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Using Microworlds to Understand Cultural Influences on Distributed Collaborative Decision Making in C2 Settings

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Abstract

As a means to facilitate coordination of international relief teams during sudden onset disasters, the UN has formed a structure called the On Site Operations Coordination Center (OSOCC). The main objective of the OSOCC is to coordinate international relief teams and help local authorities re-establish control in the affected area. As with any operation where people from different parts of the world are involved, multiculturalism can become an issue. Differences in values, norms and attitudes can create problems in communication, planning and execution of the operation. We use the C3Fire microworld and the Schwartz Value Survey as our main instruments to study cultural influences in command and control decision making in simulated OSOCC. The C3Fire microworld has been used extensively in research on networked-based command and control. Augmented with observation of a real OSOCC exercise, the experimental studies provide the basis for formulating clusters of behavioral differences in command and control that one can expect to encounter during an international operation. Results show that culturally-driven differences in planning and leadership style can pose potential barriers to efficient decision making in multicultural command-and-control centers.

Introduction

In 1988, a major earthquake struck Armenia. Many international relief teams came to help Armenian authorities to deal with the emergency. In the aftermath of the Armenian earthquake and other natural disasters, stories were told of international teams accidentally searching the same villages over and over while leaving other areas unsearched, resulting in many deaths. It became widely recognized that there was a need for more timely and coordinated response from international relief teams and that their work must not be a burden on the stricken country's resources. As a means to facilitate coordination of international relief teams during sudden onset disasters, a structure called the On Site Operations Coordination Center (OSOCC) was created.

The UN considers the OSOCC to be a coordination structure, not a command and control (C2) center. The purpose of an OSOCC is not to command international relief teams during the aftermath of a disaster. Rather, its purpose is to make impartial and transparent recommendations about how local authorities might choose to coordinate the efforts of the international relief teams. To use the label "command and control" to describe an OSOCC is therefore politically, and to some extent procedurally, incorrect. However, the recommendations made by the OSOCC strongly influence the relief effort and effectively function as executive directives. Moreover, the main objective of the OSOCC is to re-establish control in the affected area. Pragmatically, if not politically, it is appropriate to consider OSOCC work in the light of what is known about C2 decision making.

This paper has six parts. We first discuss culture and its potential impacts on decision making in C2 settings. The second part provides a description of the On-Site Operations Coordination Center (OSOCC) structure and function. The third part provides an overview of microworlds in general and of the C3Fire microworld specifically. The fourth part discusses the two studies we have conducted to capture cultural influences on decision making in C2 settings. The results from the two studies are presented in part five. The paper concludes with a discussion of the implications of the two studies for OSOCC specifically and command and control generally that proposes four clusters of culturally-driven differences in expectations and preferences for collaborative decision making.

Note that we have not conducted an exhaustive survey of how people from different cultures act in C2 settings. Our aim is more modest: to identify clusters of behavioral differences in C2 decision making that one can expect to encounter during an international operation. If clustering of differences becomes an accepted part of training programs for C2 personnel, it may help them bridge cultural barriers in OSOCC and other multicultural C2 settings.

Culture and C2 decision making

We argue that culture is a strong influential factor in international C2 operations. It is therefore relevant to first define what culture is. Most people have some idea, drawn from their own culture's folk psychology, of what the concept 'culture' means. These ideas tend to fall short because culture is a complex phenomenon. Triandis (1996) points out that while there are many definitions of culture, there is wide agreement that the elements of culture are shared by those with a common language, within a specific historic period, and a contiguous geographic location. Among these elements are customs, values and religious beliefs. These and other elements provide standards for perceiving, believing, evaluating, communicating, and acting. Culture is not encoded in our DNA but is propagated by interpersonal relations within a given physical environment (Duranti, 1997). In line with Duranti, Kim and Markus (1999) argue that cultures are composites formed by the immediate contingencies of specific sociohistorical circumstances and of individual actions. Culture emerges and is sustained by social relations within highly specific contexts. For succinctness, we adopt Smith and Bond's (1999, p. 39) definition and interpret it through the lens provided by Triandis and Duranti: a culture is a relatively organized system of shared meanings.

Culture's relation to cognition and communication

Our cultural heritage influences how we think, speak and act, and cannot easily be ignored. The influence of culture on cognition is partially revealed by studying language and communication. Innumerable studies have compared communication patterns across cultures (see e.g. Di Luzio, Günthner & Orletti, 2001) and found cultural influences on communication. Not only do we have different languages, but also different communication styles. For example, turn-taking differs remarkably between cultures. At one extreme, Swedes are known to listen quietly to the speaker and wait for their turn to talk (Daun, 1998; 1999). Interest in what the speaker is saying is displayed through silent attention. This style is reflected in the expression "*att tala i munnen på någon annan*" (to speak in someone's mouth) which means to speak at the same time as someone else. Interrupting or speaking in someone's mouth is considered very impolite and is something Swedish children learn at an early age not to do. Swedes, amongst others (e.g. Finnish people, Navajos in North America), are widely known for being a quiet people and for appreciating silence and solitude. In contrast, many Mediterranean cultures (e.g. Spaniards, Bosnians, Italians) encourage lively discussion where turn taking is less organized than in Swedish conversations and where the listener often shows his/her interest through talking aloud together with the speaker. In these cultures, there is no comparable expression as the Swedish 'to speak in someone's mouth', because that is simply how they are comfortable talking. It is therefore not impolite; on the contrary, it can be impolite to listen quietly. A quiet listener signals boredom. This does not mean that Mediterranean people like to communicate more than Scandinavians. It merely means that these cultures have communication styles in which participation and intent is displayed very differently (Daun, 1998). This example illustrates how conflicts could arise in multicultural groups. Consider a group of Swedes and Spaniards asked to work together with no prior experience with the other culture. Initially, their different communication styles would likely initially pose barriers to efficient cooperation, since each might perceive the other's communication style as insulting or rude.

Culture and values

In 1980, Gert Hofstede published his book *Culture's Consequences* which discussed a study that is still considered impressively extensive (Smith and Bond, 1999). He managed to collect questionnaire

responses from more than 100,000 individuals from around the world. The questionnaires concerned various aspects of employees' work experience that could be tied to fundamental human values. From this material, Hofstede was able to make comparisons across countries. The study now includes more than 60 nations (Hofstede & Hofstede, 2005). Hofstede's aim – and indeed it remains the aim of most of cross-cultural psychology (Smith and Bond, 1999) – was to map cultures on the basis of variables that can be directly linked to fundamental human values.

Hofstede (1980) used factor analysis to extract core 'dimensions' of human values, and compared relative weights given to each dimension across countries. This effort generated four bipolar core dimensions and national rankings for the sampled countries along each dimension. The dimensions are explained in Table 1. Definitions are taken from Hofstede and Hofstede (2005) and Smith and Bond (1999, p. 45).

Table 1: Hofstede's four core dimensions

Dimension	Explanation
Power distance:	The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally
Uncertainty avoidance:	The extent to which the members of a culture feel threatened by ambiguous or unknown situations
Individualism /Collectivism:	Individualism: One's identity is defined by personal choices and achievements. In contrast, Collectivism: One's identity is defined by the character of the collective groups to which one is more or less permanently attached.
Masculinity /Femininity:	Masculinity emphasizes achievement. Femininity emphasizes interpersonal harmony.

