# Bridging Cultural Barriers to Collaborative Decision Making in On-Site Operations Coordination Centers

# Final Report

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# Abstract

This report provides both summaries and detailed discussions of the theoretical foundations, methods, and findings of empirical research aimed at identifying barriers to collaborative decision-making in multicultural On-Site Operations Coordination Centers (OSOCC). The research was conducted in 2005 and 2006 at Linköping University and Högskolan i Skövde and was sponsored by the International Branch of the Swedish Rescue Services Agency.

The experiments were controlled but dynamic laboratory studies of communication, collaboration, and decision making by culturally homogeneous teams of four that were assembled ad-hoc and on-site. The teams' task was to manage and conduct emergency operations within the C3Fire microworld. C3Fire recorded all communication among team members and all the actions they took. Participants individually completed a battery of self-report instruments about their values and beliefs.

Results are summarized in a list of 30 dimensions of demographic and cultural diversity that are likely to be found whenever small multinational teams are formed ad-hoc and on-site. The potential impact of these dimensions is explained using the analogy of faultlines. Alignments of dimensions of diversity have the potential to generate friction and split a team into subgroups. Activated faultlines are barriers to communication, collaboration, and decision making.

The dimensions of cultural diversity identified in this research and their associated faultlines stand as hypotheses ready to be tested by observations of actual OSOCC operations, by debriefing interviews with personnel returning from OSOCC operations, and by observations of multinational training exercises. A proposal for funding to continue this productive line of research and to test these and other hypotheses will be submitted to the SRSA by 1 March 2007.

The report concludes with discussions of the implications of group faultlines and dimensions of cultural diversity for the SRSA's training programs for OSOCC personnel, for the Swedish society, and for the scientific community.

# Acknowledgments

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# Summary

This report discusses empirical research on the influence of multiculturalism and diversity on the behavior of newly-assembled small teams. The research builds upon the tradition of experimental psychology to conduct controlled but dynamic laboratory studies of decision making by newly-assembled, culturally-homogeneous teams of four. It builds upon the tradition of cross-cultural psychology to collect self-report data about participants' values and beliefs. The results of this triangulation are 30 hypotheses about the diversity in cultural norms for communication, collaboration, and decision making that may be revealed whenever small, culturally-diverse teams are formed. It explains the potential impact of the observed diversity in norms using the construct 'group faultlines' (Lau & Murnighan, 1998, 2005) - potential rifts that could split a team apart, generate friction, and pose barriers to collaboration and effectiveness.

The experiments and their analyses are intended to generalize to On-Site Operations Coordination Centers (OSOCC), emergent multicultural organizations established by the United Nations (or the European Union) in response to natural disasters. An OSOCC is an ad-hoc collection of skilled individuals from around the world who come together to organize and coordinate emergency services activities. The inherently multicultural composition of an OSOCC makes it a natural laboratory for cross-cultural research. Unfortunately, gaining access to these laboratories is both difficult and fraught with difficulties. Given the time pressure and high stakes of OSOCC operations, there is little time or room for relatively uninformed external observers who want to generate hypotheses. Our laboratory simulations of an emergency services coordination center is a viable and pragmatic alternative for generating a series of hypotheses that could be readily tested by observations in an actual OSOCC or of training exercises for multinational teams, or both.

The report has four sections. The first section develops our understanding of how culture is likely to shape the process of collaboration within an OSOCC. It begins by describing the OSOCC and the tasks faced by its small, multicultural teams of decision makers. It then reviews several perspectives on the concept of culture and examines the pitfalls inherent in cross-cultural research. This review of culture and cross-cultural theory provide the foundation for our systematic empirical approach to the study of cultural barriers to collaboration in an OSOCC. The section concludes with an introduction to the concept of group faultlines (Lau & Murnighan, 1998), potential dividing lines that might split a team into homogeneous, and possibly conflicting, subgroups. Cultural differences in communication and collaboration have the potential to form faultlines that may split a multinational group, generate friction, and impede sound decision making.

The second section presents our experimental method. Our experimental platform is the C3Fire microworld simulation of an OSOCC-like setting (Granlund, 2002, 2003). We use the C3Fire network of computers to form ad-hoc teams of four

individuals (either Swedes, Bosnians, Indians, or Pakistanis). Each team's task is to work together to control and extinguish a series of eight simulated forest fires. The team is the unit of analysis of the behavioral and communication data captured by C3Fire. After each session, team members completed one of a series of six questionnaires. These data are aggregated to produce group averages. The national group (e.g., Swede, Bosnian, Indian, or Pakistani) is unit of analysis of these data.

The third section presents the data. We identified thirty dimensions of cultural diversity. There is considerable diversity in the teams' communication and behavior and in the national groups' value structures. Both the content and patterns of communication vary systematically across the four national groups and these differences correlate with different norms for organizational structure during the C3Fire sessions. Similarly, the structure of partial correlations between the configural model of 10 value types (Schwartz, 1992, 1994) and responses to other questionnaires reveal patterns that vary systematically across national groups.

The final section presents the implications of our findings for SRSA's international operations, for SRSA's training exercises, for Swedish society, and for the scientific community. Among the implications are specific recommendations for amending the SRSA diversity training program to improve trainees' self-knowledge of their norms for decision making, communication, and collaboration. OSOCC personnel who are aware of their own norms should be better prepared to deal with the diversity they encounter in the field.

These prototypical cultural differences are not intended as definitive characterizations of specific national groups. Rather, they are presented as exemplars of the variety of barriers that are likely to appear when multinational teams are formed ad-hoc. We argue that a multinational team that is aware of its differences should be better able to work with and around them.

## Disclaimer, claims, and future work

No claim is made that the results presented here can be generalized to every individual from Sweden, Bosnia, India, or Pakistan. Rather, we claim that the 30 dimensions of diversity that were observed in the laboratory are in large part explained by the diverse cultural heritage of the experimental participants. We argue that each of these dimensions constitutes an empirically-testable hypothesis about potential barriers to collaborative decision making in multinational operations like an OSOCC. The challenge and opportunity for continued research is to test these hypotheses by conducting empirical and observational studies of actual OSOCC operations or of training exercises for multinational teams or both.

# Introduction

Emergencies such as the 2005 earthquake in Pakistan and the East Asian Tsunami of 2004 have publicly illustrated the importance and need for effective and efficient international humanitarian relief operations.  It is not enough to send international relief teams to the right place at the right time.  When in place, they must coordinate their work efficiently and effectively.

The United Nations (UN) has designed a coordination structure called the onsite operations coordination center (OSOCC) to coordinate international relief operations so that relief teams can help the local authorities without being a burden on resources and stakeholders.  OSOCCs are often set up and manned by a multinational team.  The team members generally do not know each other, speak different languages, and have different cultural and professional backgrounds.  In spite of these difficulties, they are charged with the task of working together immediately to coordinate a flood of humanitarian activities and to facilitate the local authorities' efforts to coordinate the relief effort.  As with any coordination operation that involves people from different parts of the world, multiculturalism can become an issue.  Cultural heritage influences how people think, speak and act, and cannot easily be ignored (Kim & Markus, 1999; Smith & Bond, 1999).

The aim of the work described in this report is to identify prototypical cultural differences in communication and collaboration that may pose barriers to efficient decision making in multinational teams and thereby ascertain what such teams might want to know about the potential impacts of multiculturalism prior to a mission.  The 30 dimensions of demographic and cultural diversity are not intended as definitive characterizations of specific national groups.  Rather, they are presented as exemplars of the variety of barriers that are likely to appear whenever multinational teams are formed ad-hoc.  We argue that a multinational team that is aware of its differences should be better able to work with and around them.

## On Site Operations Coordination Centers

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) discussions with Per Becker of the International Branch of the Swedish Rescue Services Agency. Becker has experience training personnel for OSOCC work.

In 1988, a major earthquake struck Armenia. Many international relief teams came to help the Armenian authorities 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.  Recognizing the need for a stronger,

more timely, and more coordinated response from international relief teams, the United Nations General Assembly adopted resolution 46/182 in 1991 which resulted in the establishment of the Department of Humanitarian Affairs. This office was restructured in 1998 and became the Office for the Coordination of Humanitarian Affairs (OCHA). OCHA's aim is to mobilize and coordinate humanitarian action in partnership with local and international agencies and personnel in order to (a) ease human suffering in emergencies and natural disasters, (b) promote prevention efforts and preparedness to reduce future vulnerability, (c) facilitate durable solutions by addressing root causes, and (d) advocate for the rights of people in need.

Whenever a disaster or emergency strikes, there is an immediate need for coordination and support. One of OCHA's missions is to stand prepared to 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, United Nations Development Program and operational humanitarian United Nations agencies. The UNDAC team can be mobilized within hours of receiving a request from a nation affected by an emergency or disaster. The UNDAC team must be mobilized rapidly in order to effectively coordinate the search and rescue operations and humanitarian relief operations of international teams and local authorities.

It is important to note that OCHA and UNDAC respond if and only if they are invited by officials of the affected nation(s). When invited, the UNDAC's immediate mission is (1) to carry out a rapid assessment of priorities and needs and (2) to support the local authorities and the United Nations Resident Coordinator to coordinate international relief on-site so that their work is not a burden on the affected nation's resources. The UNDAC team is also responsible for providing the international community with first-hand information on the disaster situation and the status of its victims.

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, the 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 concept 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 to be used in the aftermath of earthquakes, but the structure and procedures behind the OSOCC makes it a vital asset in any sudden on-set 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 on-set 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 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 team needs to be sensitive to local norms and to heed them. Differences in norms for communication, collaboration, and decision making can pose barriers to the efficient coordination of humanitarian relief activities.

### The OSOCC

Figure 1 illustrates the OSOCC's role as the central liaison between all stakeholders in the emergency relief effort: (1) OCHA, the governing UN office with headquarters in Geneva, (2) the UN Resident Coordinator, the UN's representative in the region, (3) LEMA, the local authorities who have the ultimate responsibility for all relief activity, and (4) the international relief teams.

As conceptualized by the UN, an OSOCC has three parts: (1) a Reception/Departure Center, (2) the main OSOCC, and (3) 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, shown in the center of Figure 1, is a physical location manned by personnel from UNDAC and the international relief teams. If needed, sub-OSOCCs are set up in remote locations. Sub-OSOCCs may operate semi-autonomously.
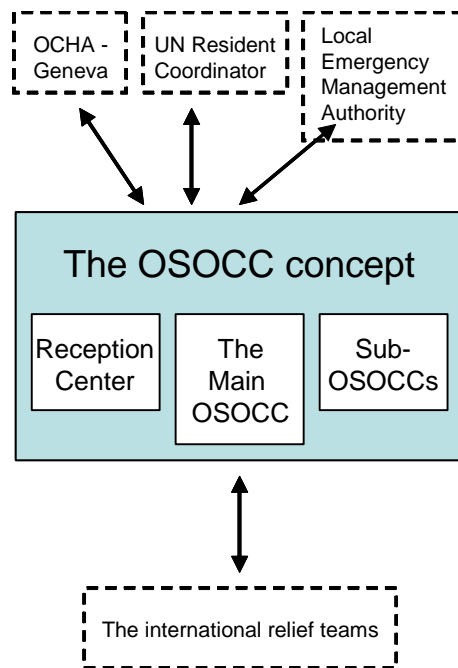
**Fig. 1.** The OSOCC and its position within the overall structure of an international relief effort.

