Using microworlds to understand cultural influences on distributed collaborative decision making in C2 settings

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Outline

• Research questions and domain of study
  – Onsite operations coordination centers
• Background
  – Culture
• Method
  – Constraints on our study
  – Microworlds
  – Participants
  – Procedure
• Results and implications
Research questions

• Do cultural differences in decision making and cooperation pose barriers to efficient cooperation in multinational coordination teams?

• If so, how?

• Can we identify dimensions of cultural diversity in norms to cooperation and coordination?
Onsite Operations Coordination Centers (OSOCC)

- Used by the UN, the EU Commission, and NATO/PfP.
- The OSOCC team is formed ad-hoc and on-site.
What is Culture?

• Culture is a relatively organized system of shared meanings (Smith and Bond, 1999, p. 39).

• Culture is passed from one generation to the next, sustained by social relations within highly specific contexts.

• Our cultural heritage largely defines our values.
  – how we prefer to lead our lives.
Culture and Values

• Schwartz’s ten value types:
  – Universalism
  – Benevolence
  – Conformity
  – Tradition
  – Security
  – Power
  – Achievement
  – Hedonism
  – Stimulation
  – Self-direction

(Schwartz, 1992; 1994)
Eliciting Values

• Schwartz’s ten value types:
  – Universalism
  – Benevolence
  – Conformity
  – Tradition
  – Security
  – Power
  – Achievement
  – Hedonism
  – Stimulation
  – Self-direction

• Self-direction
  – Creativity
  – Curious
  – Freedom
  – Choosing own goals
  – Independent

• What are the guiding principles in your life?
• Which are (un) important?

(Schwartz, 1992; 1994)
Culture and Cognition

• Culture is particularly visible (to outsiders) when studying (or engaging in) verbal communication.
  – Different cultures have different communication styles
    • e.g., turn taking

• Culture influences how we perceive information, think about it, and act upon it.
  – Different cultures make different assumptions about the world of things and people
    • e.g., task allocation
  – Different cultures have different norms for decision making:
Culture’s impact on Decision Making

• Who makes the decision?
  – Which authorities and entities are invested with responsibility and control over decision making?

• Who has the right to express opinions or advise?

• What values and interests are served by the decision?

• Is decision making an activity for the individual or the group?
Research question

- Do cultural differences in decision making and cooperation pose barriers to efficient cooperation in multinational coordination teams?

- If so, how?

- Can we identify dimensions of cultural diversity in norms to cooperation and coordination?
Method

How we elicit cultural differences in decision making using a laboratory simulation of an emergency management task.
Constraints on our study

- To elicit and capture spontaneously collaborative decision making
- To emulate the ad-hoc nature of team formation
- To gather individual self-report information about values that are likely to influence teamwork and decision making
Microworlds

• A microworld is a simulation environment that bridges the gap between traditional laboratory experiments and field research.
  
  – A small and well-controlled system that retains the important characteristics of the real world system.
  
  – Dynamic
  
  – Complex
  
  – Controllable
participants in a
network-based
setting

researcher

observation

scenario
design

participants in a
network-based
setting

information

commands

vegetation,
buildings,
and the
fire

fire-fighting
units, water and
fuel providing
units
The Players’ Tasks

• Manage multiple and potentially conflicting goals
  – Suppress the fire or save the buildings?

• Allocate responsibilities
  – Players ↔ Trucks
  – Players ↔ Areas
  – ± Leader

• Develop a strategy for fighting the fire
  – Attack the fire? Control the burn?

• Take actions that implement the strategy
  – Issue commands to trucks
  – Manage limited resources

• Communicate and cooperate
  – Use the C3Fire e-mail system
  – Coordinate actions
Data capture and display

• Communication (Email)

• Commands to trucks

• Firefighting
  – Truck movement
  – Fire suppression
  – Clusters of activity
Participants

- We have conducted 12 experiments using C3Fire.
- Seven or eight participants took part in each experiment.
- To emulate the ad-hoc nature of the OSOCC, participants were randomly and anonymously divided into two teams.