While informative, Hofstede's rankings are averages calculated from thousands of individuals. As averages, they reveal only the central tendency and conceal the variability of individual differences. The rankings falsely imply that national cultures are "unitary systems free from variation, conflict and dissent" (Smith and Bond, 1999, p. 42). There is, of course, considerable individual variability within all cultures (Hofstede, 2001). Nevertheless, Hofstede's dimensions and rankings remain valid indicators of national culture.

More recently, Shalom Schwartz (1992, 1994) has become a central figure in theoretically-grounded cross-cultural psychology. The widespread acceptance of Schwartz's instrument and the explanatory power of his configural model of "value types" have led us to adopt the Schwartz model and methodology.

Schwartz rooted his study of values in a framework of human evolutionary needs (Schwartz and Bilsky, 1987, 1990). He identified in the previous literature a set of 57 human values (e.g., creativity, curiosity, pleasure, wealth, and health) each of which had been noted in more than one culture. He developed a survey instrument that he and his colleagues have used to collect data from individuals from more than 50 national cultures. The survey asks respondents to rate each of the 57 values "As a guiding principle in my life," using the nine-point scale shown in Figure 1. The –1 is unusual but highly useful. It allows respondents to indicate a "negative" value – a value they seek to avoid expressing or promoting through their choices and behavior.

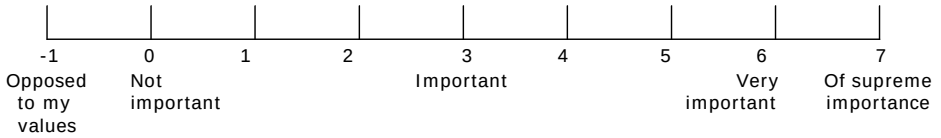


Figure 1: The 9 point response scale used in the Schwartz value survey. The extreme scores (-1 and 7) are used to anchor the ratings.

From the participants' responses to the 57 values, Schwartz constructed his configural model of 10 "value types", reproduced as Figure 2. The circular representation emphasizes the inter-relatedness of the 10 value types. Adjacent value types are proposed be to be most compatible and those on opposite sides of the circle to be in most conflict. The Schwartz model has been tested innumerable times since its initial publication. With few exceptions (e.g., certain regions in China), individuals in all literate cultures appear to implicitly distinguish the 10 value types when assessing the importance of specific values as guiding principles in their lives. The model represented by Figure 2 appears to be an exhaustive and near-universal classification of motivational values. Schwartz and others have used the instrument and the configural model of value types to explore and explain cross-cultural differences in a host of domains and applications.

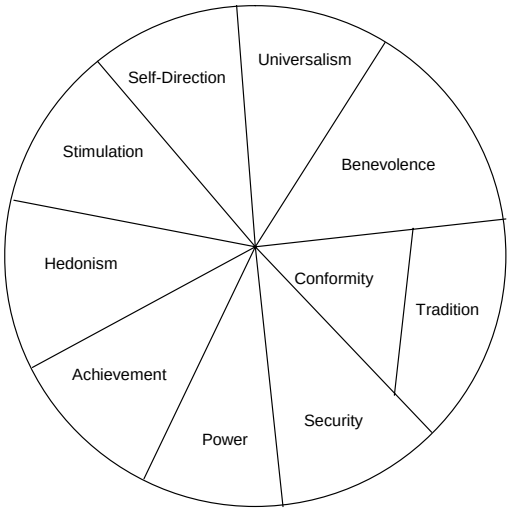


Figure 2: The configural model of the structure of core human values. (From Schwartz, 1992, 1994).

In contrast with Hofstede's dimensions, the Schwartz model uses the natural variability between individuals' answers as a source of explanatory power. His model also provides a basis for generating hypotheses that link responses to his value survey to performance measures (dependent variables), in our case captured by C3Fire. Different participants have different value structures that, ideally, correlate with differences in their patterns of behavior. By combining Schwartz's abstract level of measurement with our contextually specific measures from C3Fire, we can generate and test a myriad of hypotheses about cross-cultural differences in correlations between value types and performance variables in our simulated OSOCC.

In sum, people across different cultures differ in communication style and value priorities in life. The premise of our research is that these factors are likely to influence their decision-making styles and choice of strategies and tactics.

Culture and collaboration and decision making

Previous research has shown that there is more commonality than difference in decision-making style across cultures (Mann et al., 1998). However, differences do exist. Differences have been documented between Western and East Asian people (Chu, Spires and Sueyoshi, 1999) and between closely neighboring East Asian people (Chu, Spires, Farn and Sueyoshi, 2005). Mann et al (1998) investigated how decision making strategies differed across Western and East Asian samples and argue that what differs across cultures is a set of factors that determine (a) who makes the decision, and (b) the values and interests served by the decision. These factors include:

1) the authorities and entities invested with responsibility and control over decision making;
2) sources of expertise and advice;
3) whether it is an activity for the individual or the group;
4) the spheres in which individuals have freedom of choice; and
5) ideological principles and societal values that underlie decision rules and criteria for choice.

According to Mann et al., similarities and differences in roles, rights and responsibilities of individual decision making, all nested in the five points above, have received little attention in the cross-cultural literature. We are following Mann et al.'s lead to investigate how roles and responsibilities are distributed in culturally homogenous teams. Through investigation of cultural groups we are formulating clusters of differences in decision making that reflect the influence of cultural diversity.

OSOCC

The information about OSOCC presented in this section was obtained from (1) the United Nations' OCHA Orientation Handbook (2002), (2) the United Nations Disaster Assessment and Coordination UNDAC Field Handbook (2000), (3) OCHA's official homepage (http://ochaonline.un.org/), and (4) an interview with P. Becker, Head of Unit for Capacity at the Swedish Rescue Services Agency. Becker trains Rescue Service and other personnel for OSOCC work.

Background

When a disaster or emergency strikes a nation and there is an immediate need for coordination and support by international relief teams, the Office for the Coordination of Humanitarian Affairs (OCHA) can send members from the United Nations Disaster Assessment and Coordination team (UNDAC team) to the affected area. The UNDAC team is a stand-by team of disaster management professionals who are nominated and funded by member governments, OCHA, the United Nations Development Program and operational humanitarian United Nations agencies. The UNDAC team can be mobilized within hours of receiving a request from a country affected by an emergency or disaster. After natural disasters, such as earthquakes, the UNDAC team must be mobilized rapidly in order to effectively coordinate the search and rescue (SAR) operations of international SAR teams with local authorities.

While OCHA and its UNDAC team are responsible for ensuring that the humanitarian relief provided is effective, they are not responsible for providing that relief. The formal responsibility for all relief actions lies in the hands of the Local Emergency Management Authority (LEMA). The UNDAC plays a supporting role and assists the LEMA's efforts to coordinate the humanitarian relief effort. For this coordination to be efficient there can be one and only one coordination unit. If the local authorities elect to coordinate the work themselves without UN involvement, UNDAC will not become involved.

Coordination of international relief teams is not an easy task. The teams that arrive at the affected area talk different languages, have different backgrounds and training, and bring differing numbers of people and types of resources to the site. In fact, coordination is so difficult that UNDAC has created a coordination structure called the On Site Operations Coordination Center (OSOCC). The OSOCC is the actual physical location (or locations) where the UNDAC team does its work. The humanitarian community comes to an OSOCC to meet and exchange information and to get direction from the UNDAC team.

The OSOCC concept was introduced in the aftermath of earthquakes, but the structure and procedures behind the OSOCC make it a vital asset in any sudden onset disaster involving international relief resources. As a result it has been used with increasing frequency. There are no explicit or fixed criteria for when to set up an OSOCC. The guiding principles are: (a) the emergency must be a sudden onset disaster/emergency, where every lost hour can mean lost lives; (b) there is a need for coordination of international relief teams arriving to help local authorities; and (c) the local authorities need and have asked for support. The OSOCC is active during the first phase of relief operations and remains active

until the national/local authorities and/or the traditional UN relief structure can assume responsibility for coordination of the international relief effort.

