

Exploring the Edge: Hypothesis- Testing with the ELICIT Multiplayer Intelligence Game

Tara Leweling
taleweli@nps.edu

Dr. Mark Nissen
MNissen@nps.edu

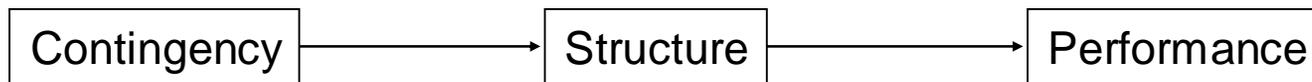
Department of Information Sciences
Naval Postgraduate School
Monterey, CA

Overview

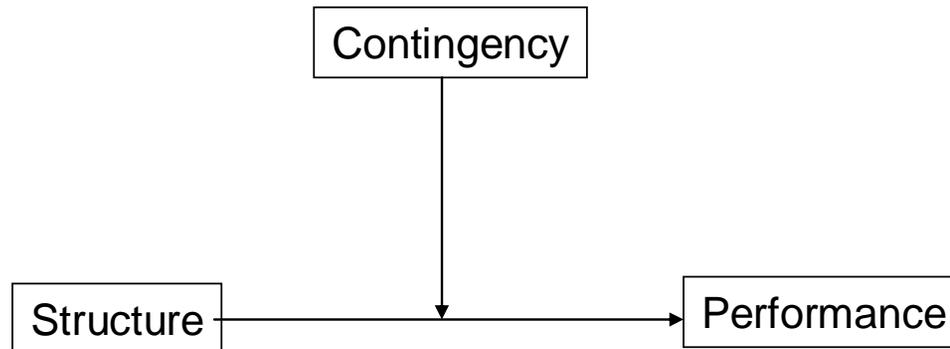
- Theoretical Framework
 - Contingency Theory (Lawrence & Lorsch, 1967; Burns & Stalker, 1961; Donaldson, 1985)
 - Information Processing Theory (Galbraith, 1973; Tushman & Nadler, 1978)
 - Hypotheses
 - Experimental Environment
 - Initial Findings
 - Implications for Theory
 - Implications for Practice
 - Recommendations for Future Experimentation
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Contingency Theory

- Classic Perspective (Pugh, 1968; Hage & Aiken, 1969; Perrow, 1967)



- Contemporary Perspective (Gresov and Drazin, 1997; Meyer et al, 1983)



Information Processing Lens

□ Organizational Form (Structure)

	<u>Edge</u>	<u>Hierarchy</u>
<i>Centralization</i>	Low	High
<i>Specialization</i>	Low	High
<i>Formalization</i>	Low	High

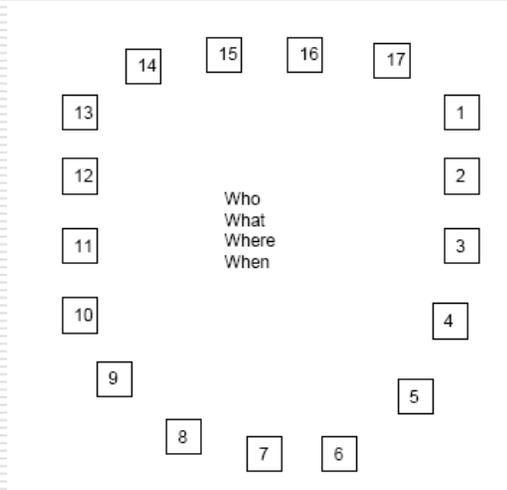
Contingency

□ Knowledge Sharing, Exchange of Mental Models

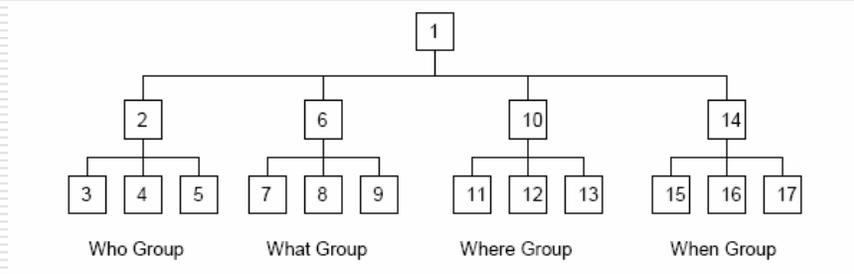
See: Galbraith, 1973; Tushman & Nadler, 1978; Birkinshaw et al, 2002; Cook et al 2000; Nissen & Orr, 2005; Gateau et al, 2007