In the discussion that follows, the term OSOCC is used to refer the 'main OSOCC' of the OSOCC concept. The OSOCC is a place where decision makers meet, coordinate activities, generate suggestions for action plans, and pass those suggestions along to the local authorities and the relief teams. Because the local authorities are responsible for executing action plans, the OSOCC is generally set up as close to the LEMA headquarters as possible.

To achieve the objectives of efficient and effective communication and coordination among all stakeholders in the relief operation, the OSOCC may structured into as many as nine functional areas. The functional areas are listed and described in Table 1. Not all functions are needed in every emergency. The OSOCC implements only those functions that it needs to assist the LEMA.

In addition to the functions listed in Table 1, three catchwords must be followed to ensure effective coordination: Participation, Transparency and Impartiality. The international relief teams have no obligation or responsibility to follow the lead of the OSOCC. Therefore, the OSOCC must try to make the teams feel that they are taking part of something important when they cooperate with other teams under the guidance of the OSOCC. For the coordination to be effective, trust between the different organizations/agencies and the OSOCC must be established. For trust to emerge, the OSOCC must be impartial in all conflicts and its work must be transparent. The OSOCC must not have any secrets. All information received must be passed on.

**Table 1.** The nine functional areas of an OSOCC.

| Title | Function |
| --- | --- |
| Management | Developing the mission statement and plans of action, assigning personnel to functions, supervising work. |
| Operations | Developing and monitoring an integrated plan for ongoing relief efforts. |
| Telecommunication | Establishing and maintaining essential communication links (e.g., e-mail, sat-phone). |
| Administration | Crowd management and internal information flow. |
| Information management | Screening, formatting, and managing of incoming information. |
| Liaison coordination | Formal information exchange with other stakeholders. |
| Logistics coordination | Coordinating the transport of goods and services according to the action plan. |
| Security | Ensuring the safety of OSOCC personnel and other stakeholders. |
| Media | Formal information exchange with members of the international media. |

### The OSOCC team

An OSOCC team is an ad-hoc collection of skilled individuals from around the world who come together to organize and control emergency services activities. 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 frequently speak different languages. Nevertheless, 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 marshal an effective relief effort. This intrinsic multiculturalism poses a challenge to communication, collaboration and decision making.

Swedish veterans of OSOCC, employees of the Swedish Rescue Services Agency (SRSA), have reported that cultural differences appear to have posed barriers to collaboration, decision making, and performance in some OSOCC. The SRSA has responded to this concern by sponsoring this program of research. The directive is to identify clusters of expectations and behaviors that vary systematically across cultures and have the potential to raise barriers to collaboration and decision making. OSOCC personnel that are aware of their differences should be better able to work with and around them.

# Culture

Considering that the word 'culture' can be used to refer not only to literature, arts and music, but also to interpersonal differences in management and organizations, (e.g. organizational and professional culture), the frame of reference must be made clear. Most people have some conception, drawn from their own culture's folk psychology, of what the concept of culture means (Triandis, 1996). These ideas tend to fall short, however, because upon close inspection and when actually trying to define culture, a very complex phenomenon reveals itself. As a result, there is no consensus among researchers on a definition of culture (Smith and Bond, 1999; Triandis, 1996). When reviewing the literature on culture and cultural differences in management (Adler, 1997), social psychology (Smith & Bond, 1999), cognitive anthropology (Foley, 1997), anthropological linguistics (Duranti, 1997) and other related fields, it is clear that there are indeed a large number of diverse definitions of culture.

Triandis (1996) points out that although there are many definitions of culture, there is wide agreement that culture consists of elements shared by those with a common language, within a specific historic period, and a contiguous geographic location. Among these elements are religious beliefs, customs, and values. These and other elements provide standards for perceiving, believing, evaluating, communicating, and acting. Accordingly, any definition of culture must include a set of shared standards for action.

Kim and Markus (1999) argue that the composition of a culture is determined by the immediate contingencies of specific sociohistorical circumstances and of individual actions. Culture emerges and is sustained by social relations within highly specific contexts. According to Kim and Markus (1999), cultures should be conceptualized as constantly changing, open systems of behaviors, artifacts, attitudes, and norms. They also consist of institutions that the people within a culture continuously reinforce through diverse means of engagement and participation. The institutions are also modified or even challenged by the same people who reinforce them. Hence, culture is a slowly evolving phenomenon.

To summarize, culture can be seen as (a) a group's shared/collective attitudes, beliefs, behavioral norms, and basic assumptions and values, (b) which influence the members' behavior, actions, thoughts, and artifacts, and (c) which are passed down from one generation to the next. For succinctness, we adopt Smith and Bond's (1999, p. 39) definition and interpret it through the lens provided by Triandis: "A culture is a relatively organized system of shared meanings". This definition is sufficiently broad to differentiate among professional cultures, regional cultures, and national cultures. Our focus is the diversity of norms for decision making held by a select set of national cultures.

Pitfalls in cross-cultural research

There are four common pitfalls in the conduct of cross-cultural research: (1) ethnocentrism, (2) finding the appropriate unit of analysis, (3) ignoring contextual confounds, and (4) replicability.

The first pitfall, ethnocentrism, is really a problem in all cross-cultural interaction. People, including researchers, generally are ethnocentric, i.e., are centered on their own group's values and standards, and have a hard time imagining how people elsewhere could think and want things differently. Basically, most people subscribe to the folk psychology that the way they see the world is the way most people see the world (Triandis, 1996). Contemporary psychology reflects this bias when it assumes and teaches that theories formulated by Western Europeans and North Americans and tested using subjects from their own cultures are applicable globally.

In fact, attempts at replicating classic North American and Western European psychological studies frequently yield different results in other parts of the world. Examples are the studies by Markus and Kitayama (1991) and Kanagawa, Cross, and Markus (2001) on culture and conceptions of the self, others, and relationships between the self and others. These studies suggest that people from different cultures perceive the 'self' in radically different manners. They found that Japanese students generally see themselves as being part of a network of relationships with other people that orients them toward social- and situation-centered relationships. This means that the 'self' changes across situations and relationships. 'I' can therefore be different when with a parent than when with a friend. On the other hand, Americans perceive the 'self' as something static and tend to be self-oriented and individual-centered (Weber & Hsee, 2000). This means that 'I' do not change; only the situation does.

These results strongly challenge the validity of traditional Western psychology theories. According to Smith, Bond and Kağitçibaşi (2006, p. 9), ethnocentrism can be confronted and minimized when researchers "work with others whose socialization yields a different but complementary perspective". Thus, researchers should work in multicultural teams and expose themselves to cultural differences in order to appreciate and deal with their ethnocentrism.

The second problem is confusion about the unit of analysis (Smith, et al., 2006). In cross-cultural research there has been much discussion on whether culture should be studied on a group- (nation) or individual level. When studying the culture of a group of people (nation-level), the consensual characterization of the group's attitudes, values, beliefs, standards for action, norms, and so on, is measured. Researchers using a nation as the unit of analysis often collect data from thousands of individuals and then use the mean values of the responses (e.g. Hofstede, 1980). Thus, group-level analysis can never focus on or take into account the individual variations that inevitably exist in a culture. Group-level measures of culture are not logically or empirically constituted the same way as

individual-level measures (Bond, 2002). Measures taken at the nation level should therefore only be used to define the context in which individuals are socialized. If we, however, want to make predictions about individuals, then measures derived from individuals are required (Smith, Bond & Kağitçibaşi, 2006). Empirical investigations like ours produce individual- or team-level measures that allow generalization to populations that are generally narrower than that of an entire nation.

Many researchers have done a relatively poor job noting the difference between national- and individual-level measures of culture (Matsumoto, 2003; Smith & Bond, 1999; Smith et al., 2006) and fallen victims to what Hofstede (1980) refers to as *the ecological fallacy* (meaning that they confuse individual and national measures of culture). Matsumoto (2003) points out that researchers often treat these two measures of culture as being equivalent, applying measures from group-level theories to individuals and vice-versa. Matsumoto argues that even though there is, in fact, some overlap among the elements that constitute individual- and national-level measures, one must not confuse the two. For example, there are distinct differences between how social history, government, politics and the law, geography and climate, and socioeconomics influence behavior that can be assessed with individual- and national-level measures. Exactly how much of the national-level culture can be found when studying any given individual from a specific culture is not known. According to Matsumoto, a study of the actual overlap between the two has never been conducted, due to difficulties measuring all of the social, economic, etc. forces that influence and shape national-level culture.

To avoid falling into the trap of the ecological fallacy, researchers have been advised to design and conduct studies that focus on specific groups of individuals, on their values and behavior, rather than on national-level characterizations of culture (Matsumoto, 2003; Smith & Bond, 1999; Smith et al., 2006).

The third pitfall in cross-cultural research is oblivion to contextual factors. Most cross-cultural research is conducted by scientists with expertise primarily in another content domain (e.g., psychology, sociology, management) and who want to extend their research to different cultural groups. All too often, cross-cultural research emphasizes either the differences between or the universality of particular dimensions, and expresses little concern for potentially confounding factors, such as personality and socio-economic situation (Van de Vijver & Leung, 2000).

The fourth pervasive problem faced by cross-cultural research is (the lack of) replicability. Van de Vijver and Leung (2000) refer to replicability as the Achilles heel of cross-cultural endeavors. The likelihood of replicability will increase as researchers become aware of their own cultural "glasses" and as they (we) place more emphasis on theory testing, and use more sensitive and suitable methodological tools. To achieve successful replication, researchers from the

cultures involved need to consult each other to make sure that the same thing is measured across the cultures.

<u>Nationality as a proxy for culture</u>

Researchers focusing on culture not only find it difficult to agree on a definition of culture, but also struggle to achieve consensus on how to distinguish one culture from another. How much difference must there be between two cultural groups before they can be said to be truly different? According to Smith and Bond (1999), there is no one answer to that question. Once again, there are many answers. Cultural groups can be defined and partitioned based on religion, language, geographical area, ethnicity, ecology, age, hobbies, lifestyles, strength of kinship bonds, etc.

For practical reasons, researchers within cross-cultural psychology often take the easy way out by defining a cultural group on the basis of nationality. As a general rule, people from the same country can be assumed to share a language, a historic period, and a geographic location, and therefore to have a shared foundation on which a culture can emerge and be maintained. Using nationality as a 'definition' of culture is widely recognized to be a convenient solution at best (e.g., Hofstede, 1980; Schwartz 1992, Smith & Bond, 1999; Smith, et al., 2006) and has been roundly criticized (Duranti, 1997; Hofstede & Hofstede, 2005). When using nationality as the basis for a culture, there is a risk losing track of the diversity within a country. The differences found between any two countries might also be found between carefully selected subcultures within any one country. There is also the risk of assuming a homogeneity that does not exist, i.e. assuming that a country is free from variation, conflict, and disagreement (Smith & Bond, 1999). Nevertheless, it is often the only pragmatic thing to do.

When choosing nationality as a proxy for culture and conducting a cross-cultural study concerning group behavior, the diversity of group members' demographic background becomes very important. A procedural control that might seem trivial but that can be hard to attain is to use a matched group design: sample from populations that are comparable to ensure that cultural differences (and nothing else) are measured (Smith et al., 2006). Since the wish is for the group to be representative of its culture and to behave in accordance with what is acceptable and expected in its culture, there must be as few demographic confounds within the group as possible. For example, when comparing two cultural groups of the same profession, one must also make sure that the prerequisites for membership in that profession are the same in both cultures.