The relationship between the UNDAC team and the local authorities (LEMA) can strongly constrain the activities of people working in the OSOCC. Because OSOCC personnel play a supporting role, their interactions with the LEMA must conform to local social conventions. Like all international personnel, the OSOCC personnel need to be sensitive to and follow local norms. Differences in norms for behavior, collaboration, and decision making can pose a challenge to the efficient coordination of humanitarian relief activities.

The OSOCC Concept

Figure 3 illustrates the OSOCC's role as a liaison between the OCHA/UN/LEMA and the international relief teams. OCHA is the governing UN office with headquarters in Geneva. The UN Resident Coordinator is the UN's representative in the affected country. During an emergency situation, he works in close cooperation with the OSOCC and is the UN official responsible for coordinating UN humanitarian assistance. He monitors and provides early warnings of potential emergency situations and by leading contingency planning to the UN. The LEMA is formally responsible for coordinating all relief operations.

The OSOCC has three parts: (1) the Reception/Departure Center; (2) the main OSOCC; and (3) possibly one or more sub-OSOCCs. The Reception Center is located at entry and exit points, such as airports or harbors. Its purpose is to assist airport authorities and to expedite the registration and arrival/departure of international relief providers. The main OSOCC is a physical location where decision makers meet. It is set up as close to the LEMA headquarters as possible. If needed, sub-OSOCCs are set up in remote locations. Sub-OSOCCs may operate semi-autonomously.

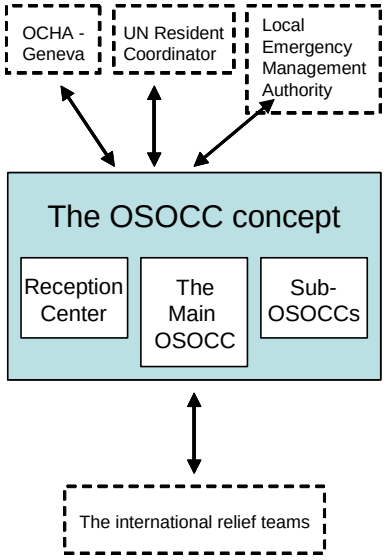


Figure 3: The OSOCC and its position within the overall structure of an UN-supported international relief effort.

The Main OSOCC

The main OSOCC, shown in the center of Figure 3, is a physical location manned by personnel from UNDAC and the international relief teams. Each international relief team is responsible for promoting the effective functioning of the OSOCC. To facilitate the efficient OSOCC operation, it is recommended that the international teams supply the OSOCC with manpower. Countries that support

large relief teams (e.g., Sweden) generally do so. It is difficult to say a priori how many people are part of a Main OSOCC. There are usually only four or five. There have been occasions when one UNDAC member was the entire Main OSOCC team. The international relief teams often manage to allocate some of their personnel to the OSOCC. Their participation helps ensure its efficiency.

The Main OSOCC has four goals. These goals are to (1) provide a system for coordinating and directing the activities of an international relief effort at the site of a disaster; (2) provide a framework for cooperation and coordination among the international humanitarian entities; (3) act as a link between such entities and the affected area's authorities; and (4) to coordinate the activities of international Search and Rescue teams as appropriate.

The cultural consequences of this ad-hoc and on-site team-formation can be daunting. The representatives of the various international teams generally do not know each other. They may or may not know members of the UNDAC team. They speak different languages. And yet they are charged with the task of working together immediately to coordinate a flood of humanitarian activity and to facilitate the LEMA's efforts to coordinate the relief effort.

Microworlds

Microworlds are simulated environments that realistically capture aspects of decision making problems (Johansson, 2005; Woltjer, 2005). With the use of microworlds we can bridge the gap between the confines of the traditional laboratory experiment and the "deep blue sea" of field research (Brehmer & Dörner, 1993). Brehmer and Dörner (1993) argue that microworlds (a) provide a task that can be made more complex, challenging, and realistic than traditional laboratory studies but that (b) generalize to interesting parts of real world problem solving while remaining (c) controllable and more easily analyzed than field studies.

Microworlds are characterized by the fact that they are *complex, dynamic* and *opaque* (Brehmer and Dörner, 1993). They are complex because they pose many goals, which means that the participants have to consider several options concurrently, e.g., different courses of actions or contradicting goals. Secondly, they are dynamic in the sense that participants have to consider different time-scales and unforeseen effects since the relationship between different variables are uncertain. Opaqueness refers to those dimensions of the simulation that are invisible to the participant, e.g., the speed, direction, and impact of wind. Opaqueness forces participants to make hypotheses and test them in order to understand and control the system. By enabling the experimenter to manipulate these dimensions, microworlds provide a much more tractable, reproducible, and flexibly designable research environment than a field study (Brehmer and Dörner, 1993; Gray, 2002). Furthermore, with microworlds the researcher is able to investigate questions that cannot be addressed in either field studies or laboratory experiments (Gray, 2002), and at the same time address issues that can be seen in real world tasks (Dörner and Schaub, 1994). It has been shown that experimental participants take well-designed microworlds seriously and become so engaged that their behaviour becomes completely natural and, accordingly, valuable to the researcher (Dörner and Schaub, 1994; Gray, 2002). These considerations make microworlds valid tools for studying the impact of culture on decision making in command and control settings.

Two studies designed to study cultural influences on decision making

We have conducted two studies of cultural influences on decision making in command and control in the OSOCC. The first study is a microworld study using C3Fire. The second study is an observational study conducted during an OSOCC exercise run by the Swedish Rescue Services Agency (SRSA) and the Danish Emergency Management Agency (DEMA). We first turn to the experimental study and its results and then continue with the observational study.

Study 1 – C3fire

OSOCC operations place strict constraints on the conduct of the experiment. OSOCC teams are formed ad-hoc and on-site. Team members may or may not know each other. Because there is no time for team-building, they get to know each other as they work. As they get to know each other, their way of working together is likely to evolve. These considerations led us to design the experiment to meet three sets of constraints: (a) we need to elicit and capture spontaneous but collaborative emergency-services decision making in response to a simulated emergency, (b) we need to emulate the ad-hoc nature of OSOCC team formation and to capture the actions for decision making that guide the development of teamwork in the simulated OSOCC, and (c) we need to gather individual self-report information about values.

Apparatus - The Microworld C3Fire

C3Fire (Granlund, 2002) is a microworld in which a group of people work together to extinguish a computer-simulated forest fire. The group's task is to collaborate in an experimentally controlled configuration for command and control interaction. The C3Fire microworld is distributed in a client-server configuration, meaning that each participant working in the simulation works at his own client PC. Their actions are logged in the C3Fire system and are observed by a researcher who manages the experiment.

The C3Fire microworld has been used extensively in previous research on network based command and control (Artman and Wearn, 1999; Granlund, 2002, 2003; Johansson et al., 2003; Woltjer, 2005), and comes form a long tradition of microworld research of distributed decision making (Brehmer, 1992, 2005; Brehmer and Dörner, 1993).

There are three classes of units in C3Fire; fire trucks, water trucks and fuel trucks. All units are interdependent. All four participants involved in C3Fire can control all units. Interdependencies among decision makers arise whenever different classes of fire-fighting units are assigned to different participants in the simulated OSOCC. For example, the locations and activities of water trucks and fuel trucks constrain the actions of the fire trucks. If different people have control over these different resources, their actions are mutually constraining. This provides ample opportunity for conflicts to arise.