Organizational Forms

□ Edge



□ Hierarchy



Hypotheses

- ❑ Hypothesis 1. People working together in an Edge organization will outperform those who perform the same work in a Hierarchy.
 - ❑ Hypothesis 2. Organizations comprised of people with greater professional competence will outperform those with less-competent people, regardless of organizational form.
 - ❑ Hypothesis 3. Performance of an Edge or Hierarchy organization will increase over time and through task repetition.
 - ❑ Hypothesis 4. Performance of an Edge organization will increase more quickly than that of a Hierarchy.
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Experimental Design

- 2 x 2 x 2 Factorial Design
 - Organizational Form (Edge, Hierarchy)
 - Organizational Change (None, "Switched" at midpoint)
 - Exchange of Mental Models (Allowed, Disallowed)
- Four teams over four weeks undertake counterterrorism task
 - Task involves high cognition and interdependence among players
 - Each team member identifies future terrorist attack only once
 - New scenario each week; all teams solve homomorphic scenarios
- Operationalization of Edge vs. Hierarchy information sharing

	<u>Edge</u>	<u>Hierarchy</u>
<i>Share</i>	To any player	To any player
<i>Post</i>	To any website	To team website only*
<i>Pull</i>	From any website	From team website only*
<i>"Postcard"</i>	To any player	To teammate or supervisor only*

* Within the Hierarchy, the Cross-Team Coordinator could post & pull from any website, as well as send "Postcards" to subordinates

- Objective performance measured by aggregate *time* and *accuracy*
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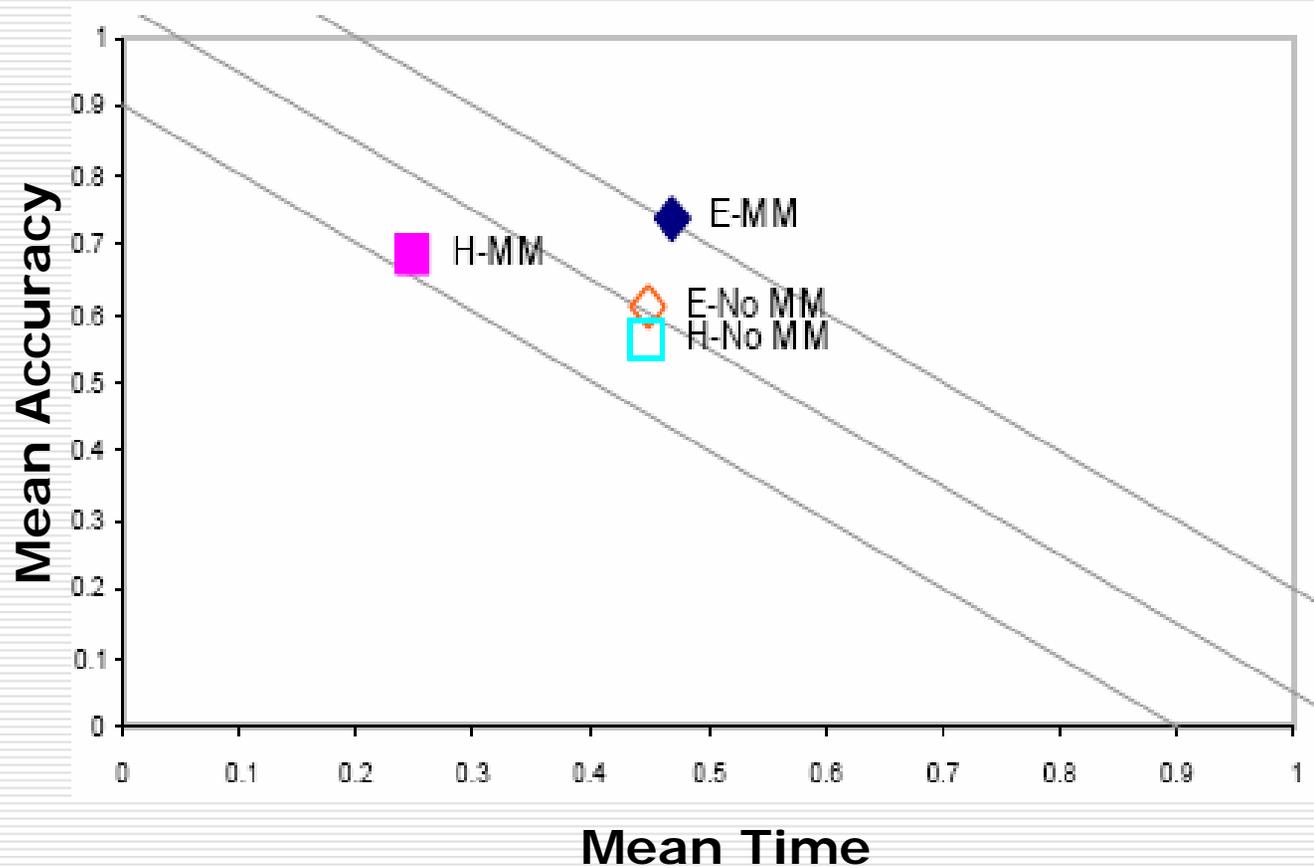
Experimental Groups

