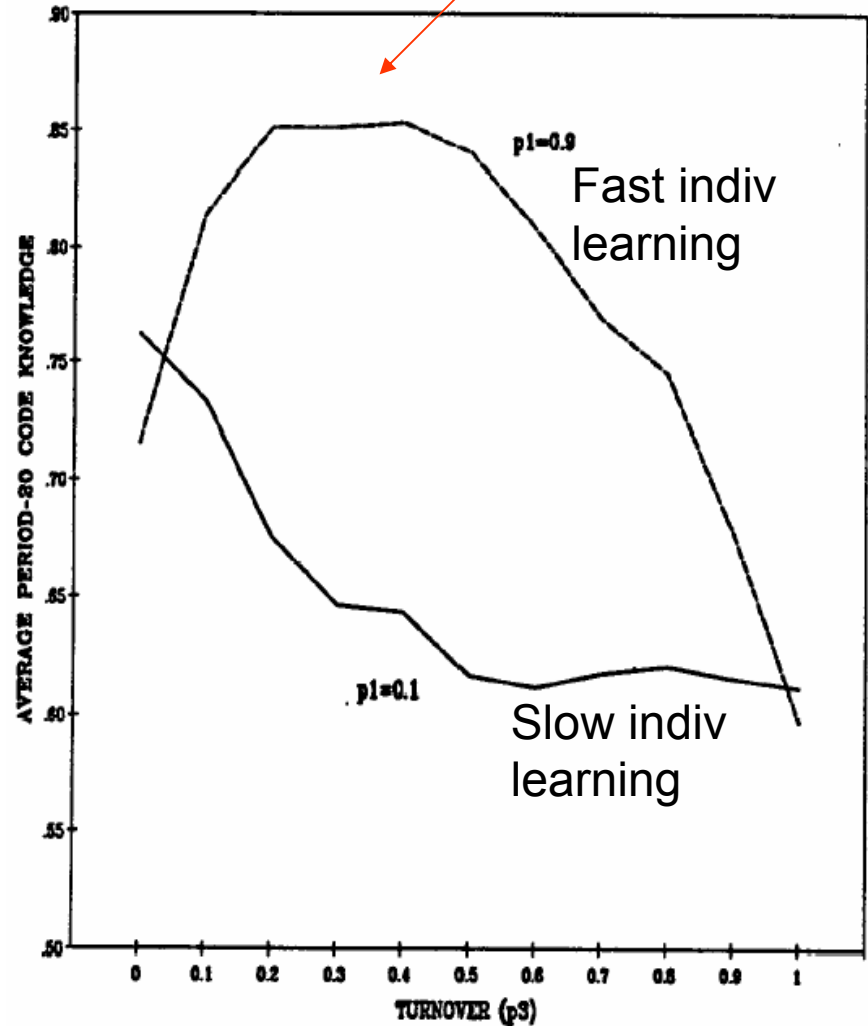


Effect of Heterogeneous Socialization Rates ($p_1 = 0.1, 0.9$) on Equilibrium Knowledge
 $M = 30; N = 50; p_2 = 0.5; 80$ Iterations.

Turnover

- Alternate way of maintaining diversity
 - Besides low value of p_1
- The greater the turnover, the less the avg socialization time, so the less the avg individual knowledge
- But turnover contributes to organizational knowledge if people learn quickly (high p_1)
 - prevents groupthink

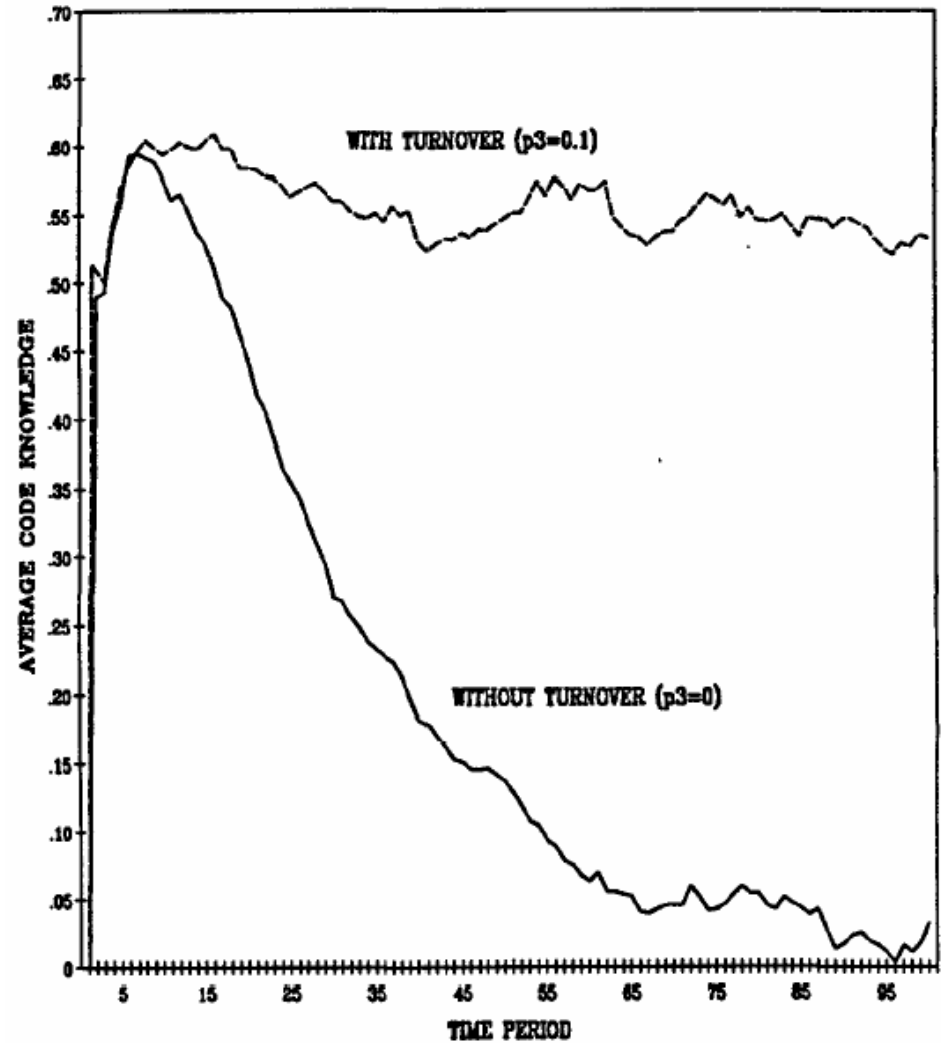
Org learning maximized by moderate turnover



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.

Environmental Turbulence

- Changes in reality
 - With prob p_4 , a -1 changes to +1 or vice-versa
- When individuals and org converge, there is no more change, regardless of changes in reality, so org knowledge (adaptation) necessarily declines
- This is avoided through turnover
 - Prevents convergence, continues exploration



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

Conclusions

- Tension between exploration & exploitation
 - Exploitation
 - Refinement and extension of existing competencies
 - Returns are positive, proximate, predictable
 - Exploration
 - Experimentation with new alternatives; diversity
 - Returns uncertain, distant, and often negative
- Mutual learning has advantages to both individuals and orgs, but contains trap of departing from reality