The participants can communicate through e-mails only. We, as experimenters, did not establish an organizational structure for communication and control that the teams were to follow. E-mail communication and truck control were not constrained by the experimenters or the C3Fire software. As a result, all participants could (1) communicate with all other participants (they could send a message to one or all other participants) and (2) command all trucks (all fire, water, and fuel trucks) and, (3) override commands made by other participants. In short, all structure was left to the teams, much as it is in an OSOCC.

Every event in an experimental trial generates time-stamped data that C3Fire automatically records and stores. There are three classes of events: commands to trucks, the way the team allocates duties, and the content and structure of their communication. These are the major dependent variables gathered during the experimental trials. This paper concerns the commands to trucks only.

Participants

Fifty-five male participants who identify with three different national cultures, ages 19-37 (mean 24.8), participated in our experiment. Thirty-two of the participants identify themselves as Swedish, 8 as Iranian Swedes, and 15 as Indian. All participants signed an informed consent form. They were promised monetary compensation for completing two four-hour sessions of experimentation. All 55 participants completed the study and received their compensation.

The overarching goal is to identify clusters of expectations and behaviors for collaboration and organizational structure that (1) vary systemically across cultures and that (2) personnel in a newly-formed OSOCC can use to identify potential barriers to collaborative decision making. To this end it is

necessary to elicit expectations and spontaneous behaviors from a variety of cultures. Inspection of the pioneering work of Hofstede (1980), suggests that the Swedes, Iranians, and Indians differ strongly from one another along a variety of dimensions.

Procedure

The participants reported to the laboratory in groups of eight. In the laboratory, the eight were randomly and anonymously assigned to two teams of four OSOCC decision makers. The purpose of the random and anonymous assignment to teams was to minimize reputation effects and to emulate the ad hoc nature of OSOCC team formation. In what follows, the word 'team' signifies the four participants in a simulated OSOCC and is the basic unit of analysis in the experiment. The word 'group' is reserved for all eight participants when the two teams are brought together or to the larger ethnic group with which they identify. One Indian group consisted of seven participants and worked in teams of four and three.

The two teams worked in parallel in two different simulated OSOCC. This arrangement made it possible to gather data on two teams (two units of analysis) simultaneously. It also provided the opportunity to periodically reassign participants to teams to minimize reputation effects.

The cycle of activities

The procedure consisted of eight cycles, each including three sets of activities corresponding to the three constraints.

Activity 1 – C3Fire experimental trials

Each of the eight participants sat at a separate client computer and was linked to his teammates by the C3Fire software. Their only mode of communication was the email system provided by C3Fire. The two teams of four were connected to different server computers. The two servers independently ran the same C3Fire scenario concurrently.

Scenarios

We created eight different experimental scenarios. The teams encountered scenarios designated A through D on the first day of experimentation. They encountered scenarios E through H on the second day. Table 2 shows the systematic manipulation of three factors that generated the eight experimental scenarios. The factors are map, map rotation, and initial fire size. Two different maps (m1 and m2) with differing configurations of forests and houses, etc., form the foundation for the eight scenarios. Four scenarios use map m1 and four use map m2.

Table 2: Dependent variables and their manipulation in the C3Fire scenarios.

Scenario	Map	Map rotation	Fire size	Scenario	Map	Map rotation	Fire size
A	m1	0	2x2	E	m1	180	2x2
B	m2	0	2x2	F	m2	180	2x2
C	m1	90	3x3	G	m1	270	3x3
D	m2	90	3x3	H	m2	270	3x3

As shown in the third column of Table 2, map rotation was manipulated at four levels (0°, 90°, 180°, and 270°) to make the maps appear different. Initial fire size refers to the size of the fire, in squares, at the beginning of the scenario. This was manipulated at two levels: the larger the fire, the greater the challenge.

Anonymity

One of the salient social characteristics of an OSOCC is that its members may not know each other when they arrive on site. They get to know each other as they work. There is no straightforward way to capture this emergence from anonymity in an experimental setting in which participants may indeed know each other. We crossed this hurdle by bringing eight participants into the laboratory at once and

splitting them, randomly and anonymously, into two groups of four. Initially, no one on a team knew who the other three team members were. As they day advanced, they became better acquainted and had numerous opportunities to interact as a team.

Specifically, team membership was randomly assigned and unknown during the first C3Fire trial of each day. There was no opportunity for consultation before the trial. As in a new OSOCC, the team had little common ground (other than their shared ethnicity) but had to attack the emergency immediately. This situation was repeated for the second, fifth, and sixth C3Fire trial. Team membership was randomly shuffled and, once again, there was no opportunity for consultation. Participants repeatedly found themselves in a new OSOCC facing a new emergency.

Activity 2 – Group discussion

In the second part of each cycle, the team sat around a computer monitor, watched a replay of their C3Fire session, and engaged in an open-ended conversation about their session. During these 'after action reviews', most teams developed an organizational structure, allocated responsibilities, and debated alternative strategies for dealing with the emergencies posed by C3Fire. Their conversation was recorded using both a video camera and audio equipment for subsequent qualitative and quantitative analyses. The groups' discussions of the C3Fire sessions are not covered in this paper.

Activity 3 – Questionnaires

The participants filled out six different questionnaires designed to assess the participants' (1) demographic background, (2) personality traits according to the Big Five (NEO Five Factor Inventory, NEO-FFI: Costa & McCrae, 1992), (3) conflict avoidance, (4) tolerance for uncertainty, (5) time horizon, and (6) value priorities (the Schwartz Value Survey: Schwartz, 1992, 1994).

Results

Following Schwartz (1992), we have constructed plots of partial correlations between the 10 value types and (a) measures of fire-fighting effectiveness during the C3Fire trials and (b) the indices provided by the other survey instruments. Two of these plots are presented here. Figure 4 shows the patterns of partial correlations between the index of time horizon and the 10 value types. Strongly positive correlations reveal values that are associated with planning and a future-directed activity. Negative correlations reveal values that are associated with short-term goals. The correlations for the Indian participants are weak with one curious exception, the sharp downward spike at tradition. This single-point anomaly may be spurious. The overall flat pattern for the Indian participants suggests, for these individuals from this ethnic group, there is little association between values and planning for the future. Planning may not be a key activity for this group. In contrast, there are strong correlations, both positive and negative, between the Swedes' and the Iranians' rankings of the value types and the index of time horizon. Achievement, power, and security are positively correlated with planning for both groups. It appears that both of the groups raised in Sweden may perceive planning as a way to get ahead.

Figure 5 shows the patterns of partial correlations with the index of conflict avoidance. Strongly positive correlations reveal values that are associated with avoiding confrontation. Negative correlations reveal values that are associated with meeting challenges head-on. The difference between the Swedish and Iranian groups is striking. For the Iranians, both achievement and power are strongly and negatively correlated with conflict avoidance. Iranian participants who indicated a relatively high need to achieve are much less adverse to conflict than similarly ambitious Swedes.