Group	Session 1 V4	Session 2 V3	Session 3 V2	Session 4 V1
A – PhD	E – no MM			
B – Advanced C2	H – MM	H – MM	E – MM	E – MM
C – Introductory C2	E – MM	E – MM	H – MM	H – MM
D – SOF / Intel	H – no MM			
<u>Key:</u> V1-V4: Elicit Version 1-4 H: Hierarchy manipulation E: Edge manipulation MM: Mental models distributed No MM: Mental models <i>not</i> distributed				

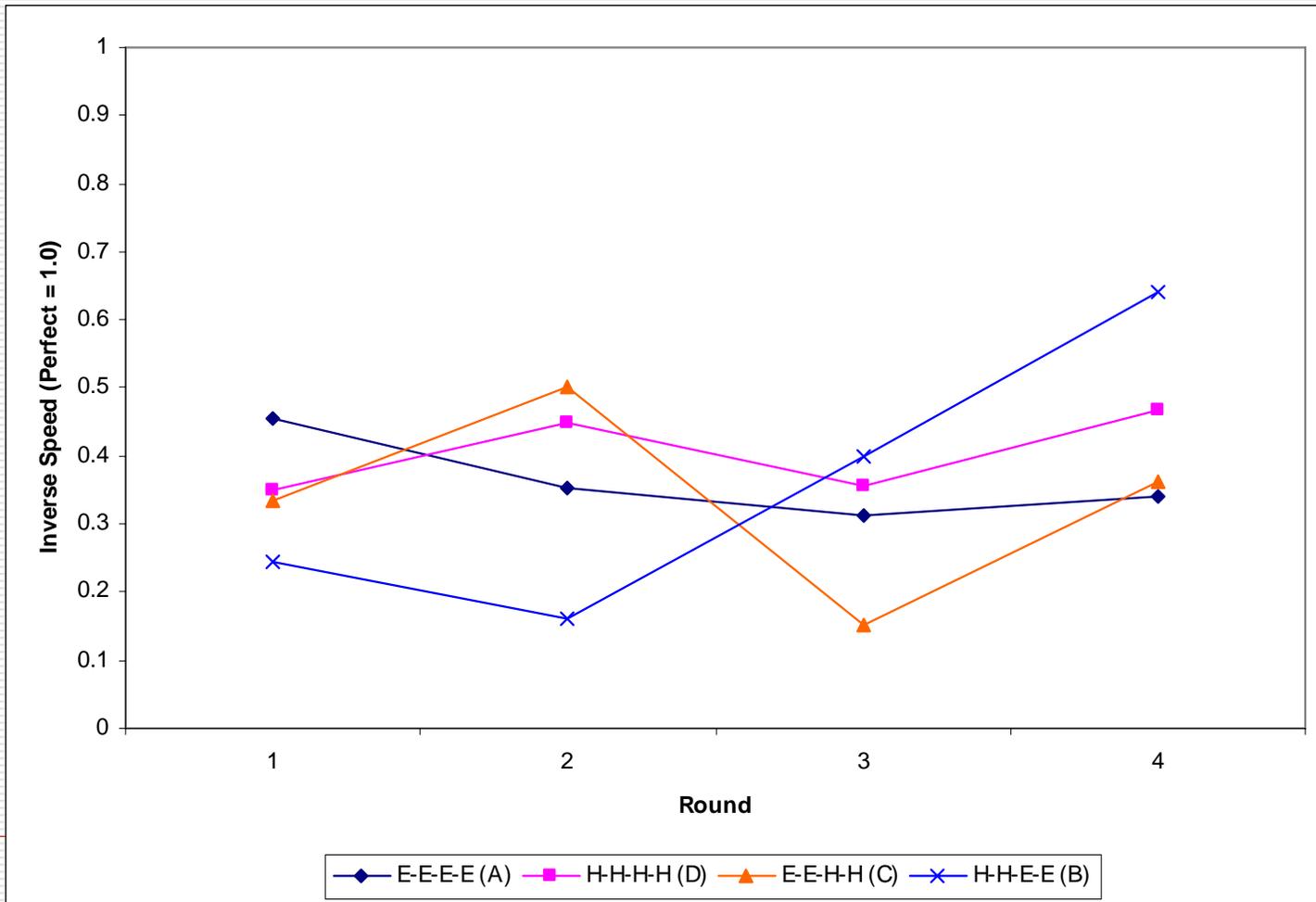
Initial Findings

- Organizational Form
 - Edge outperforms Hierarchy in *time*
 - Same accuracy, greater speed
 - Exchange of mental models
 - Exchanging mental models improves *accuracy*