<u>Culture's relation to communication and decision making</u>

Innumerable studies have compared communication patterns across cultures (*see e.g.* Di Luzio, Günthner & Orletti, 2001) and found obvious cultural influences on communication. Not only do we have different languages, but also different

communication styles. There is evidence of significant differences in gesturing across cultures (Smith et al., 2006). Turn-taking also differs remarkably between cultures. For example, Swedes are known to listen quietly to the speaker and wait for their turn to talk because it is impolite to interrupt (Daun, 1998, 1999). Interest in what the speaker is saying is displayed through silent attention. In the Swedish language the expression "att tala i munnen på någon annan" (*to speak in someone's mouth*) implies that speaking simultaneously with someone else is very impolite. This adage is something Swedish children learn at an early age (Daun, 1998; 1999). Swedes, amongst others (e.g. Finish people, Navajos in North America), are widely known for being quiet people and for appreciating silence and solitude.

In contrast, many south European cultures (e.g. Spaniards, Bosnians, Italians) encourage lively discussions 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 such 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 can signal boredom. This does not mean that Southern European people like to communicate more than Scandinavians. Rather, these cultures have divergent communication styles in which participation and interest are displayed very differently (Daun, 1998). These examples characterize Swedes and Southern Europeans generally and do not necessarily apply to specific individuals, but even so, they illustrate how conflicts in multicultural groups could arise. Consider a group of Swedes and Spaniards asked to work together with no prior experience of each other's cultures. Initially, their different communication styles would likely pose barriers to efficient cooperation, since each might perceive the other's communication style as insulting or rude.

The differences in how people from different cultures perceive their worlds and how they communicate are likely to influence their norms for decision making and strategies for cooperation in multiple ways. Weber and Hsee (2000) have conducted a review of the literature on cross-cultural investigations of decision making behavior, focusing on probability judgments, risk perception, risk preference, and the use of different modes of decision making. Their review indicates that cultural differences can found in all four topics. Even though the research within this area is still in its cradle and somewhat inconclusive (Weber & Hsee, 2000), we can still learn a lot from what has been found.

Studies concerned with probability judgments have repeatedly found that people from all cultures tend to be overconfident. An interesting result is that respondents from Asian cultures, show evidence of strikingly higher degrees of overconfidence than respondents from other cultures (Yates, Lee, Shinotsuka, Patalano & Sieck, 1998; Yates, Lee & Shinotsuka, 1996). Concerning risk perception, there are cross-cultural differences in what people conceive as risks, which in turn influences decision making. According to Douglas and Wildavsky

(1982), every culture chooses its risks and ignores others. This can be seen when people prefer to avoid certain risks and not others (Weber & Hsee, 2000).

Strohschneider and Güss (1999) investigated strategic aspects of complex and dynamic problem solving, comparing German and Indian students. They found that the German students used a more active and control-oriented strategy and committed fewer strategic and tactical errors than did the Indian students. The differences were ascribed to cultural differences in exposure to individual and independent problem solving. The German students were accustomed to make decisions themselves; the Indian students were not. Based on their results, Strohschneider and Güss (1999, p. 250) warn against ethnocentrism in decision making research: "Doing research in a monocultural fashion makes it impossible to differentiate strategic knowledge from the underlying processes and leads to theories of problem solving that are highly specific for the single culture". Similar thoughts are expressed by Chu, Spires and Sueyoshi (1999) and Chu, Spires, Farn and Sueyoshi (2005). These two studies compared how respondents from different cultures apply decision processes and use decision aids. The first study investigated decision making with American and Japanese students; the second study used Taiwanese and Japanese students. Results showed not only that the participants from different nations (cultures) used differing decision processes, such as weighing alternative choices, information seeking, and willingness to accept trade-offs. They also used decision aids differently. This illustrates the dangers of exporting Western theories and assuming that decision processes are universal. It also illustrates that two neighboring cultures may not be alike.

Mann et al. (1998) investigated how decision making strategies across Western and East Asian samples differed. They argue that one dimension that may differ across cultures is the set of factors that determine who makes the decision as well as the values and interests served by the decision. These factors include:

- the authorities and entities invested with responsibility and control over decision making, as well as sources of expertise and advice,

- whether it is an activity for the individual or the group,

- the spheres in which individuals have freedom of choice, and

- ideological principles and societal values that underlie decision rules and criteria for choice

According to Mann et al. (1998) similarities and differences in roles, rights and responsibilities of the individual in decision making has received little attention in the cross-cultural literature.

Even though differences in decision making styles can be found, Mann et al. (1998, p 326) propose that "despite apparent differences in complexity of decision problems across cultures, the core issues are essentially the same – fulfillment of human needs, protection of the individual, promoting group survival, and

maintenance of community norms and standards". One must therefore be careful not to put too much emphasis on the small differences found. A related issue is that of the limited sampling used in the studies reviewed by Weber and Hsee (2000). In nearly all studies, the respondents come from America and/or East Asia. There is relatively little applied decision making research conducted with the participation of people from other parts of the world. It is therefore not a surprise that Weber and Hsee conclude their article emphasizing the need for further research within the area.

### Hofstede's cultural dimensions

In 1980, organizational sociologist Gert Hofstede published his book *Culture's Consequences* which discussed an impressively extensive study. He collected questionnaire responses from more than 100,000 individuals from around the world. All respondents worked in the marketing and service divisions of a multinational corporation (IBM). 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. In his first analysis, 40 countries were compared. Later, several more were included in the study and together with other researchers' replications of Hofstede's study, the study now includes more than 60 nations (Hofstede & Hofstede, 2005).

Based on the data collected at IBM sites around the world, Hofstede identified four different bipolar dimensions of cultural diversity: (1) Power Distance, (2) Uncertainty Avoidance, (3) Individualism/Collectivism, and (4) Masculinity/Femininity. These four core dimensions of human values are presented in Table 2. Definitions are taken from Smith and Bond (1999, p. 45).

**Table 2.** Hofstede's four core dimensions of cultural diversity.

| Dimension | Explanation |
| --- | --- |
| Power Distance: | The amount of respect and deference between those in superior and subordinate positions. High rankings (low numbers) indicate the expectation of considerable deference. |
| Uncertainty Avoidance: | A focus on planning and stability to deal with life's uncertainties. High rankings indicate a strong emphasis on stability. |
| Individualism - Collectivism: | Individualism: One's identity is defined by personal choices and achievements. Collectivism: One's identity is defined by the character of the collective groups to which one is more or less permanently attached. High rankings reflect high individualism. |
| Masculinity - Femininity: | Masculinity emphasizes achievement. Femininity emphasizes interpersonal harmony. High rankings indicate an emphasis on achievement. |

Power Distance refers to the inequality that is often formalized in boss-subordinate relationships. People in cultures with low rankings on power distance expect all people to have equal rights. In these cultures, older people are neither feared nor respected (due to age) and powerful people are expected to try to look less powerful than they are. In contrast, in cultures with high rankings on power distance, subordinates and superiors are perceived as being different kinds of people. Hierarchy is a sign of existential inequality. Older people are both respected and feared. People with power are expected to look as powerful as possible.

Uncertainty Avoidance refers to a focus on planning and stability to deal with life's uncertainties. People in cultures with low rankings on uncertainty avoidance accept the uncertainties inherent in life relatively easily and take each day as it comes. They believe in their own ability to influence their lives, their superiors, and the world. Furthermore, in these cultures, people are willing to take unknown risks, are comfortable with ambiguity and chaos, and are open to change and innovation. In contrast, in cultures with high rankings on uncertainty avoidance, the uncertainties inherent in life are perceived as a continuous threat that must be fought. These cultures emphasize conservatism, law, and order. People in high uncertainty avoidance cultures tend to feel powerless toward external forces and take risks only if they are known. High uncertainty avoidance reveals itself in behaviors that seek clarity and structure.

Individualism/Collectivism are two poles of one dimension. Individualism refers to an identity that is defined by personal choices and achievements. In individualistic cultures a person is expected to take care of only his/her immediate family and to emphasize individual independence, initiative and achievement. Identity is based in the individual; there is a strong sense of 'I'. In contrast, in collectivistic cultures, a person's identity is defined by the character of the collective groups to which he/she is more or less permanently attached. People in collectivistic cultures are born into extended families which protect them in exchange for loyalty. In collectivistic cultures a person is expected to take care of his/her extended family. Thus, there is a "we" consciousness; identity is based in the social system.

Masculinity/Femininity refers to the implications of the biological differences between the sexes for the emotional and social roles of the genders. In masculine cultures there is considerable role differentiation between the genders, both emotionally and socially. There is an ego orientation which stresses what you do; what you achieve. Men should be assertive and ambitious. Women should be modest, but may elect to be assertive and ambitious. In feminine cultures, however, there is minimal emotional and social role differentiation between the genders. The focus is on who you are, not what you do. Both men and women should seek interpersonal harmony and be modest.

Hofstede (1980) managed to provide an empirical mapping of the world's major nations across these four dimensions of culture. He also integrated these results with previous theory and data about national cultures, dimension by dimension (Bond, 2002). While Hofstede's study and his dimensions are informative, it must be kept in mind that his characterizations of national cultures are founded on averages calculated from thousands of individuals. His analysis of cultural differences can therefore be said to be valid for nations but not for any specific individual in a nation (Bond, 2002; Hofstede, 1980; Smith & Bond, 1998). Hofstede's dimensions are exemplars of group-level measures.

### Critiques of Hofstede

Hofstede has been criticized for several aspects of his study. First, he has been criticized for his selection of respondents. All participants worked for IBM, a company which is said to have a rather specific organizational culture (Smith & Bond, 1998) which the company most probably tries to instill in all offices, regardless of where in the world they are situated. In addition, all respondents worked within the marketing and servicing divisions and can hardly be seen as a representative sample of their cultures. Furthermore, the questionnaire items that lay the foundation for Hofstede's dimensions were a part of IBM's employee survey and were not designed for cross-cultural comparisons specifically. But, due to the matched groups of participants, he managed to keep the demographic diversity low and therefore managed to find differences based largely on the respondents' nationality (Smith & Bond, 1998).

Hofstede argued that behavior across nations can be described and explained with his four dimensions. This idea has been taken on by researchers from many scientific fields and has spawned a variety of studies that have been able to replicate Hofstede's cultural dimensions (e.g. Merritt, 2000). Merritt's replication was conducted in the context of airline pilots' work and culture. She found, in line with Hofstede, that national culture exerts an influence on cockpit behavior over and above the professional culture of pilots.

A replication study made in East Asia by Michael Bond and colleagues (Hofstede, 2001) using the Chinese Value Survey gave evidence for a fifth dimension: Long- and Short-Term Orientation. The dimension expresses to what extent virtuous living is a goal, independent of any religious justification. It is also related to the ability to solve well-defined problems. Long-term orientation stands for the fostering of virtues directed toward future rewards – in particular, perseverance and thrift. Hence, delayed gratification of needs is accepted. Short-term orientation stands for the fostering of virtues related to the past and present – in particular, respect for tradition, preservation of "face" and fulfilling social obligations. Immediate gratification of needs is expected (Hofstede & Hofstede, 2005). Hofstede (2001) has expended his framework to include this fifth dimension.

The most commonly replicated and extensively scrutinized dimension seems to be Individualism – Collectivism. Recently, there have been discussions about whether or not it is fruitful to perceive cultures in this sense (Bond, 2002; Van de Vijver & Leung, 2000). Bond (2002) argues that much of the confusion regarding Individualism – Collectivism is the product of researchers who have fallen victims to the ecological fallacy. In spite of clear instructions from Hofstede not to apply his cultural dimensions to analyses of individuals, many researchers do precisely that when trying to apply Hofstede's dimensions to new contexts. Like all group level constructs, Individualism – Collectivism cannot be used to infer or predict an individual's values or behavior.

