



A Framework for Understanding Cultural Diversity in Cognition and Teamwork

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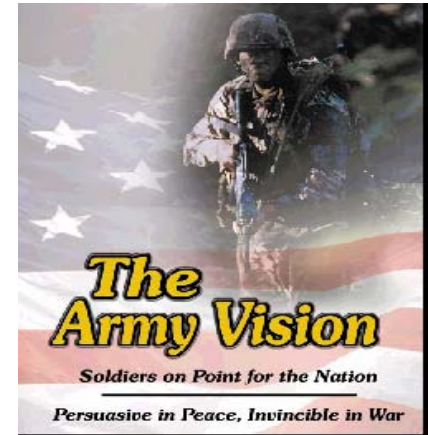
Army Research Laboratory

Human Factors Integration Division

Human Research and Engineering Directorate

Uncertainty and Adaptability

- Objective Force operational environment will be characterized by greater access to information and increased operational **uncertainty**.
- A focus of the ARL HRED Command and Control Research program is to improve leader and team **adaptability** to meet Objective Force requirements.



- Uncertainty is a sense of doubt that blocks or delays action.
- Uncertainty results from:
 - Incomplete Information
 - Inadequate Understanding
 - Undifferentiated Alternatives
- Strategies for coping with uncertainty include:
 - Over-Planning
 - Delay of Action
 - Adaptability

- Adaptability is a way to cope with uncertainty.
- Adaptability is achieved by:
 - Recognizing the need to adapt
 - Understanding how to adapt
 - Having the resources to adapt
 - Choosing to adapt
- Adaptability is influenced by:
 - Practice
 - Expectations
 - Preparation
 - Technology

Research Question

How is teamwork affected by culture?



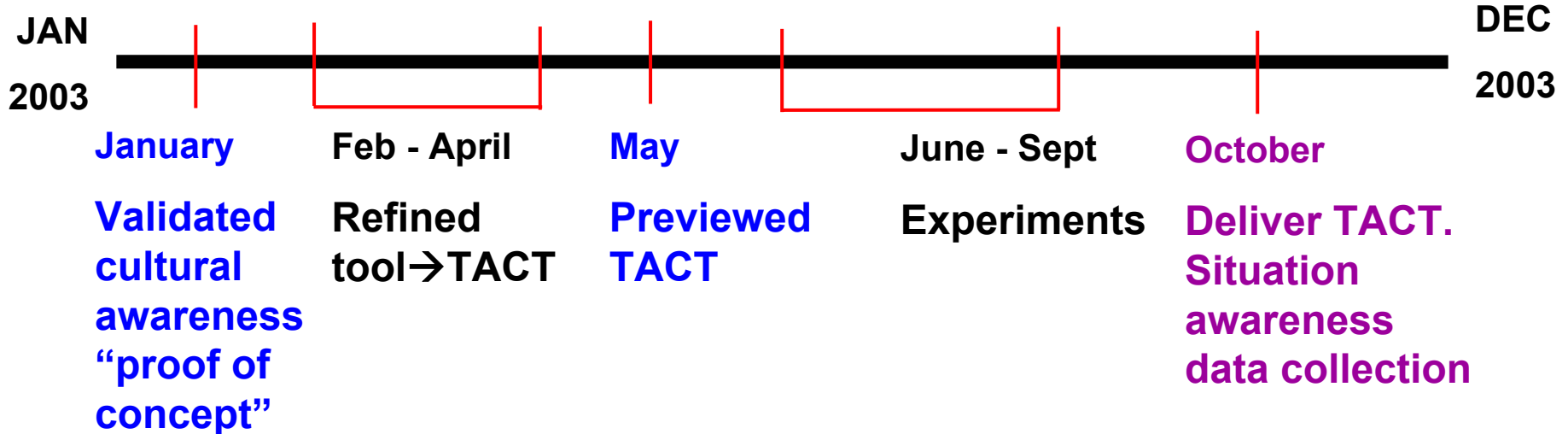
Research Objective

Improve performance on multinational teams.