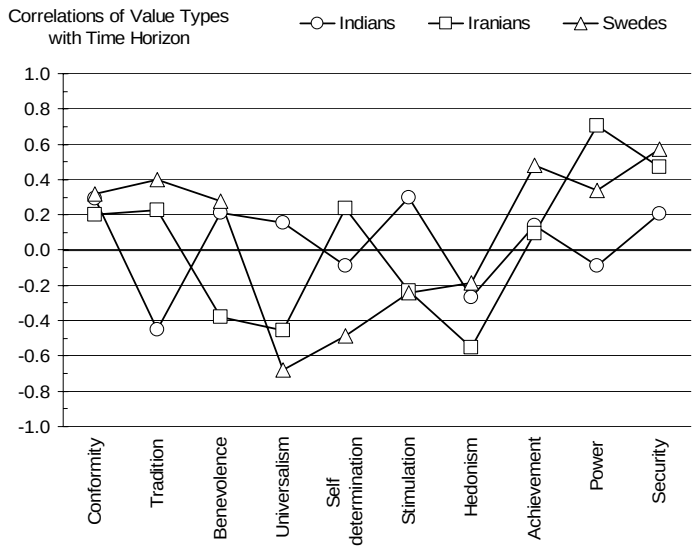


Figure 4: Associations between value types and the index of time horizon. Positive correlations indicate a common preference for the value type and actions that plan for the future.

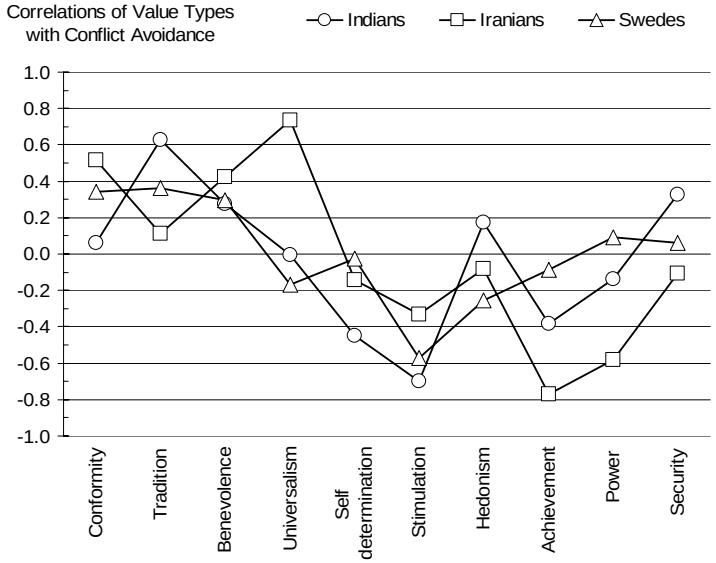


Figure 5: Associations between value types and the index of conflict avoidance. Positive correlations indicate a common preference for the value type and actions that seek to avoid conflict.

We have analyzed the allocation of responsibilities and distribution of trucks across the four participants (A, B, C and D) using plots of the relative frequency of commands they sent to the 12 trucks (F1, F2, F3, etc.). In these plots, a fully black cell represents the highest percentage of commands sent to a truck by a specific individual. At the other extreme, a purely white cell means that no commands were sent to the truck by that participant. Intermediate tones of grey represent intermediate percentages of messages in a linear mapping. Two cells that are equally dark therefore represent equal frequencies of commands. In Figure 6, we can see that participant A did not command any trucks, participant B sent commands only to gas trucks (G10-12), and participant C only to water trucks (W7-9). In contrast, participant D sent commands to almost all trucks, but concentrated on the fire trucks (F1-6). This distribution suggests that the team largely adhered to a strict partitioning of roles and responsibilities.

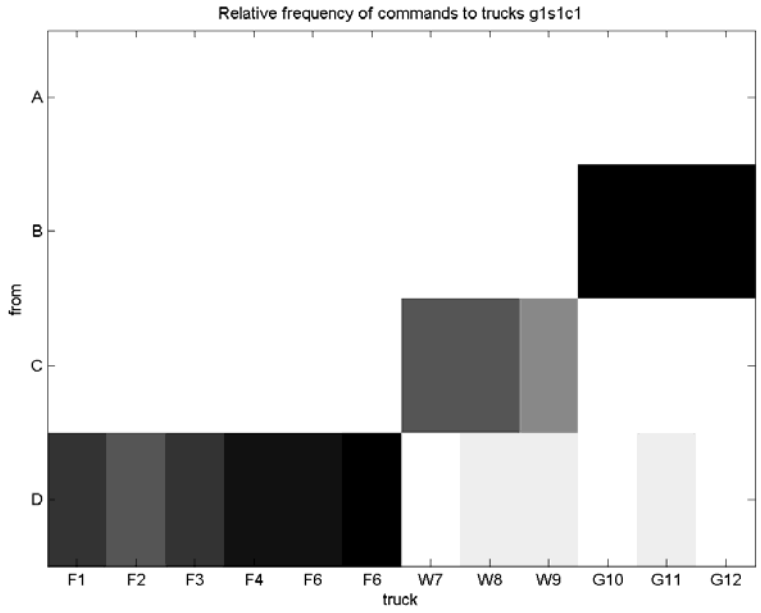
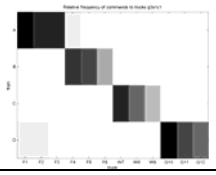
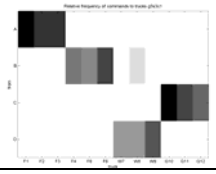
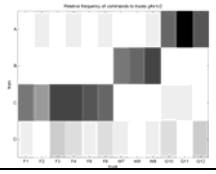
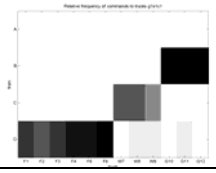
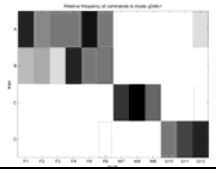
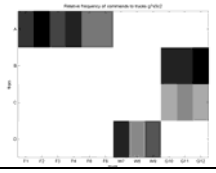
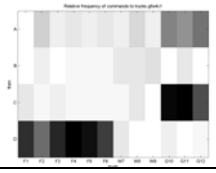
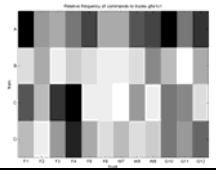


Figure 6: Relative frequency of commands from participants on one team to trucks during one trial: Swedish group 1, scenario 1, team 1.

One of the authors printed all matrices without any identifiers regarding the nationality of the team. The other author clustered them based on patterns in the distribution of the grey tones. We then devised categories that identified each cluster. We found eight different patterns of command structure and truck distribution. Table 3 illustrates and describes the eight different categories of truck distribution found when analyzing all C3Fire trials from all three national groups.

Table 3: Categories of truck distribution in C3Fire

Category – name	Distribution of trucks	Examples
Partitioned according to 'convenience'	The participants command three trucks each. The partition is based on participant name and truck number: Participant A commands trucks 1-3; participant B commands trucks 4-6; participant C commands trucks 7-9, and participant D commands trucks 10-12.	
Partitioned according to 'preference'	The participants command three trucks each. The partition is based on the participants' preferences.	
Assistant	One participant coordinates the other participants' actions through email communication and actively commands the trucks when he finds appropriate. The other three participants divide the trucks according to type.	
Coordinator	One participant coordinates the other participants' actions through email communication. The other three participants divide the trucks evenly according to truck type. The leader interferes occasionally but does not send commands to more than 3 trucks.	
Shared fire trucks	Two participants command the fire trucks together. The third participant commands the gas trucks and the fourth commands the water trucks.	
Shared gas trucks	One participant commands all six fire trucks. Another participant commands the water trucks and the other two participants command the gas trucks together.	
Vague structure	The participants command several trucks but put emphasis on some trucks. In the example we can see that all participants command almost all trucks but that they put emphasis on particular types of trucks. A vague structure can be seen.	
No visible structure	There is no visible structure. Most participants send commands to a large number of trucks.	