### Schwartz's configural model of 10 value types

In the last 20 years, Shalom Schwartz (1992, 1994) has become a central figure in theoretically-grounded cross-cultural psychology. Schwartz roots his study of values in a framework of human evolutionary needs (Schwartz and Bilsky, 1987, 1990) and defines values as "desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity" (Schwartz, 1994, p. 21). According to Schwartz, values (1) serve the interests of some social entity, (2) can motivate action, (3) function as standards for judging and justifying action, and (4) are acquired "both through socialization to dominant group values and through the unique learning experiences of individuals" (ibid).

Schwartz identified in the 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. In contrast with Hofstede's study, this method assesses value structures at the individual-level of analysis.

The instrument asks respondents to rate each of the 57 values "As a guiding principle in my life," using the nine-point scale shown in Figure 2. 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.

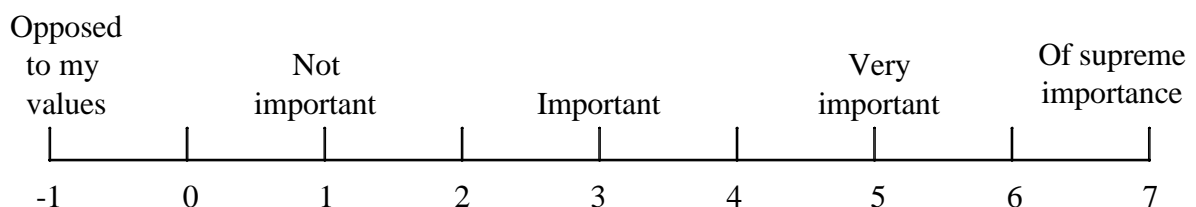| Opposed to my values | | Not important | | Important | | Very important | | Of supreme importance |
|---|---|---|---|---|---|---|---|---|
| -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Fig. 2.** 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, Schwartz found that the interrelationships of the 57 values formed 10 value types. When assigning names to the value types, Schwartz was guided by a theoretical framework claiming that values reflect three universal human requirements: 1) biological needs, 2) needs for social coordination, and 3) need for group welfare and maintenance (Smith et al., 2006). The ten value types are presented in Table 3.

**Table 3.** Schwartz's 10 value types.

| Value type | Symbol | Description |
|---|---|---|
| Self direction | SD | Independent thoughts and actions; autonomy and independence. |
| Stimulation | ST | The organismic need for variety, excitement, novelty, and challenge. |
| Hedonism | HE | Pleasure or sensuous gratification for oneself. |
| Achievement | AC | Demonstrating competence to obtain social approval; the focus is social esteem. |
| Power | PO | Attainment of social status and prestige, and control or dominance over people and resources; the focus is social esteem. |
| Security | SE | Safety, harmony, and stability of society, of relationships, and of self. |
| Conformity | CO | Self-restraint in everyday interaction; restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms. |
| Traditions | TR | Respect, commitment, and acceptance of the customs and ideas that one's culture or religion impose on the individual. |
| Benevolence | BE | Concern for the welfare of close others. |
| Universalism | UN | Understanding, appreciation, tolerance and protection of the welfare of all people and for nature. |

Note: Definitions from Schwartz (1994)

Schwartz set out not only to identify these universal value types, but also to specify the dynamic relations among the types. In order to do this, he analyzed his data using Smallest Space Analysis, a scaling technique that represents values as points in a multidimensional space. The distance between the points (values) represent their empirical relations. The more similar two values are, the higher their correlation and, in turn, the closer they are in space.

The smallest space analysis revealed that the ten value types form a configural model, reproduced as Figure 3. The circular shape of the model is explained by the fact that, even though the theory discriminates among value types, the values actually form a continuum of related motivations where adjacent value types share motivational features for the individual. The motivational differences between

value types are continuous rather than discrete, with more overlap in meaning near boundaries of adjacent value types. In other words, adjacent value types are proposed be to be most compatible and those on opposite sides of the circle to be in most conflict. For example, those individuals who endorse universalism (e.g. tolerance) as the guiding principle in their life are not likely to be compatible with those who see power (e.g. dominance) as the guiding principle in their lives. The location of tradition outside of conformity implies that these two types share the same motivational goal, that is, the subordination of the self in favor of social expectations.
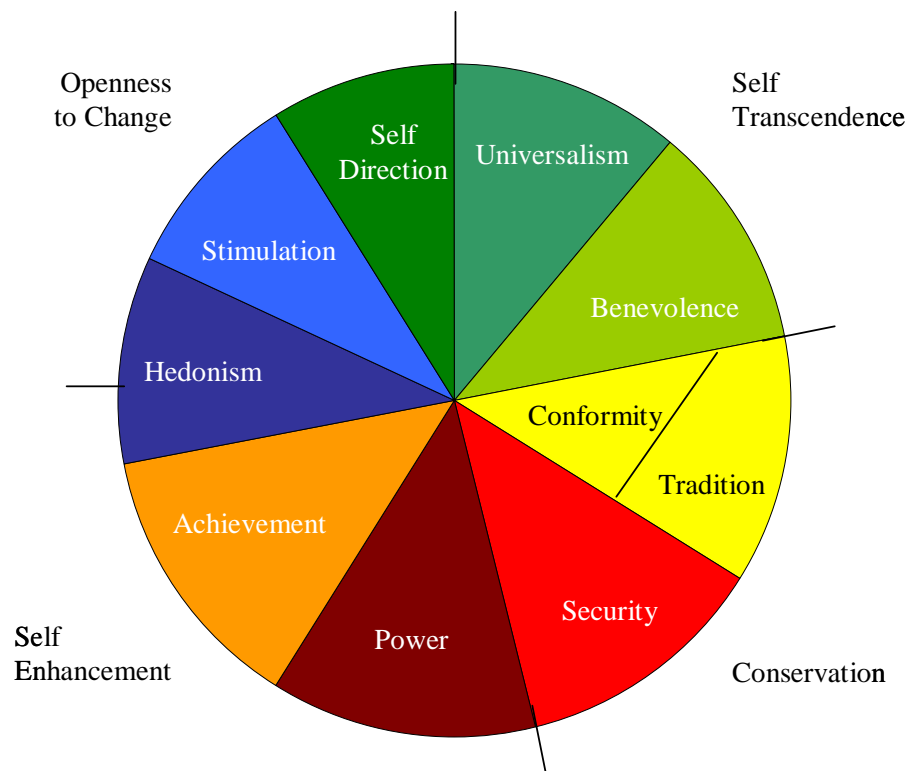


**Fig. 3.** The configural model of the structure of core human values. The left circle represents the interrelationship between the ten value types. The right circle illustrates how two dimensions are embedded in the configural model. (From Schwartz, 1992, 1994).

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 3 appears to be an exhaustive and near-universal classification of motivational values. Schwartz and others have used the instrument (for rating the 57 values) and the configural model of value types to explore and explain cross-cultural differences in a host of domains and applications.

The ten value types can also be perceived as two bipolar dimensions. One dimension is openness to change versus conservation. On the one side, openness to change seeks novelty and autonomy. On the other, conservation seeks safety,

tradition and conformity. The other dimension, self-transcendence versus self-enhancement, contrasts cooperation with others for the collective good against individual striving for personal gain.

In contrast with Hofstede's dimensions, the Schwartz configural model uses the natural variability between individuals' answers as a source of explanatory power. The model also provides a basis for generating hypotheses that link responses to the value survey to performance measures (dependent variables).

## Group diversity and faultlines

The term 'group diversity' typically refers to the degree to which members of a group or team have different attributes such as gender, nationality, ethnicity, profession, and educational background (Milliken, Bartel & Kurtzberg, 2003). These visually or contextually self-evident categorizations are generally assumed to provide the foundation on which team members interact and cooperate when they first meet (Byrne, 1971; Lau & Murnighan, 1998).

Lau and Murnighan (1998) introduced a concept called group faultlines to facilitate understanding and to explain the impact of diversity on the effectiveness of work groups. They argued that any analysis of diversity must go beyond the consideration of single characteristics, such as nationality, in isolation and investigate the effects of multiple characteristics and their interrelationships. Their article was the first to present a model for analyzing several characteristics simultaneously and has spawned a growing literature on group faultlines (e.g., Lau & Murnighan, 2005; Molleman, 2005; Thatcher, Jehn & Zanutto, 2003).

Group faultlines are hypothetical dividing lines that may split a group into subgroups based on several characteristics simultaneously. According to Lau and Murnighan, to understand a team and its dynamics, it is important to consider not only several characteristics at once but also the alignment of those characteristics. The faultline model maintains that an alignment of characteristics can encourage a group to split into subgroups. Further, multiple, cross-cutting alignments can encourage the development of a number of potential subgroups.

The first faultline model (Lau & Murnighan, 1998) focused on faultlines based upon demographic characteristics such as sex, race, and age. Although group members can categorize themselves in many different ways, they can rarely deny or hide their demographic attributes, especially those physical characteristics that stand out. For better or worse, these visually evident features contribute strongly to the initial impressions formed by others. When the group is new, faultlines are most likely to form based on demographic attributes (Lau & Murnighan, 1998). As the group interacts, other attributes such as personality, values, and skills will become increasingly influential and may, in turn, lead to the development of new faultlines (Dyck & Starke, 1999; Lau & Murnighan, 2005). In short, depending on the similarity and salience of group members' attributes, groups may have many potential faultlines, each of which may activate. Active faultlines increase the

potential for the team to split into subgroups composed of individuals with similar (aligned) attributes.

According to the model, the strength of group faultlines depends on three compositional factors: (1) the number of individual attributes apparent to group members, (2) their alignment, and, as a consequence, (3) the number of potentially homogeneous subgroups. Faultlines are weakest when attributes are not aligned and multiple subgroups can form (Lau & Murnighan, 1998). Lau and Murnighan (1998) hypothesized that groups with strong faultlines were relatively likely to split into subgroups. Further, they proposed that the rift, when activated, would likely become a source of friction and conflict that would reduce performance and group coherence.

The four hypothetical groups in Table 4 are designed to sketch demographic diversity and faultlines. Where there is minimal (Group 1) or extreme diversity (Group 4) in a group, members have only the group as such in common during the initial phase of their cooperation. In Group 1 all participants seem to be alike while in Group 4 they seem to have nothing in common that could become aligned and lead the group to split into subgroups. With repeated interaction, other attributes may align to lead either group to split into subgroups.

**Table 4.** Hypothetical groups showing the relationship between demographic diversity and group faultlines.

| Group | | | | | Diversity level and faultline strength |
|---|---|---|---|---|---|
| 1 | Student<br>Man<br>20<br>Swede | Student<br>Man<br>20<br>Swede | Student<br>Man<br>20<br>Swede | Student<br>Man<br>20<br>Swede | Minimal diversity.<br>No faultline. |
| 2 | Student<br>Man<br>20<br>Pakistani | Student<br>Man<br>20<br>Swede | Student<br>Woman<br>20<br>Swede | Student<br>Woman<br>20<br>Pakistani | Low diversity.<br>Two faultlines:<br>Moderate faultline strength. |
| 3 | Teacher<br>Man<br>50<br>Swede | Teacher<br>Man<br>55<br>Swede | Student<br>Woman<br>31<br>Iranian | Student<br>Woman<br>35<br>Iranian | Low diversity.<br>One very strong faultline. |
| 4 | Student<br>Woman<br>20<br>Swede | Teacher<br>Man<br>30<br>Bosnian | Nurse<br>Woman<br>65<br>Iranian | Fireman<br>Man<br>50<br>Indian | High diversity.<br>Many weak faultlines. |

The second group in Table 4 consists of young students with different genders and nationalities. Because there are only two sexes and two nationalities, the diversity of the group is relatively low. Nevertheless, the diversity that exists suggests that the group may be cut by two weak faultlines. One aligns the characteristic gender,

the other nationality. Depending upon which characteristic is the more salient to the group, one or the other of these faultlines might be activated and foster the formation of two subgroups.