- **Develop models**
- **Develop and test training tools**

Groundwork for developing recommendations for information systems design and collaborative tools for multinational teamwork

Time Line



Barriers to Adaptability

• Lack of Trust

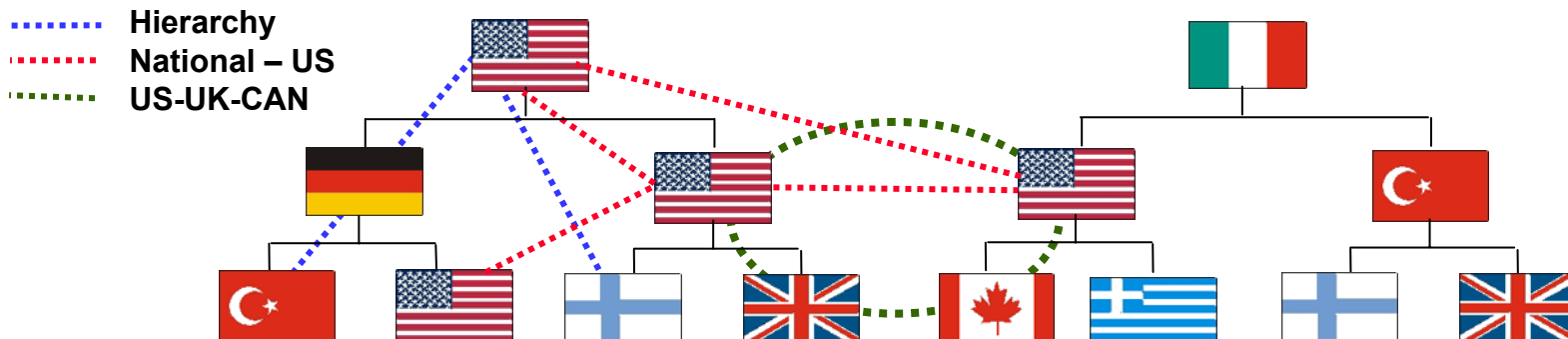
- Unsure of team member capabilities
- Closely monitor task performance to insure understanding and compliance
 - Time consuming
 - Perception of distrust and micromanagement
- Tendency to work vertically, rather than horizontally within or across teams (by the book)
- Tendency to work within national teams both horizontally and vertically

• Lack of Cohesion

- Lack of commitment to the HQ SFOR team
- Lack of acceptance of team goals
- Slow team building

• Focus on Efficiency

- Limits information exchange
- Discourages risk taking or creativity





Theoretical Basis

Teamwork

- **Similarities in functions exist across team taxonomies (Dickinson & McIntyre, 1997; Fleishman & Zaccarro, 1992)**
- **Team performance depends on many factors including team members' knowledge, skills, and abilities relative to a task or the team (Cannon-Bowers & Salas, 1997)**
- **Conceptualizing teamwork in terms of situation assessment, assigning roles and responsibilities, coordination, and support emphasizes cognitive functions that manifest in measurable behaviors (McGlynn, Sutton, Sprague, Demski, & Pierce, 1999)**

Culture

- **Individuals have similar culturally based behavior patterns associated with cognitive values or dimensions, that vary by degree (Hofstede, 1980; Kluckhohn and Strodtbeck, 1971)**
- **Interactions among members of multinational teams will improve if team members could see the world through each others' eyes (Klein, Pongonis, and Klein, 2000)**
- **Dimensions of national culture potentially impact multinational military command and control teamwork (Klein, Klein, & Mumaw, 2001)**

Linking Culture to Teamwork and Teamwork to Team Performance

Teamwork Functions

Situation Assessment: Sharing of information among team members on resources and constraints, task and goals, and priorities.

Coordination: Activity pacing, response sequencing, time and position coordination.

Assigning Roles and Responsibilities: Matching members to tasks.

Support Behavior: Assisting team members in monitoring and correcting errors, and providing back-up to other members.

Cultural Dimensions

Power Distance: The extent to which unequal distribution of power is accepted and expected.