There were differences in preferences of truck distribution across the national groups. Table 4 shows the frequency of each category in each national group.

Table 4: Truck distribution in the Swedish, Indian and Iranian groups when engaged in C3Fire

Organization Categories (total sum in parentheses)	Swedish participants	*Frequency %*	Iranian participants	*Frequency %*	Indian participants	*Frequency %*
Partitioned convenience(=33)	33	*0,52*	-	-	-	-
Partitioned preference (=14)	7	*0,11*	-	-	7	*0,22*
Shared fire trucks (=4)	4	*0,06*	-	-	-	-
Shared fuel (=5)	-	-	-	-	5	*0,16*
Assistant (=14)	7	*0,11*	6	*0,38*	1	*0,03*
Coordinator (=7)	2	*0,03*	4	*0,25*	1	*0,03*
Vague structure (=21)	9	*0,14*	4	*0,25*	8	*0,25*
No visible structure (=12)	1	*0,02*	2	*0,13*	10	*0,31*

The partitioned distribution of trucks based on convenience was by far the most frequent type of truck distribution in the Swedish group. The Swedish group also used the partitioned distribution based on preference a number of times, and so did the Indian group to a large extent. In contrast, this type of distribution was never used by the Iranian group. The two types of partitioned distributions represent a well-structured, egalitarian approach to the allocation of responsibilities across participants. The critical observation here is that our Iranian participants did not use this type of distribution, even though they were raised in Sweden. The Swedish propensity to egalitarianism (Hofstede, 1980; Schwartz, 1992, 1994) does not appear to have been instilled to the same degree in these young men who identify themselves as Iranian Swedes. This encourages us to continue look for culturally driven differences in the immigrant population in Sweden.

The Coordinator distribution represents a highly structured and egalitarian distribution of task allocation in which there is a nominal leader. The leader monitors the game and sends emails to the team members about what needs to be done. He sometimes controls the trucks, but no more than three trucks during the whole game. It was used by the Iranians several times and the Swedes during two games. This distribution can be seen as an egalitarian but more controlled structure than the partitioned distribution. In the Assistant distribution, on the other hand, the leader actively commands both participants and trucks. This represents a less egalitarian and more formally hierarchic allocation of responsibilities since the leader often overrides the other participants' commands. It was used by all three groups. Note that the Iranian favored these two types of distribution. The Iranians appear to prefer to have a leader supervising or controlling the other participants' actions.

The two Shared categories represent truly cooperative approaches to the task. There is no clear leader, no coordinator, and no assistant who directs the other participants. The shared fire truck approach was used a couple of times by the Swedes but was not a dominant mode of working for the group. The shared fuel approach was used by the Indians.

The two last truck distributions, vague of no structure, are dominant in the Indian groups. Everyone seemed to drive more trucks than they were allotted. Everyone drove a little bit of everything. It is not clear from these data whether the Indians distrust organization or are truly cooperative or are comfortable with spontaneous chaos.

In sum, the Swedes preferred a non-partial partitioned division of tasks based on convenience rather than preference. On a few occasions there was a leader in the Swedish teams. The Iranians preferred a structure with a leader or coordinator keeping track of the game and the team members' activities. The Indians preferred to share the allocations of tasks and had seldom a team leader.

The experiments using C3Fire indicate that there are differences in both value preferences and task allocation among the three groups. As our experiments continue and our analysis is extended to include

the communication data, we will be able refine these results. If these differences were to be seen in an OSOCC, the implications would likely be dramatic. The contrasts in preferred operation procedures could easily give rise to conflicts in an OSOCC or other command and control setting.

Study 2 – Observation

As a complement to the experimental research, we conducted an observational study of an exercise, run by SRSA (Swedish Rescue Services Agency) and DEMA (Danish Emergency Management Agency). The exercise was designed to train future OSOCC professionals' skills in coordination work and to instill an understanding of the significance and content of OSOCC work in the participants. Two parts of the exercise were observed through exploratory observation: (1) the exercise management, and (2) a team of eight decision makers participating in the exercise. The aim of the observation was to understand how people participating in OSOCC work are trained to stand prepared for an international relief effort.

The exercise was a real-time full-scale exercise simulating the first crucial hours of an OSOCC mission. It lasted for about 24 hours and was part of a seven-day course in operational management. The exercise was conducted on the fifth and sixth day of the course and was considered the grand finale of the course during which the participants were to implement what they had learned during the course. Twenty-four participants from all over Europe participated in the course. During the first day of the course, the participants were divided into three teams. Each team was given a team meeting room. Every day of the course the teams got some information about the exercise and were given the opportunity to prepare for the exercise. When the fifth day and its exercise came, the team had prepared a travel route, technical equipment, task assignments, plan of an sub-OSOCC, contact lists, etc..

The exercise scenario

The scenario postulated that a hurricane had left the infrastructure of a fictional country devastated and its population in despair. The teams' mission was to reach the affected country (Denmark), from the neighboring country (Sweden), and set up a sub-OSOCC. Each team carried out the exercise separately. The three teams did not have contact with one another during the exercise.

The teams were assigned region within the DEMA exercise facility where they were to set up their sub-OSOCCs. The sub-OSOCC's objective was to coordinate the international relief efforts in the allotted region, following instructions from the Main OSOCC (impersonated by the exercise management staff) and other stakeholders (e.g., LEMA, adhering to the OSOCC Concept structure).

The exercise management

The course participants were divided into three teams. For every team, an exercise management Team Manager and an observer was appointed from the SRSA/DEMA staff (see Figure 7). The Team Managers' tasks were to direct the exercise for his/her team. The managers ran the exercise with the help of pre-defined scripted stage directions, consisting of scheduled events, such as phone calls, e-mails, actions and incidents to which the manager had to expose the team. The exercise was a truly dynamic process, where the predefined actions to be played out in the exercise functioned only as guidelines for the exercise. Some events were carried out according to the script and other events were played out when appropriate as determined by the actions that had been taken by the teams. The team managers therefore continuously assessed the situation and the team's performance. If more or less action was needed, the exercise was modified accordingly. The dynamic simulated situation was illustrated on maps and schedules that were available for all personnel on the exercise management team.

Most events, such as phone calls and emails, were implemented by the manager himself. Some events and actions were implemented with the help of actors, ensuring that the exercise would be realistic for the exercise participants. The actors were mainly SRV/DEMA professionals of various backgrounds who had had no previous contact with the exercise participants. The actors impersonated important stakeholders that the OSOCC personnel are likely to run into during a mission, such as police and

military officers, customs personnel, UNDAC and LEMA people, media representatives, international relief team managers, and more.

Each team had an appointed observer. The observers had many years experience in international relief operations and OSOCC work. They functioned as evaluators of the teams' performance, as instructors, and as assistants to the teams. Each observer followed his team during the whole exercise. Several times during the exercise the observer did a "time out" in the exercise and commented on the team's performance up to that point. He pointed out actions that were successful and less successful and encouraged the team to reflect on their performance, team dynamics, and future actions. The observers continuously reported to the Team Manager and thereby helped the Team Manager to assess the current situation.