 - In Edge, exchanging mental models improves accuracy while problem-solving speed is constant
 - In Hierarchy, exchanging mental models improves accuracy while problem-solving slows
 - Organizational Change
 - Hierarchy to Edge: No degradation
 - Edge to Hierarchy: Significant degradation, then recovery
 - Organizational Learning
 - Edge and Hierarchy: *Rate* of team learning is about equal
 - Individual learning within the Edge is more volatile than within the Hierarchy
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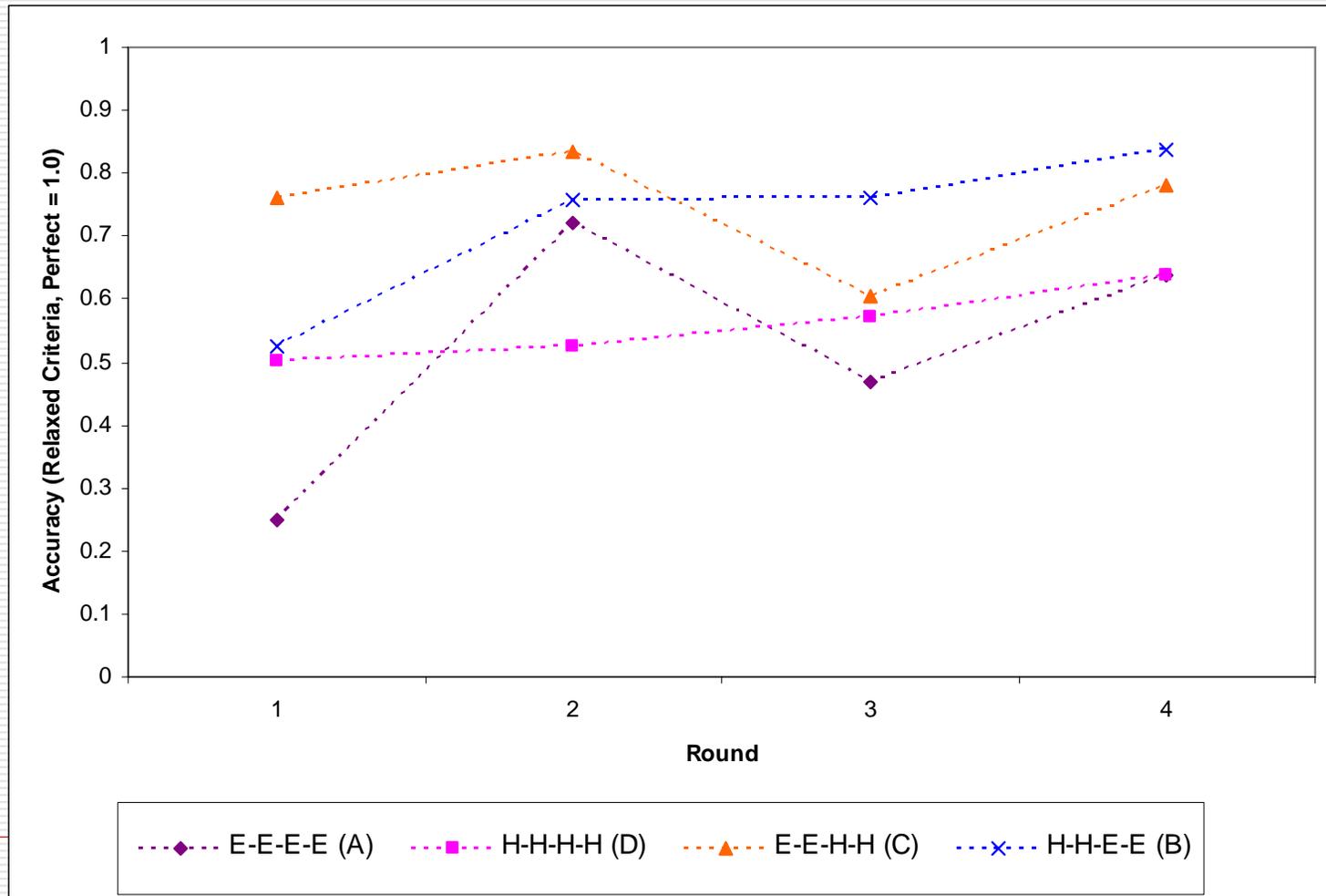
Individual-Level Results