The third group could split into two subgroups that differ along all four characteristics - ethnicity, gender, profession, and age. The two teachers are older Swedish men and the two students are younger Iranian women. The differences in all four characteristics make the group moderately diverse. Their sharp alignment defines one very strong faultline. Lau and Murnighan (1998) argue that this is the type of group in which a faultline is most likely to activate, split the team into subgroups, and cause friction and conflict. One implication of this claim is that faultlines are most likely to form in groups of moderate, rather than high, diversity.

Since the introduction of the first faultline model several research teams have accepted Lau and Murnighan's (1998) challenge to conduct empirical tests of the impact of faultlines and of faultline strength on group work. The original article hypothesized that groups with strong faultlines are more likely to split into subgroups and that a rift would reduce both performance and group coherence. The tests, however, suggest that the relationship between faultlines and performance is not as linear and straightforward as predicted.

One of the first empirical tests of the faultline model was conducted by Thatcher et al. (2003). They developed an analytical tool to measure faultline strength. Their data suggest that the effect of faultlines on inter-group conflict and on group cohesion and performance traces a curvilinear (U-shaped) curve like that shown in Figure 4. Groups with either very weak or strong faultlines (e.g., Groups 4 and 3, respectively, in Table 4) experienced more conflict and lower morale and performed less well than homogeneous groups (Group 1) or groups with two weak faultlines (moderate faultline strength, Group 2).
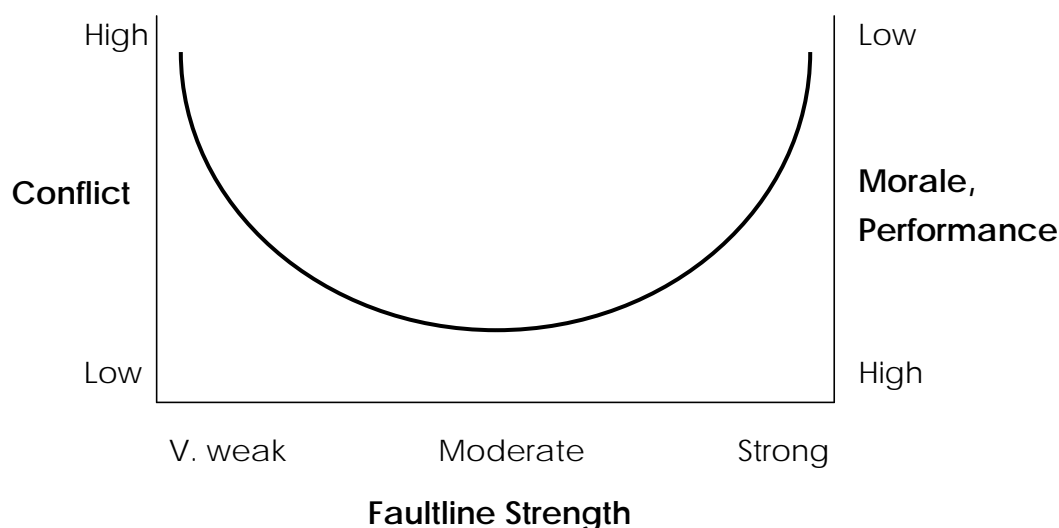


**Fig. 4.** Diagram illustrating the U-shape relationship between faultline strength and conflict, performance, and morale.

According to Thatcher et al., a possible explanation of the curvilinear relationship between faultline strength and performance is that some of the members of a group with moderately strong faultlines are likely to belong to more than one subgroup. As team members move between the various subgroups they may create a communication link and thereby improve communication across subgroups. As a result, the group as a whole can experience less conflict and higher levels of morale and group performance. Thatcher et al. (2003, p. 233) conclude that "… diversity in and of itself is not negative; it is the composition and arrangement of the diversity among members that ultimately influence group process and performance".

These results are in line with earlier research by Early and Mosakowski (2000) investigating hybrid team cultures in multinational teams. In three separate studies, moderate levels of heterogeneity (strong faultlines) rather than low or high levels were found to lead to poorer performance.

Molleman (2005) investigated whether faultlines based on demographic characteristics, abilities, and personality traits affect team functioning and found that strong demographic faultlines have negative effects on cohesion and lead to more conflicts. In addition, strong faultlines are especially detrimental to team functioning when team members expect to work autonomously.

Lau and Murnighan (2005, p. 654) conducted a field experiment that showed that members of strong-faultline groups "identified socially not with the group as a whole but with their demographically similar subgroups". This social identification in turn led to affect- and process based biases, that is, led people to view members of their own sub-group as more likeable and competent. Lau and Murnighan also showed that work related communication differed between weak- and strong-faultline groups, where weak- to moderate-faultline groups were particularly effective.

Few studies seem to have covered the seismic events that actually activate group faultlines and produce a rift that has the potential to split the group into subgroups. In their original article, Lau and Murnighan (1998) hypothesized that it is the nature of the group's task that is the most likely trigger in a well-established group. Dyck and Starke (1999), however, found that conflicts and fragmentation in groups whose members knew each other well were activated by outside events such as the introduction of important new group members. The new members introduced ideological rather than demographic faultlines.

To sum up the research on diversity and faultlines, it is clear that diversity is difficult to handle from a methodological point of view. The early research on diversity relied on overly simple measures of diversity, resulting in inconsistent results. The faultline research is still in its cradle and also suffers from some inconsistency regarding its results (Li & Hambrick, 2005), perhaps because of the immaturity of the theory itself or the use of too complex measures of diversity. It is, however, obvious from the faultline research conducted so far that team

diversity can be beneficial for teams when the differences and similarities in the team are aligned in a way that makes overlap between potential subgroups possible (Thatcher et al., 2003).

The teams in Table 5 have five team members to illustrate overlap between subgroups. In Group 1 there is minimal diversity and no faultline. If this group were to split into subgroups, the split would probably be due to personal interests, ideology, or personality traits. Group 2 is an example of how an individual can belong to several subgroups. The Bosnian fireman can interact with his countrymen and he can also relate to the Swedes since they, too, are firemen. One can imagine how the one Bosnian fireman could become a conduit for information flow between the Bosnian physicians and the Swedish firemen.

**Table 5.** Hypothetical groups showing the relationship between dimension of demographic diversity and group faultlines.

| Group | | | | | | Diversity level and faultline strength |
|-------|---|---|---|---|---|----------------------------------------|
| 1 | Fireman Man 29 Swede | Fireman Man 35 Swede | Fireman Man 32 Swede | Fireman Man 31 Swede | Fireman Man 37 Swede | Minimal diversity. No faultline. |
| 2 | Physician Man 35 Bosnian | Physician Man 30 Bosnian | Fireman Man 29 Bosnian | Fireman Man 32 Swede | Fireman Man 35 Swede | Low diversity. Two faultlines with moderate strength. |
| 3 | Fire chief Man 50 Swede | Fire chief Man 55 Swede | Press officer Woman 31 Pakistani | Press officer Woman 31 Pakistani | Press officer Woman 35 Pakistani | Low diversity. One very strong faultline. |
| 4 | Fireman Man 31 Indian | Fireman Man 33 Swede | Physician Woman 55 Swede | Physician Woman 52 Bosnian | Physician Man 50 Bosnian | High diversity. Many weak, faultlines. |

Group 3 has one very strong faultline with four alignments: profession, sex, age, and nationality. It is likely that this group will split into two subgroups. There are several very weak faultlines in group 4: there are two professions, two sexes, two generations, and three nationalities. The group could split along any one of these potential rifts. Nevertheless, everyone has something in common with everyone else making it relatively unlikely that any one faultline would rupture. For instance, the group could split based on gender, but then the two female physicians would still have the same profession and age as the one Bosnian man. Although the Indian man's nationality is unique, he and the Swedish man share a profession and are the same age. The multitude and weakness of faultlines suggests that, if subgroups were to form, the boundaries between them would likely be quite fuzzy.

Faultline maps

Tables 4 and 5 emphasize the alignment of characteristics and the potential formation of group faultlines. Such tabulations are possible whenever team membership is known and the elements of cultural diversity have been identified. An alternative representation is required when membership is not known and the value of the faultline concept lies chiefly in its role as a precautionary alert that sources of friction might emerge.

We offer a pair of alternative representations for the case where faultlines might split a team into as many as four different subgroups. The representation shown in Figure 5 is a symbolic mapping. It uses letters to distinguish the four groups and uses vertical lines to represent faultlines. The letters used in Figure 5 identify the four national groups that participated in our study – Swedes (S), Bosnians (B), Indians (I), and Pakistanis (P).

As shown in Figure 5, there are 15 unique ways in which a multinational team composed of individuals from four different national cultures could split. There are seven alignments that could produce one faultline and six that could produce two. No faultlines are likely where there is no diversity and the case of extreme diversity could conceivably generate many faultlines.
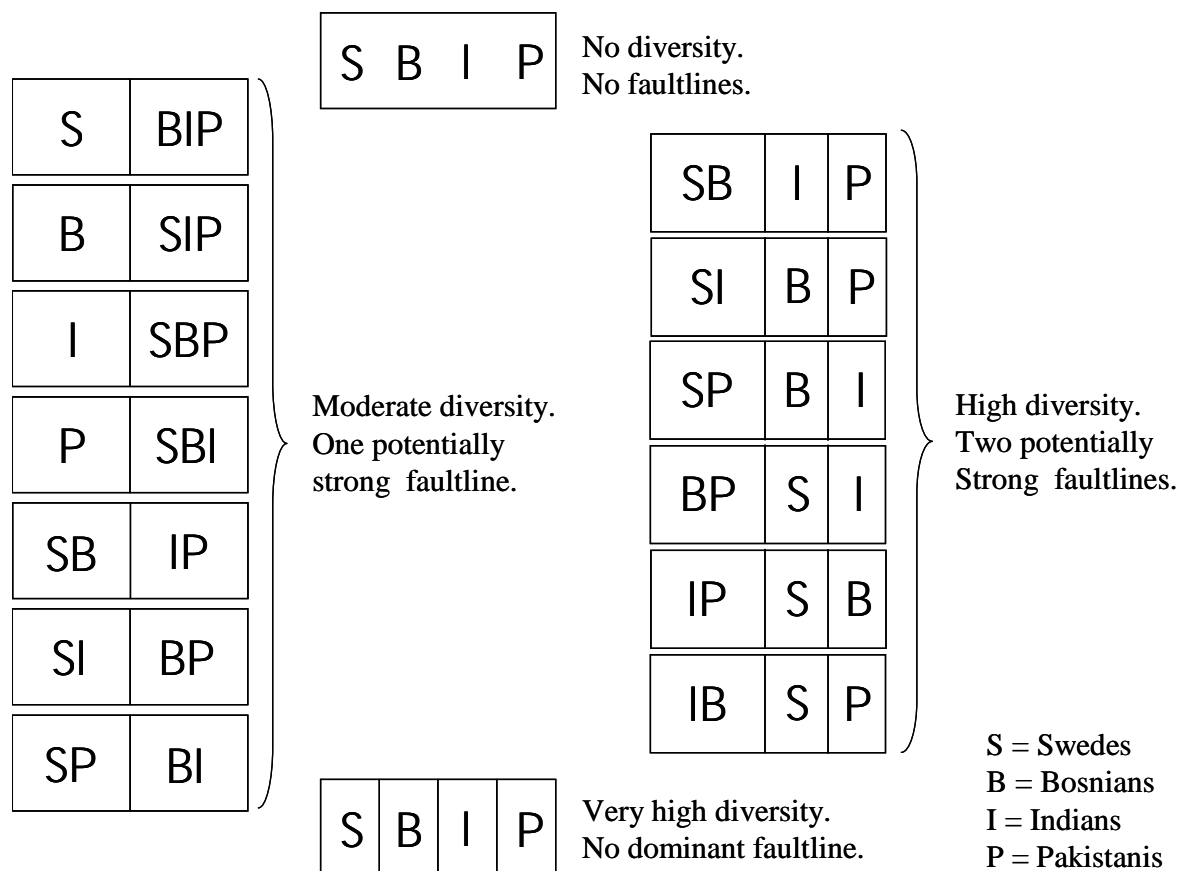