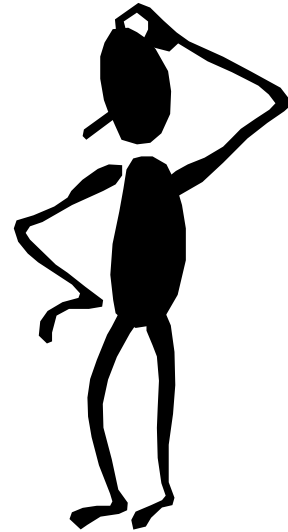
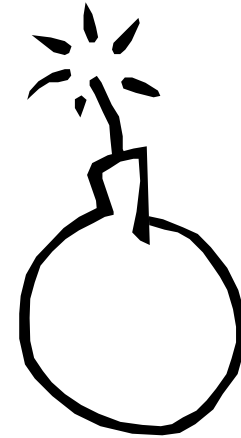
Uncertainty Avoidance: The extent to which uncertainty is experienced as stressful and actions are taken to avoid it.

Activity Orientation: The extent to which independence or interdependence is emphasized.

Potential Impact (Examples)

•Power Distance

➤ If a leader is high Power Distance, team members may not be used to exploit their best skills, possibly resulting in miscommunication, lack of coordination, and loss in situational awareness.



•Uncertainty Avoidance

➤ If a leader has a high need for certainty, the task may become so detailed and structured that it obviates any creative action on the part of team members, thereby defeating the purpose of team action.

•Activity Orientation

➤ If a leader is highly independent-oriented, the leader may disregard some team members' contributions if they don't obviously contribute to the task at hand. Information and opportunities for shared information may be lost.

Framework for understanding the relationship between cognitions and team functions

| | | Situation Assessment | Coordination | Roles & Responsibilities | Support Behavior |
|------------------------------|-------------------------|----------------------|--------------|--------------------------|------------------|
| Power Distance | High | | | | |
| | Low | | | | |
| Uncertainty Avoidance | High Need for Certainty | | | | |
| | Low Need for Certainty | | | | |
| Activity Orientation | Independent | | | | |
| | Interdependent | | | | |

Framework for understanding the relationship between cognitions and team functions

| | End Point | Situation Assessment | Coordination | Roles & Responsibilities | Support Behavior |
|------------------------------|-------------------------|----------------------|---------------|--------------------------|------------------|
| Power Distance | High | Vertical | Centralized | Rank | Leader |
| | Low | Horizontal | Decentralized | Expertise | Team |
| Uncertainty Avoidance | High Need for Certainty | Clear Info | Well-defined | Highly Specialized | Formal |
| | Low Need for Certainty | Ambiguous Info | <i>Ad-hoc</i> | Multi-functional | Informal |
| Activity Orientation | Independent | Direct Comms | Doing | Skills & Abilities | Task |
| | Interdependent | Indirect Comms | Being | Connections | Relationship |

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Hypotheses:

- Barriers to Adaptability are created by High Power Distance**
- Barriers to Adaptability are created by High Need for Certainty**

Framework Validation

•Participants

- 17 participants (16 male, 1 female)
- 7 nations represented
- Native English speakers or ESL speakers
- 94% first tour at HQ SFOR
- 53% previous NATO experience

•Scenario-based, Structured Interview Format

- 12 questions (1 per cell)
- Sessions tape recorded

•Data transcribed and coded

- 3 transcribers also rated content
- Consensus reached on rating discrepancies



Scenario



Task: Assemble a team and re-design Newcomers' Orientation

Suspense: 30 days

Restriction: Must include representatives of at least 5 nations

Example of Targeted Questions

| | End Point | Situation Assessment | Coordination | Roles & Responsibilities | Support Behavior |
|-----------------------|-------------------------|----------------------|--------------|--------------------------|------------------|
| Power Distance | High | PD x SA | | | |
| | Low | | | | |
| Uncertainty Avoidance | High Need for Certainty | | | | |
| | Low Need for Certainty | | | | |
| Activity Orientation | Independent | | | | AO x SB |
| | Interdependent | | | | |

PD x SA Question Asked: *Is it important that information flow to you first? Why or why not?*

AO x SB Question Asked: *If you received confusing information from one team member, who would you request help from to clarify this information? Why?*

Framework Validation *continued*

•Categorical Analysis

- Data collapsed across team functions due to small sample size
- Data collapsed across nationality to reflect American versus non-American results.
- Data collapsed across language to reflect native English speaker versus non-native English speaker results