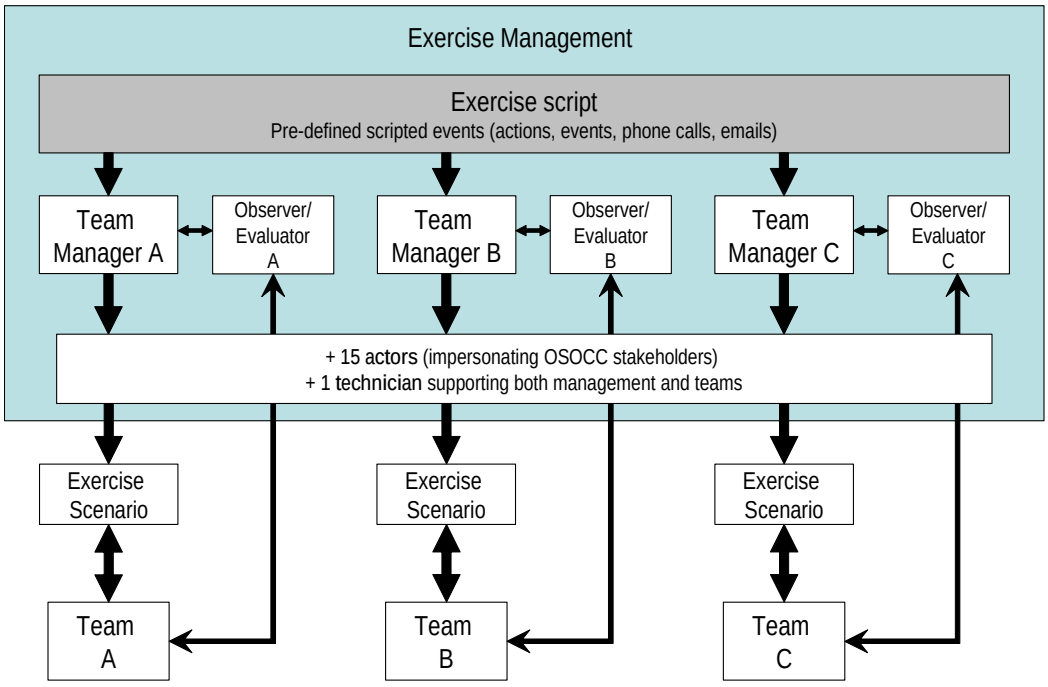


Figure 7: The exercise structure. Each team's exercise events were directed by a Team Manager, and each team was followed by an observer/evaluator. The events were played out according to an exercise script and in relation to teams' responses to earlier events. The Team Manager and/or actors played the events, resulting in a realistic and dynamic scenario. A technician supported the exercise management and the teams' handling of technical equipment.

The management staff also included a technician, specialized in all kinds of technical equipment needed during a mission, who functioned as technical support for both the management and the participating teams.

The exercise and course as a whole concluded with an evaluation session of the exercise with all three teams together. Since all teams had experienced the exercise differently, with some events left out or added in the individual teams, this session functioned mainly as a group discussion in which overall performance of the teams was discussed, rather than specific team members or episodes. During this session, the team members were encouraged to share their experiences during the exercise.

The observed team

One of the authors followed one of the teams as their "shadow", i.e. sat in during their meetings two days before the exercise and inactively took part of the exercise. The team was told that the shadow's intention was to learn more about OSOCC work.

There were eight team members from eight different countries. These people had not only different national backgrounds (all Europeans), but also different professional backgrounds (military, fire brigade, civilian), and different experiences of similar missions.

The exercise started at Revinge in Sweden where the team received two cars, some office supplies and money. The team was also given technical equipment in the shape of laptop computers, satellite phones, mobile phones, a printer/scanner, and more. During the days before the exercise, the team was given maps, some information about the hurricane, and background information about the affected region. From the location in Sweden, the team had to drive to a facility in Denmark, an area where they had never been before. As a part of the exercise, the team got stuck in customs, which was the first trial of the exercise. After solving the customs problem, the team contacted the Main OSOCC (the exercise management) and asked where to set up their sub-OSOCC. The team was given instructions to set up their sub-OSOCC at a specific location (in DEMA exercise facilities). When arriving to the exercise facility, the team was allotted a locale for their sub-OSOCC and some furniture.

From their sub-OSOCC, the team's tasks were to assess the situation in a region of the affected country allotted by the Main OSOCC, to contact important stakeholders and to help coordinate the international relief operations.

Results

The exercise management

Observing the exercise management gave several opportunities for informal interaction with SRSA/DEMA personnel that have been active during OSOCC or similar work. Personal communication with people who had been part of international relief efforts revealed that it is crucial to know the local norms for behavior if one wants to be successful. To show up too early or late to a meeting can be devastating for the OSOCC's reputation. What is considered too late/early is culturally specific. Leadership styles were also reported to differ and pose barriers to efficient cooperation. For example, one Swedish fire chief, who usually works as a team leader when on international missions, reported that he usually tells his Swedish personnel not to be informal with him when others can see it. The Swedish leadership style is known to be egalitarian and "friend-like". He had noticed that when his Swedish employees talked to him the way they do on Swedish ground, people from other cultures sometimes considered him to be without authority and lost their respect for him. This is an example of Power Distance (Hofstede, 1980). Swedish employees do not expect much difference in power between themselves and their leader. Many decisions are based on consensus in the group and are often compromises between differing views. In many other cultures, however, a large difference in power is expected between the person in charge and the followers. In these cultures, the leader often has the right to decide without taking his employees' thoughts into account.

The observed team

The observation suggests that cultural differences are salient and acknowledged by the participants. There seemed to be clear differences in leadership and communication styles that would be interesting to study further. As an example, the team was led by a fire chief from northern Europe, here called 'N'. He seemed comfortable as the leader and directed the team meetings with the help of highly organized lists of topics to be discussed. N's careful planning and egalitarian leadership are exemplars of moderate uncertainty avoidance (Hofstede, 1980) and of a preference for security (Schwartz, 1992, 1994).

During one meeting, the group was asked by the leader to prioritize in what order the topics where to be brought up for discussion. This took time from the meeting but ensured that everyone knew what was to be discussed and in what order. After discussing the first two bullets on their list, a man from the south of Europe, here called 'S', who also is a fire chief, interrupted the discussion. S wanted to move on to the fourth topic on the list, a topic that was related to his tasks. N wanted to keep to the pre-defined list of topics, but S insisted on discussing his topic with the motivation that "It will be quick". A discussion started about whether or not the group should continue to discuss the current topic or move

on to S's topic, resulting in a change of topic. S's unwillingness to follow the pre-defined agenda and moving directly to his own topic can easily be interpreted as an instance of strong uncertainty avoidance and an indicator of a preference for achievement. According to Hofstede (2005), people from weak uncertainty avoidance cultures are often perceived by others as quiet and controlled, whereas people from strong uncertainty avoidance cultures can be perceived as busy, emotional and aggressive. These tendencies were illustrated by the two fire chiefs' behavior.

Several members of the team had severe difficulties speaking and understanding English, which was the official language during the course and exercise. Both during the course and especially during the exercise, confusion arose during meetings due to language misunderstandings. This is likely to generalize to real international command and control situations, such as OSOCC missions. It is not possible to tell in advance which people will be part of the OSOCC, where they come from and what background they have. It is therefore not certain that they have a shared language. This creates problems. If the persons in coordination or command positions cannot understand each other, how can they ensure effectiveness and efficiency?

Due to the differences in professional backgrounds (military, fire brigade, civil authority), the team members seemed to have different expectations for meeting behavior and the exercise itself. The exercise was structured to provide the participants with the opportunity to implement procedures learnt during the operational management course. However, familiar procedures imported from their normal work seemed to surface and rule their work. As a result, on several occasions, some participants complained about and appeared to have conflicts with the team's work procedures. When team members from different cultures import differing procedures, conflicts are bound to arise. When combined with differing leadership styles and planning behavior, adhering to idiosyncratic procedures can lead to serious misunderstandings. This was reflected in the team's meeting behavior. Differences in time frame for planning and norms for behavior and communication resulted in ill-structured meetings with much confusion about tasks and procedures. These types of conflicts are likely to occur during real OSOCC missions and during command and control missions in general. They underscore the importance of shared training and the need to define clusters of cultural differences.