**Fig. 5.** The 15 possible sets of faultlines dividing the four national groups.

The representation shown in Figure 6 is spatial. It maps the different groups to different quadrants and assigns them a characteristic color. The white horizontal

and vertical spaces between the groups represent the faultlines. The colors used in Figure 6 to identify the national groups are based upon each nation's flag. Sweden is shown in blue, Bosnia in yellow, India in orange, and Pakistan in green. This color convention is used consistently throughout the report.

The assignment of quadrants in the faultline map is based on a pair of naïve assumptions. The horizontal alignments reflect the assumption that geography may afford common ground between disparate national groups. Sweden and Bosnia are both European. To some extent they are likely to share a common European heritage. Similarly, both Pakistan and India lie on the Indian subcontinent south of the Hindu Kush / Himalaya suture zone that welds them to the rest of Asia. In spite of the tension between these two nations, their two cultures are likely to have more in common than they do with the two European cultures. The vertical orientation in the faultline map reflects the assumption that a common religion, in this case Islam, may afford common ground.

The 15 panels in Figure 7 wed the two representations to illustrate the 15 possible faultline maps that could characterize the interaction between team members from four different cultures. The upper portion of each panel shows the symbolic representation. The lower portion contains the spatial representation. Figures 7a and 7b represent the two end members – very high diversity (7a) and no diversity (7b). The white space separating the four groups in Figure 7a represent a pair of cross-cutting faults that split the team into four subgroups. The melded colors in Figure 7b represent the absence of faultlines. The remaining panels combine the melding of colors and white space to illustrate cases where there are one or two potentially strong faultlines.
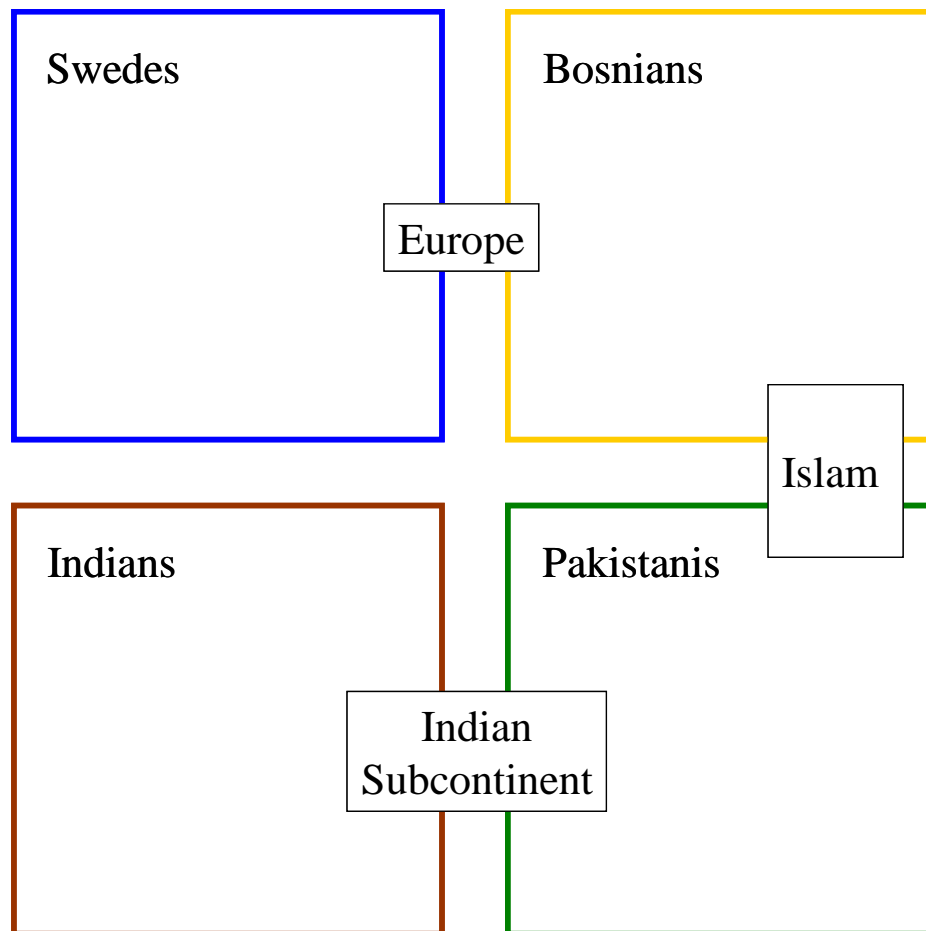
**Fig. 6.** The basic map for the four national groups. The distribution on the map reflects the naïve hypothesis that geography and religion might be sources of similarity between pairs of groups.
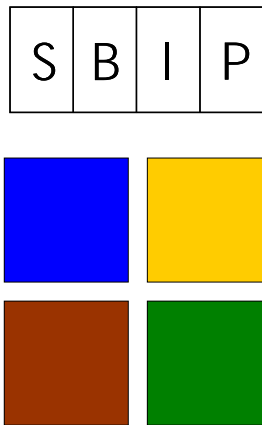
**Fig. 7a.** The two representations of a team with members from four national groups with very high diversity and no dominant faultline.
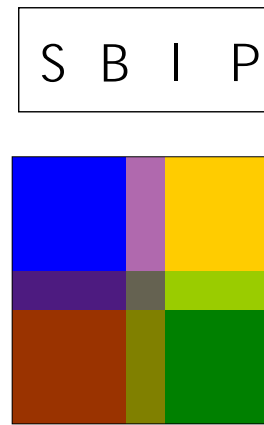


**Fig. 7b.** The two representations of a team with members from four national groups with no diversity and no faultlines. The intermediate colors represent the team's unity.
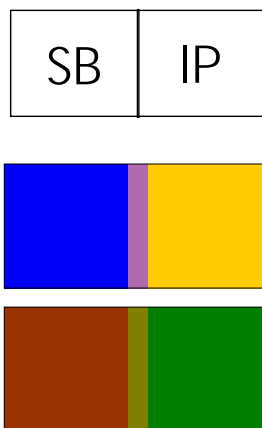


**Fig. 7c.** Moderate diversity with one potentially strong faultline between the two groups from Europe (S & B) and the two groups from the Indian subcontinent (I & P).
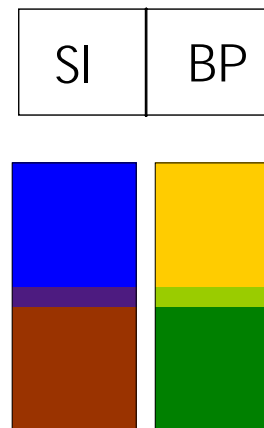


**Fig. 7d.** Moderate diversity with one potentially strong faultline between the two traditionally Islamic nations (B & P) and the two traditionally non-Islamic nations (S & I).
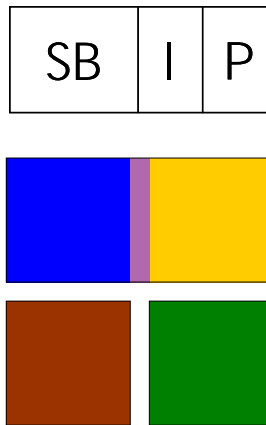
**Fig. 7e.** High diversity with two potentially strong faultlines. The horizontal faultline separates the two European groups (S & B) from the two non-European groups. The vertical faultline separates the two groups from the Indian subcontinent.
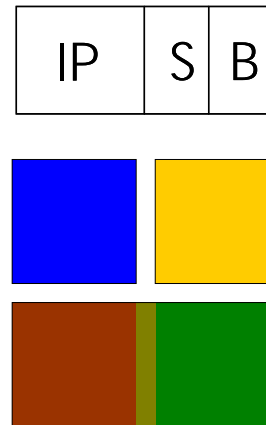


**Fig. 7f.** High diversity with two potentially strong faultlines. The vertical faultline separates the two groups from the Indian subcontinent (I & P) from the two from Europe. The vertical faultline separates the two European groups.
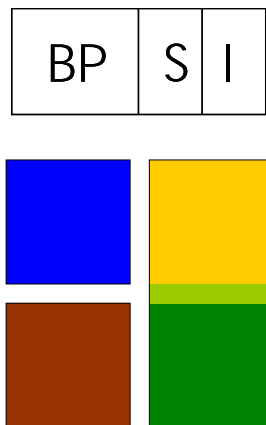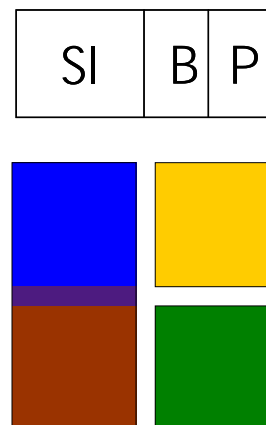


**Fig. 7g.** High diversity with two potentially strong faultlines. The vertical faultline separates the two traditionally Islamic groups (B & P) from the traditionally non-Islamic groups. The horizontal faultline separates the Swedes and Indians.



**Fig. 7h**. High diversity with two potentially strong faultlines. The vertical faultline separates the two traditionally non-Islamic groups (S & I) from the two traditionally Islamic groups. The horizontal faultline separates the Bosnians from the Pakistanis.
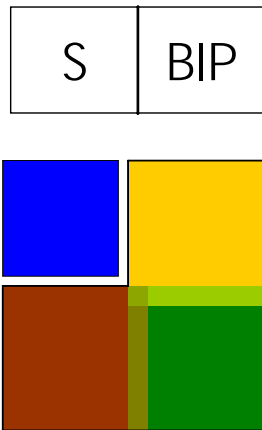
**Fig. 7i.** Moderate diversity with one strong faultline isolating the Swedes from the other three groups.
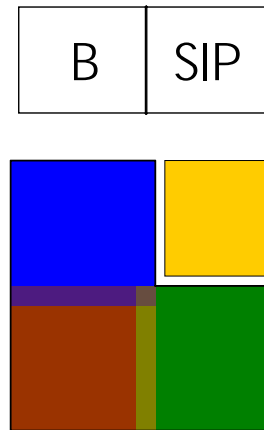


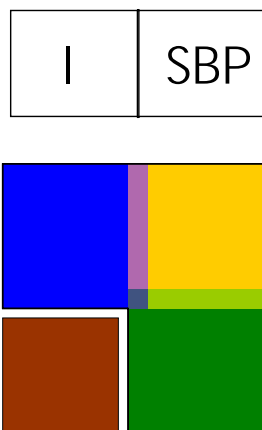**Fig. 7j.** Moderate diversity with one strong faultline isolating the Bosnians from the other three groups.