•Results*

| | Americans | | Native English Speakers | | Non-Native English Speakers | |
|-----------------------|-----------|-----|-------------------------|-----|-----------------------------|-----|
| | Mean | SD | Mean | SD | Mean | SD |
| Power Distance | 1.45 | .11 | 1.39 | .09 | 1.43 | .14 |
| Uncertainty Avoidance | 1.40 | .10 | 1.41 | .08 | 1.50 | .14 |
| Activity Orientation | 1.58 | .09 | 1.51 | .08 | 1.63 | .13 |

**Non-significant*

Cultural Awareness Training



- **Klein Associates, Inc. “Proof of Concept”**
- **Army Research Laboratory: Training Adaptable Coalition Teamwork (TACT)**

“Proof of Concept” Usability Survey

•Participants

- **60 participants (57 male, 3 female)**
- **18 nations represented**
- **Native English speakers or ESL speakers**

•Measurement materials

- **Paper and pencil usability survey**
 - **Pre- and Post-test***
- *Discontinued due to time constraints.**



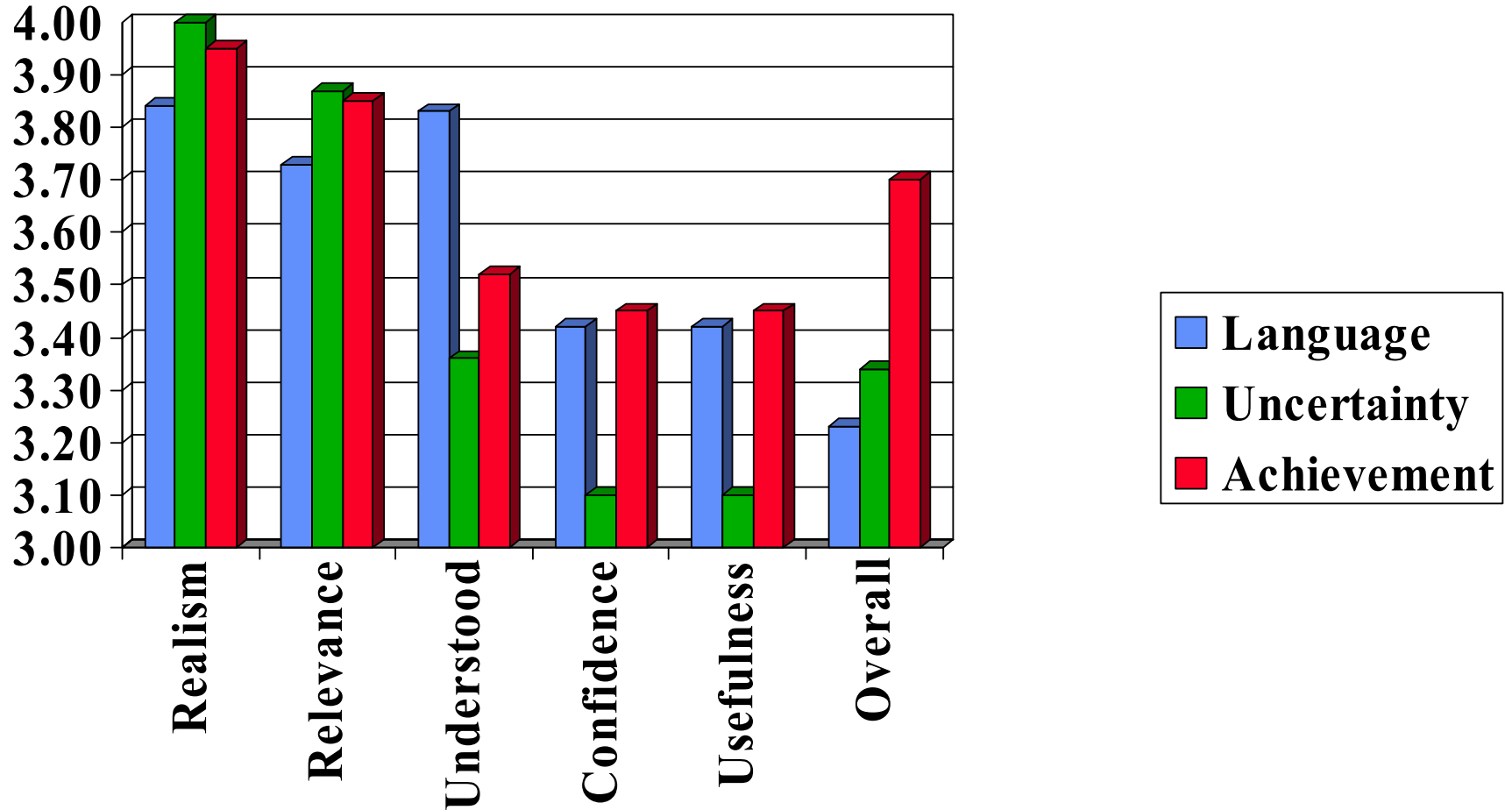
Computer based training

•Three modules

- **Language (19 participants)**
- **Tolerance for Uncertainty (20 participants)**
- **Achievement Orientation (21 participants)**

Survey Items

Five-point scale (1 – 5); Rating of 5 is a better rating than 1



Opportunities for Improvement

•Written Comments

- Increase content
- Increase student interaction with the computer
- Embed knowledge assessments
- Decrease difficulty for non-native English speakers.



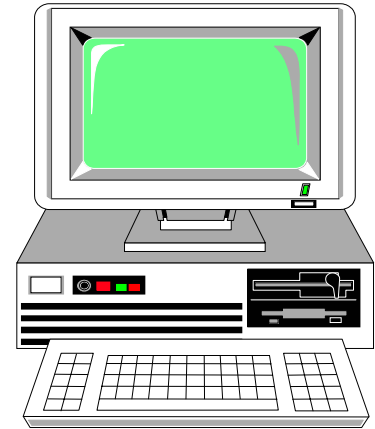
Data supported initiation of an iterative process of refine, test, and refine for the training tool.

Training Adaptable Coalition Teamwork (TACT)

Leaders and teams that recognize culturally based biases and understand the implication of culture's impact on fundamental team performance functions are better prepared to adapt, as needed, to ensure mission success.

Self-paced computer-based training (CBT) tool

The training focus is on national culture, or the values, beliefs, and thoughts that guide interpretation of unfolding events and social interactions on multinational military command and control teams.



Military Peacekeeping Officers learn:

- Ways to help reduce or avoid teamwork problems due to culturally based cognitive differences**
- Ways for turning cultural diversity into mission strengths**

Dissemination of Results

Framework Concept

- **ARL-HRED, Human Factors Integration Division, Technical Advisory Board, June, 2003**