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Groups</th>
<th>Number of participants</th>
<th>Number of sessions for analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swedes</td>
<td>4</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>Bosnians</td>
<td>3</td>
<td>22</td>
<td>46</td>
</tr>
<tr>
<td>Indians</td>
<td>4</td>
<td>30</td>
<td>62</td>
</tr>
<tr>
<td>Iranians</td>
<td>1</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>11(12)</strong></td>
<td><strong>84 (92)</strong></td>
<td><strong>172 (180)</strong></td>
</tr>
</tbody>
</table>
Procedure

• Each participant
  – Is assigned a computer.
  – Reads instructions to subjects.
  – Receives training (individual and team)

• Cycle of activities
  – C3Fire play
  – Questionnaires

Q’s = questionnaires
1. C3Fire
2. Q’s
3. C3Fire
4. Q’s
5. C3Fire
6. Q’s
7. C3Fire
8. Etc.

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C3Fire play

- Two parallel sessions start simultaneously. C3Fire assigns the teams automatically.

- The game lasts until the fire is suppressed or 20 minutes have passed.
Questionnaires

• Directly after six of the eight sessions, the participants are asked to fill in a questionnaire:
  – Demographics
  – Neo FFI (Costa & McCrae, 1989)
  – Time Horizon
  – Conflict avoidance
  – Tolerance for Uncertainty

• All questionnaires were distributed in Swedish for the Swedes, the Iranians, and the Bosnians, and in English for the Indians.
  – Back translation was used to insure conformity
Results and implications
Three dimensions of cultural diversity

1. Task allocation: Their methods for allocating roles and tasks across team members,

2. Conflict avoidance: The teams’ attitude toward conflict, and

3. Goal establishment: How goals and strategies are established.
Task allocation

Truck identity

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Task allocation

Truck identity

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Partitioned structure

convenience

Shared structure

fire

Structures with leadership

preference

Vague or no structure

gas

assistant

vague

coordinator

none
Conflict avoidance

1. Task allocation: Their methods for allocating roles and tasks across team members,

2. The teams’ attitude toward conflict, and

3. How goals and strategies are established.
The correlogram

Conflict Avoidance: SWEDES

Hedonism  Achievement  Power  Security  Conformity  Tradition  Benevolence  Universalism  Self-direction  Stimulation
Conflict avoidance
– all groups

Correlations of Value Types with Conflict Avoidance

- Hedonism
- Achievement
- Power
- Security
- Conformity
- Tradition
- Benevolence
- Universalism
- Self-Direction
- Stimulation

Swedes
Indians
Bosnians
Models of conflict avoidance

Swedes

Indians

Bosnians

Hedonism
Achievement
Power
Security
Conformity
Tradition
Benevolence
Universalism
Self-Direction
Stimulation

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Models of conflict avoidance

• Swedish and Indian model:
  – Conservative people seek to avoid conflict.
    • Maxima at conformity and tradition
  – Pleasure seekers do not avoid conflict.
    • Minima at hedonism and stimulation

• Bosnian model:
  – Weak correlations between conflict avoidance and all value types.
  – Have Bosnians been conditioned to believe that conflict cannot be avoided?
Goal establishment

1. Task allocation: Their methods for allocating roles and tasks across team members,

2. The teams’ attitude toward conflict, and

3. How goals and strategies are set up
   - Priorities
   - Firefighting behavior
Priorities and behavior

Fight the fire

Protect houses and schools
### Three dimensions of cultural diversity

<table>
<thead>
<tr>
<th>Dimension</th>
<th>−</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearly structured task allocation</td>
<td>Indians; Bosnians</td>
<td>Swedes</td>
</tr>
<tr>
<td>Tolerance for conflict</td>
<td>Swedes; Indians</td>
<td>Bosnians</td>
</tr>
<tr>
<td>Clearly structured goals</td>
<td></td>
<td>Swedes; Indians; Bosnians</td>
</tr>
</tbody>
</table>
Performance

• The three cultures established different goals
  – Swedes attacked the fire
  – Bosnians contained the fire
  – Indians saved the houses

• Hence, there is no single performance metric that can be applied to all groups.

• This is a major take home message!
Implications

• The data showed that people from these three cultures have diverse norms for collaborative decision making.

• The existence of cultural differences does not imply that one way is better than the other.

• These differences might lead to difficulties in cooperation.
Implications for the OSOCC

• Cultural aspects of cooperation and communication should be topics during training.

• Helping personnel of multinational teams learn and know about cultural differences might create understanding and promote better cooperation.
Thank you for your attention!

Questions or comments?

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