**Fig. 7k.** Moderate diversity with one strong faultline isolating the Indians from the other three groups.
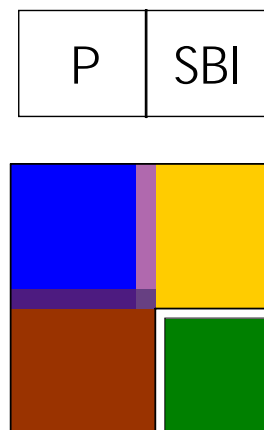


**Fig. 7l.** Moderate diversity with one strong faultline isolating the Pakistanis from the other three groups.
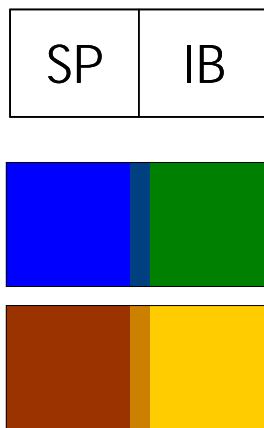
**Fig. 7m**. Moderate diversity with one potentially strong faultline separating the Swedes and Pakistanis from the Bosnians and Indians.
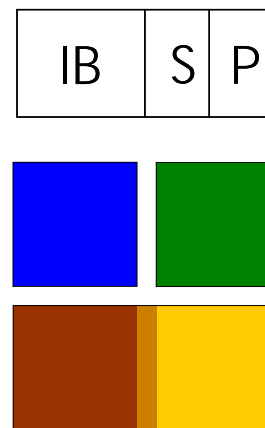


**Fig. 7n**. High diversity with two potentially strong faultlines separating the Swedes and Pakistanis from each other and the other two national groups.
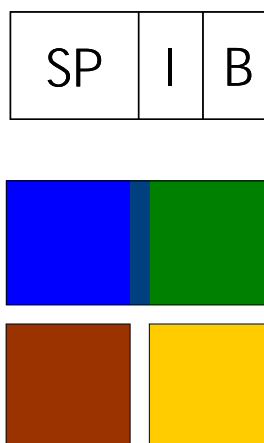


**Fig. 7o.** High diversity with two potentially strong faultlines separating the Bosnians and Indians from each other and the other two national groups.

# Method

This section discusses the empirical method used to study cultural influences on and barriers to collaborative decision making in an OSOCC. The results section that follows presents evidence that this approach can be used successfully to overcome the pitfalls common to much of cross-cultural research and to avoid committing the ecological fallacy.

## Constraints on the method

A critical challenge we faced was to find an appropriate method to capture human behavior in a dynamic and complex work situation like an OSOCC. Our approach was to use the C3Fire microworld (Granlund, 2003) to simulate an emergency management task and to conduct dynamic laboratory experiments with culturally homogeneous groups of individuals from three different countries. The C3Fire microworld has been used extensively in research on networked-based command and control (Artman, 1999; Granlund, 2003; Johansson, Persson, Granlund, and Mattson, 2003). Microworlds are said to bridge the gap between the confines of the traditional laboratory experiment and the "deep blue sea" of field research (Brehmer & Dörner, 1993).

The nature of multinational emergency management operations place a pair of strict constraints on the conduct of the experiment. The first constraint is unfamiliarity. OSOCC teams are formed ad-hoc and on-site. As a result, members may or may not know each other. Because there is no time for team-building, team members get to know each other as they work. As they get to know each other, their way of working together is likely to evolve. Accordingly, the design the experiment had to (1) elicit and capture spontaneous but collaborative emergency-services decision making in response to a simulated emergency, and (2) emulate the ad-hoc nature of team formation.

In addition, we wanted to gather individual self-report information about values, personality, and beliefs. These data ground the research in the tradition of cross-cultural psychology and are the basis for generating hypotheses about whether and how culture shapes individual characteristics that may, in turn, influence team behavior.

Since it is difficult to know exactly how to distinguish one culture from another based on something other than nationality, we too use nationality as a proxy for culture in our study. Accordingly, our units of analysis are the team and the national group. We are aware of the difficulties in doing so, but since we wish to identify dimensions of diversity that reflects differences in cultural background and have to work within our means, nationality is our best proxy for culture. We do not claim that the results from these individuals can be generalized to all individuals in their countries of origin. Rather, we assume that the differences in their behavior can be in part explained by their cultural heritage.

In our experiments with teams of four drawn from the same national group, we seek to avoid potential demographic confounds by keeping the demographic characteristics of our participants as homogenous as possible. In each experiment group all participants (1) are the same sex, (2) are approximately the same age, and (3) have the roughly the same level of education, and (4) come from the same nation. Accordingly, we are using a matched group sample that facilitates comparison across the national groups.

By using an experimental approach and a strict experimental procedure, we are being sensitive to confounding factors in the environment, since much of the environment is controlled by the experiment itself.

By collecting data that reveal how the different national groups choose to divide roles and responsibilities, how they set up goals in the game and what strategies they use to reach those goals, we make it possible to identify dimensions of decision making behavior along which these national groups differ.

## Participants

A total of 114 participants who identify themselves as either Swedish, Bosnian, Indian, or Pakistani participated in our experiment. Their demographic characteristics are listed in Table 6. All participants signed an informed consent form and were treated in accord with the standards established by the Institutional Review Board of Linköping University. All completed the study, which took approximately 8 hours, and received compensation of 500 sek (more than $60).

**Table 6.** Demographic profiles of the participants.

| Group | N | Age range (M, SD) | Sex | Mean years of education (SD) | Occupations |
|---|---|---|---|---|---|
| Swedes | 32 | 19 - 37 (24.5, 3.5) | All male | 14.4 (1.7) | 20 students 12 other |
| Bosnians | 22 | 18 - 49 (25.8, 7.3) | 16 men 6 women | 14.4 (2.9) | 11 students 11 other |
| Indians | 30 | 22 - 29 (24.7, 1.9) | All male | 17.0 (1.5) | All students |
| Pakistanis | 30 | 22 - 31 (25.7, 2.7) | All male | 16.5 (0.9) | All students |
| All groups | 114 | 18 - 49 (25.2, 4.1) | 108 men 6 women | 15.6 (2.1) | 91 students 23 other |

### Cultural groups and experiments with teams from the same culture

The overarching goal of this project was to identify for the SRSA clusters of expectations and behaviors for collaboration and organizational structure that (1)

vary systemically across cultures and that (2) SRSA personnel in a newly-formed OSOCC could use to identify potential barriers to collaborative decision making. To this end it was necessary to elicit expectations and spontaneous behaviors from a variety of cultures. The pioneering work of Hofstede (1980), suggests that the Swedes, Bosnians, Indians, and Pakistanis differ strongly from each other along a variety of dimensions. Each of these national groups is well-represented in Sweden. Due to their assumed diversity and availability, these are the four national groups we elected to study. We acknowledge that by adopting the nation as our proxy for cultural identity we expose ourselves to valid criticisms about insensitivity to the diversity within nations. There is little we could have done to overcome this concession to convenience other than to conduct our experiments in the nations themselves. The strong constraint of limited funding precluded this option.

To avoid the pitfall of unexpected context effects and to avoid confounds associated with the clashing of cultures, it was also necessary to elicit expectations and spontaneous behaviors in culturally homogeneous settings. Accordingly, we opted to conduct experiments with teams composed of individuals drawn from the same national group, e.g., four Swedes or four Bosnians or four Indians or four Pakistanis.

### Gender and religion

One of our initial hypotheses was that the expectations and behaviors for collaborative decision making would vary systematically across teams composed of individuals from the four different national groups. At the beginning of the project we set out to find participants from the large pools of immigrants in Sweden. Due to personuppgiftslagen (PUL) (1998:204), however, finding participants was more difficult than we could imagine. PUL makes it impossible to ask Migrationsverket for registers of immigrants. Nevertheless, our contact at Migrationsverket was quite helpful with regard to recruiting participants. She implied that it might be difficult and culturally inappropriate to mix Islamic men and women in the same study group. The choice was therefore between all-female or all-male groups. Since we have both male and female experiment leaders, we investigated the (in-) appropriateness of having (a) a female experimenter lead sessions with Islamic men and (b) a male experimenter lead sessions with Islamic women. Cultural sensitivity dictates the first option. Strictly Islamic men who have immigrated to Sweden have been in contact with many Swedish women (e.g., at Migrationsverket, when learning Swedish, at Arbetsförmedlingen, etc.) and are used to being around women with some authority. Their female counterparts have the same experience with Swedish women but relatively little experience with Swedish men. Accordingly, strictly Islamic women would probably be less comfortable in the presence of male experimenters than Islamic men with female experimenters. Accordingly, we decided to recruit only men.

A second reason for keeping the gender of the groups constant is the desire to avoid a potential confound. By recruiting only men, we had hoped to eliminate gender as an unaccounted contextual variable. Mixing the sexes within a team would have added yet another dimension to the analysis and might complicate the identification of cultural influences on collaboration and decision making.

However, when recruiting Bosnian participants, a group of women reported interest in participating. We therefore had one group of six Bosnian women in an all-women group.

### Demographic uniformity

The main consideration while recruiting participants was to find individuals who varied minimally across all demographic variables other than national group. Every effort was made to match individuals across national groups, that is, to have a matched group experimental design. A second consideration was to focus on people like those who would likely be selected by their nations to participate in the management of international relief operations. Young people were recruited because the study required participants to be computer literate.

Figure 8 shows the mean and standard deviations of the participants' age across the four national groups. The one-way ANOVA found no significant differences in age across the groups. The corresponding faultline maps reflect this uniformity. If the participants were to have been mixed to form a multinational team, which they were not, age would not have been a likely ground for the formation of faultlines.
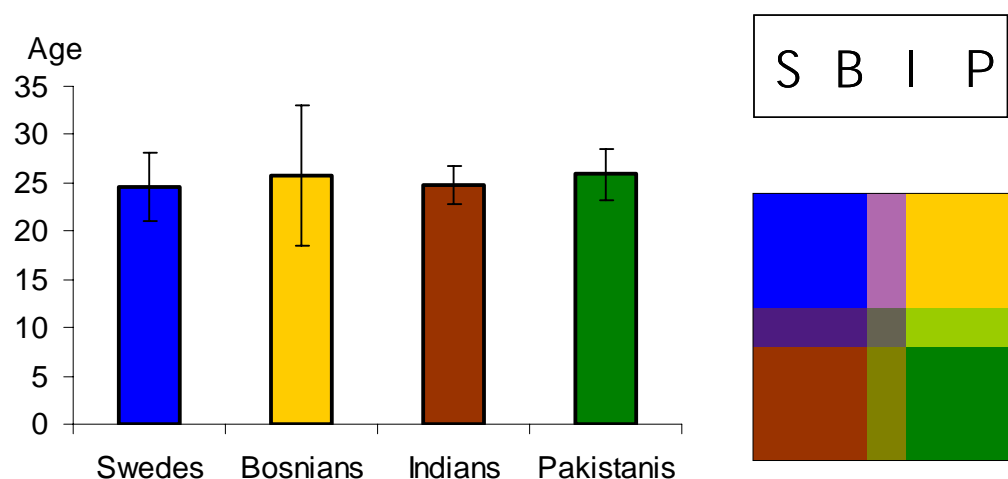


**Fig. 8.** Mean and standard deviation of the participants' ages and the corresponding faultline maps.

Unfortunately the same claim may not be tenable for a second demographic variable, years of education, shown in Figure 9. While every attempt was made to recruit individuals with essentially identical levels of academic training, the one-way ANOVA indicates that national group was significant, $F(3, 109) = 16.7$, MSE = 3.1, p < .001, power >.98. The high level of significance and the strength of the test underscore the difficulty in creating a matched-group design. The Tukey HSD procedure indicates that the Swedes did not differ from the Bosnians, that the Indians did not differ from the Pakistanis, and that all other pairs differed significantly. Most of the Swedes and Bosnians had undergraduate degrees whereas all the Indians and Pakistanis had Masters Degrees. To an observer the difference may have been negligible but, in some situations, some might perceive it to be a valid reason to differentiate themselves from other team members. The corresponding faultline maps reflect the potential for friction between the undergraduate students and the graduate students. It is important to emphasize, again, that the groups were never mixed and, accordingly, there was no opportunity for such a faultline to form.