Initial Clusters of Culturally-Driven Differences in Expectations and Preferences for Collaborative Decision Making

We interpret our data to reveal that the three cultures diverge along four dimensions: (a) the presence or absence of a clear team leader, (b) their attitude toward ambiguity (or more generally, risk), (c) their expectations for and tolerance of conflict in the course of task performance, and (d) their methods for allocating roles and tasks across team members. Leadership style directly influences the propensity for hierarchical organization. Risk aversion (as revealed by the team's attitude toward ambiguous information) focuses that organization's efforts. Leadership style and risk aversion resonate with Hofstede's (1980) power distance and uncertainty avoidance. The third dimension, expectations for and tolerance of conflict, refers to attitudes and behaviors directed at establishing and maintaining both intra-team and inter-team harmony. The last dimension, role allocation, is novel and addresses the process and rigidity of team formation.

The first three dimensions are essentially bimodal, e.g., a cultural group either prefers to have a team leader or does not. Conflict aversion and ambiguity aversion appear to be closely linked in our subject pools. Cultural groups that seek to clarify ambiguous information also seek to minimize discord. Other groups appear to perceive ambiguity and discord as normal parts of team processes.

The bimodality of the first three dimensions and the apparent alignment of attitudes toward ambiguity and conflict suggest a natural partitioning of our results into four clusters that can be summarized in the 2 x 2 matrix shown in Table 5. The clusters in the upper row represent teams with clear leaders. Teams without leaders form the clusters in the bottom row. The clusters in the left-hand column represent teams that actively seek to promote harmony and to clarify uncertain information. Teams that are

relatively ambivalent to conflict and ambiguity occupy the clusters on the right. The multiple methods for role allocation are distributed across the clusters independently of the matrix structure.

Table 5: Clusters of patterns of behavior associated with cultural differences in collaborative decision making

Risk-Averse Egalitarian Hierarchies • The team has a leader who directs/coordinates task performance • Roles and tasks are clearly partitioned and largely adhered to • The leader strives to avoid conflicts and eliminate ambiguity	**Risk-Tolerant Hierarchies** • The team has a leader who serves as an assistant • Roles and tasks flex depending upon task demand • Conflicts and ambiguity are perceived as natural and inevitable parts of distributed work
Risk-Averse Egalitarian Teams • No clear leader • Roles and tasks flex depending upon task demand • The team jointly works to avoid conflict and ambiguity	**Risk-Tolerant Inchoate Groups** • No clear leader • Ambiguous roles • Multitasking (no clear distribution of tasks) • Conflicts and ambiguity perceived as natural and inevitable parts of distributed work

Table 5 is an initial attempt to formulate a clustering of culturally driven differences that can be expected to influence collaboration in international command and control settings. We present these clusters with several disclaimers. First, it is likely that the clustering shown here will evolve as our work progresses. Second, it is important to remember that our results are strictly valid only for the groups we studied; they will not generalize to everyone from the nations of Sweden, Iran, and India. Nevertheless, our data suggest clusters of differences that may pose barriers to efficient and effective cooperation in international teams.

The cluster in upper left of Table 5 reflects preferences for a relatively traditional hierarchic team structure. The team has a leader who oversees all of the team's activities. Each team member has a clear role that is determined either by convenience or preference. That partitioning of roles is largely adhered to. Part of the leader's job is to promote internal harmony and minimize uncertainty. This cluster of attitudes is revealed by the 'coordinator' type of command matrix during the C3Fire experiment (see Tables 3 and 4). The clearest instance of this cluster was witnessed during the observational study. Fire chief N's careful planning in cooperation with his team, during which he tried to involve all participants of the team in discussion, illustrates an egalitarian leadership style. As an aside, it is important to note that none of the clusters represents an archetypically top-down 'militaristic' hierarchy. Even the most traditional clustering displays a refreshing egalitarianism.

The cluster in the upper right reflects preferences for a somewhat hierarchic team. The team has a leader but roles, while specified, are not rigid. Team members can take on or drop responsibilities in response to changes in the task demands. The option to flex may be associated with a willingness to tolerate both ambiguous information and inter-team conflict. Examples of flexible behavior are seen in the 'assistant' type of command matrix (see Tables 3 and 4). Sending commands to trucks that had been assigned to another participant has two implications. First, it reveals a willingness to let roles flex. Second, it raises the possibility of conflict (e.g., "Don't drive my trucks!") and implies that such conflicts are an acceptable part of team functioning.

The cluster in the lower right reflects preferences for behaviors that appear to some to be chaotic. As reflected by the 'vague structure' and 'no visible structure' types of command matrix (see Tables 3 and 4), these teams have no clear structure and tolerate considerable ambiguity. Harmony is not a concern.

It is important to note that many of these inchoate groups suppressed the fires quickly. Thus there appears to be no correlation between the reification of team of structure and degrees of success.

The cluster in the lower left reflects preferences for a leaderless organization of equals. As reflected by the 'partitioned' and 'shared' types of command matrix (see Tables 3 and 4), roles are determined either by convenience or preference but are allowed to flex in response to the dynamics of the situation. The team works together to promote internal harmony and minimize uncertainty. This cluster appears to be strongly influenced by the Scandinavian model of social cooperation, mutual respect, and harmony.

Finally, and somewhat reluctantly, we identify our national groups with these initial clusters. The majority of the northern Europeans observed during the exercise appeared to be comfortable working in a Risk-Averse Egalitarian Hierarchy. We suspect that Fire chief S, from southern Europe, might have been more comfortable with a more formal and less egalitarian hierarchy.

Our Iranian participants, who were raised in Sweden by parents who fled the ouster of the Shah, appeared to favor a Risk-Tolerant Hierarchy. In contrast, our Swedish participants with their many generations of Swedish ancestors gravitated to Risk-Averse Egalitarian teams. The Swedes were alone in preferring a partitioned structure. While the Iranian group's score on the time horizon questionnaire suggests that they plan much as Swedes, their score on the conflict avoidance questionnaire suggests they do not shun conflict as much as Swedes. The Iranians prefer hierarchies; the Swedes do not. The contrast between these two sets of young adults raised in Sweden is somewhat remarkable and can be attributed to their diverse cultural heritage.

Finally, our Indian participants invariably developed relatively ill-formed groups with no clear leaders and no partitioning of roles. This result obtained even when all members of the group came from the same state (i.e., Madhya Pradesh or Tamil Nadu) and spoke the same language (i.e., Tamil or Urdu). The Indian groups' performance during the C3Fire sessions revealed little taste for hierarchical structure. Their scores on the time horizon questionnaire suggest that they did not concern themselves much with long-term planning, but rather were caught up in the moment. Our data suggest that the buzzing confusion of the Indian marketplace reappears in collaborative groups.

It is not difficult to imagine how these differences could compromise cooperation in OSOCC or other command and control centers if individuals who naturally align themselves with different clusters were to work together. If these and other cultural influences can be pinpointed, clustered, and illustrated for OSOCC staff, the OSOCC might be better prepared to deal with conflicts based on cultural differences. We are continuing our research and will continue to refine our definition of culturally-driven clusters of approaches to collaborative decision making.

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