Team Results (Time)



Team Results: Accuracy



Implications for Theory

□ Organizational Forms

- We can think of Edge and Hierarchy forms as organizational information processing structures (i.e., March and Simon, 1950s)
 - What is the relationship between information processing structures and an organization's capacity for transferring and making use of *knowledge*?
 - What is the relationship between information processing structures and volatility when organizations learn?

□ Organizational Change

- Why is change from Edge to Hierarchy detrimental to performance?
 - Why is change from Hierarchy to Edge not detrimental to performance?
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Implications for Policy and Practice

- Example: Hurricane Katrina Disaster Relief Operations
 - If objective performance is critical, participants working on complex, interdependent tasks of disaster relief should lean toward Edge-like organizing
 - Switching disaster relief efforts from Edge-like to Hierarchy-like organizing will degrade performance, and the organization will perhaps then recover
 - Anecdotal evidence suggests, however, that agents “lower” in the Hierarchy may limit or “opt out” of participation
- Consistent with prior work when considered in terms of mutual adjustment as a primary coordination mechanism (Reeves and Turner 1972; Argote 1982)

Traditional C2 structures are ineffective for complex tasks requiring significant coordination

Implications for Policy and Practice

- In uncertain, new, novel and/or dynamic task environments...
 - *Countering insurgents*
 - *Creating new interagency and coalition partnerships*
 - *Building capacity and operating procedures for new mission areas (e.g., counterpiracy, protecting economic exclusion zones)*
- ... Knowledge sharing and transfer is critical
- “Edge-like” organizing is more optimal
- In known, stable and conventional task environments ...
 - *Managing HQ “ops” & “watch” centers*
 - *Producing an Air Tasking Order*
 - *Teaching basic soldiering skills*
- ...Knowledge sharing and transfer is less critical
- “Hierarchy-like” organizing may produce efficiencies

*“Edge-like” organizing is more optimal
for novel or dynamic situations*

Summary

- ❑ Different task environments call for different organizing principles
 - ❑ Edge and Hierarchy have unique strengths and weaknesses
 - ❑ Most optimal form depends upon stakeholder goals for organization
 - ❑ “Gut” instincts may not enact sufficient organizational redesign
 - Experimentation is critical for determining optimal ways to organize in various task contexts
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