- **8th International Command and Control Research and Technology Symposium, June 2003, National Defense University, Washington, D.C.**

“Proof of Concept”

- **HFES 47th Annual Meeting, Oct 2003, Denver, Colorado**



Related Work

NATO Concept Development and Experimentation (CDE)

- **Proposal titled “Leader and team adaptability in multinational coalitions: Cultural diversity in cognition and teamwork”**
- **Valuable opportunity for the international community to synchronize efforts to develop adaptive leaders and teams**

Small Business Innovative Research (SBIR) 03.2 Topic

- **Solicitation titled “Advancing the Objective Force through multinational coalitions and interagency task forces”**
- **Offers agile, free thinking, small, high tech companies the opportunity to generate innovative and significant solutions to meet soldier needs**

Back up slides

Question Set



•Situation Assessment

- **Power Distance:** Is it important that information flow to you first? Why or why not?
- **Uncertainty Avoidance:** As the team is operating, how much detail do you want?
- **Activity Orientation:** When providing a status update, would you update the team as a whole or each member individually?

•Roles & Responsibilities

- **Power Distance:** What issues would you take under consideration in assigning roles & responsibilities for coming up with suggestions for improving the orientation program?
- **Uncertainty Avoidance:** Will you have specialized roles and responsibilities on your team or will team members have multifunctional roles?
- **Activity Orientation:** What decision criteria did you use to assign responsibilities?

Question Set *continued*



•Coordination

- **Power Distance:** How are decisions made?
- **Uncertainty Avoidance:** Would you plan for the meetings or have them as things come up?
- **Activity Orientation:** Would you have the team working together or have them working independently?

•Support Behavior

- **Power Distance:** How will progress toward the goal be monitored and who will be responsible to correct errors that come up?
- **Uncertainty Avoidance:** How do you like progress updates, more on the formal or the informal side?
- **Activity Orientation:** If you received information from one team member that was confusing, who would you request help from to clarify this information? Why would you choose this person to turn to?