The recruiting effort failed to maintain demographic uniformity along the dimension of occupation. Not all were students. As shown in Figure 10, all Indians and Pakistanis, three-quarters of the Swedes, and half of the Bosnians were students. The chi square test indicates the difference in occupational status is statistically significant, $\chi^2(6, N = 114) = 32.9$, $p < .001$. Clearly the Bosnians are different than the other three groups. Removing the Bosnians and repeating the test indicates that the Swedes are different than the Indians and Pakistanis, $\chi^2(4, N = 92) = 12.7$, $p < .05$. In sum, the presences of non-students in both the Swedish and Bosnian groups makes them different from each other and from the Indians and Pakistanis.

A demographic variable that can have a profound impact on the conduct of a computer-based experiment is computer literacy. A questionnaire asked the participants about their use of computers at work and for entertainment. Figure 11 shows the results for four dimensions of computer use. Separate chi square tests were conducted for each of the measures. None of the tests approached the .05 level of statistical significance. Accordingly, all four national groups had essentially identical levels of computer literacy. All participants were computer literate. The use of chat programs is particularly relevant to this study because the experimental platform, C3Fire, contains a chat-based communication tool that is the sole medium for communication during the game.

Appendix 1 presents a complete itemization of the demographic data generated by the self-report questionnaire given to the participants.
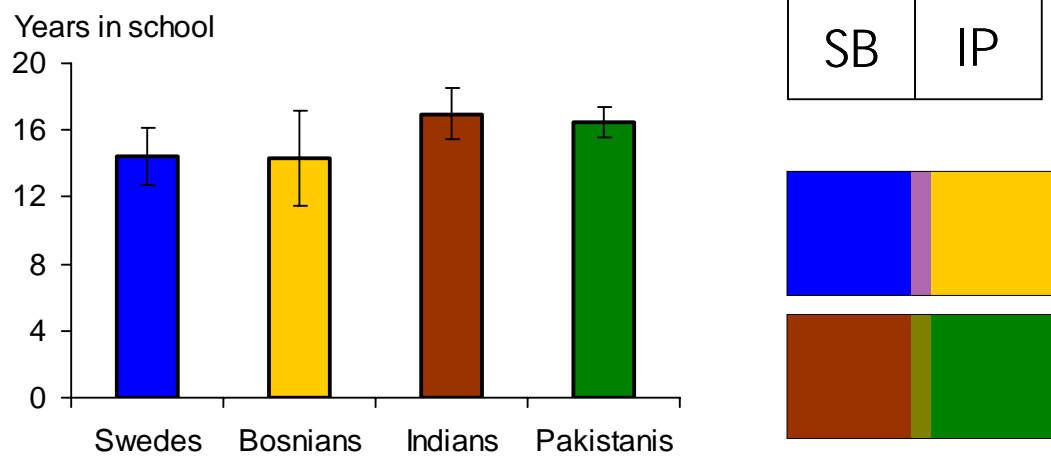
**Fig. 9.** Mean and standard deviation of the participants' years of education and the corresponding faultline maps.
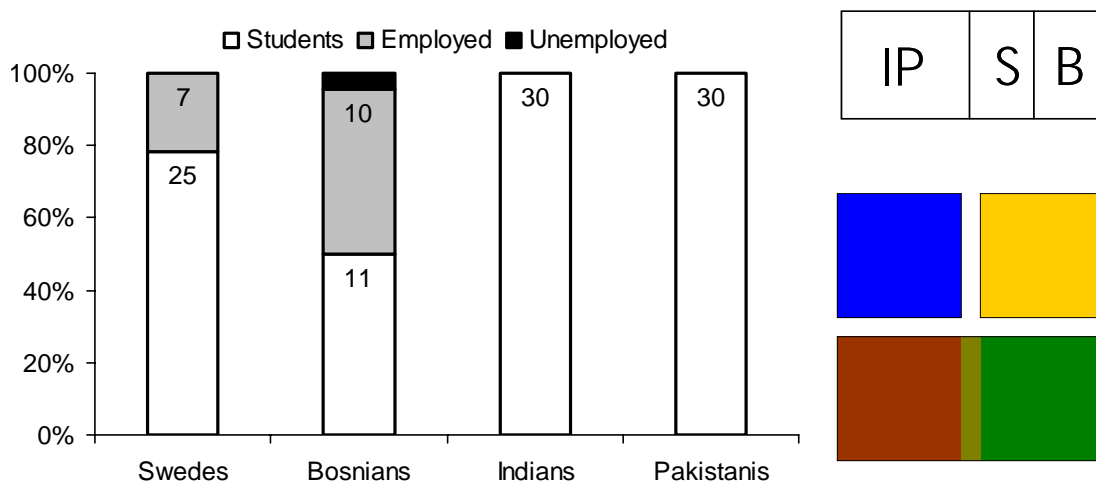


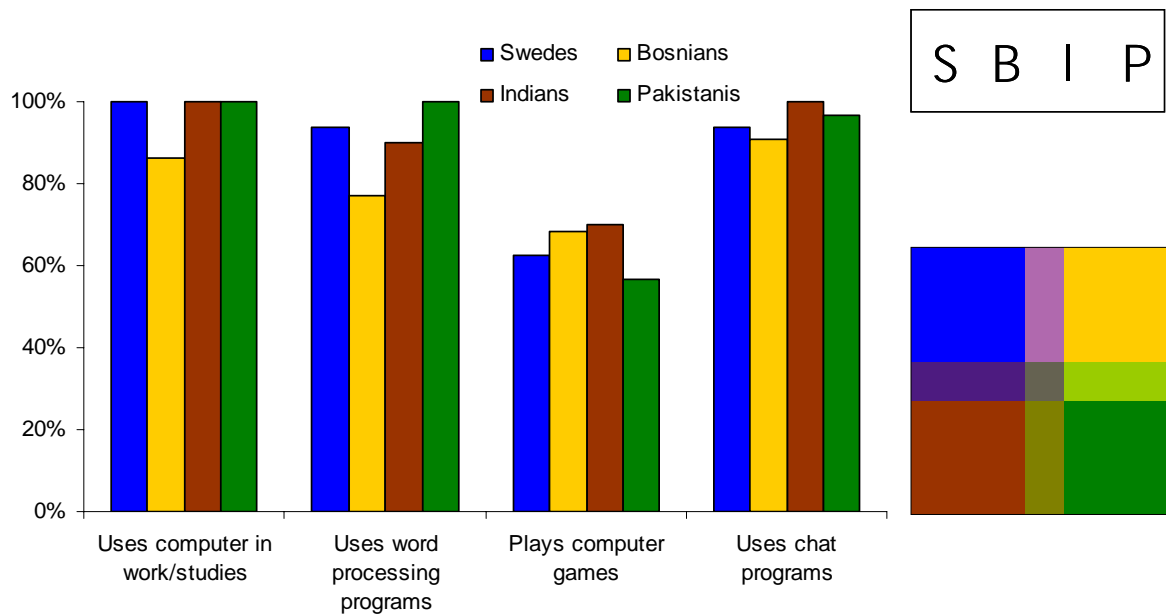**Fig. 10.** Stacked bar graph showing the participants' employment and the corresponding faultline maps.

**Fig. 11.** Graph showing four measures of computer use and the corresponding faultline maps.

## Apparatus

C3Fire (Granlund, 2002) is a microworld in which participants play the roles of fire chiefs. Their task is to collaborate to fight fires in an experimentally-controlled setting under the observation of an experiment manager. C3Fire captures many of the characteristics of complex decision-making environments: it implements high degrees of connectivity and complexity, emulates sources of uncertainty and time pressure, and poses multiple, concurrent goals (polytely) (Brehmer, 2005; Brehmer & Dörner, 1993; Funke, 1993, 2001; Gray, 2002; Rigas, Carling, & Brehmer, 2004).

The C3Fire interface and instructions on how to interact with C3Fire are discussed in depth in the Instructions to Subjects which is attached as Appendix 2. An example of the interface is shown the figure on the last page of Appendix 2. The interface contains a map, the email facility, and information about the status of the fire-fighting equipment. The map is divided into a grid of squares.

Figure 12 is a sketch that shows how the participants interacted with C3Fire and each other. Four participants sat at separate monitors. All saw the same map representation of the simulated world and were presented the same (complete and accurate) information. They communicated with each other via the C3Fire email network. An experiment manager supervised and monitored the experiment but did not intervene during the experimental sessions.
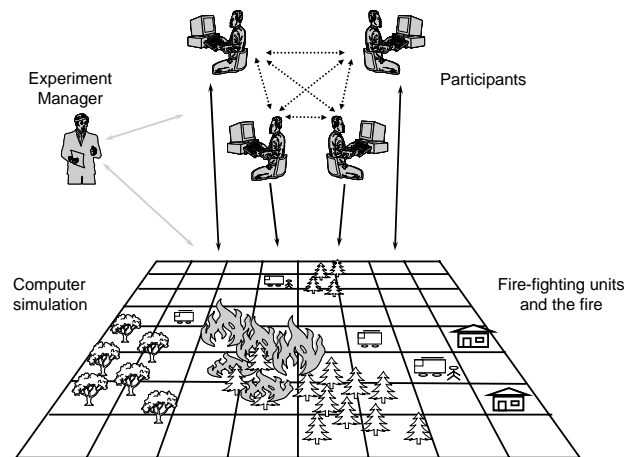
**Fig. 12.** Sketch of the C3Fire map and the experimental setting.

The emergency situation is a forest fire. The speed of burning and spreading of the fire are functions of vegetation, terrain, the presence of buildings, and wind direction and speed, and are pre-set by the experiment manager. Participants can extinguish the fire by directing fire trucks to move to squares (in the map grid) that are on fire. The trucks are constrained by limits on the rates with which they drive, deploy, and fight the fire. These limits are set by the experimenter. One of the team's jobs is to dispatch the trucks.

In previously published studies of network-based command and control using C3Fire, the fire trucks were the only trucks under the participants' control (Artman, 1999; Granlund, 2002, 2003; Johansson, 2003; Johansson, Persson, Granlund, & Mattsson, 2003; Svenmarck, 1998). This restriction facilitated analysis of the effects of organizational structure for command and control on the decision-making process. Our focus is less on organizational structure than on the interplay of a distributed team of decision makers. To this end, we extended C3Fire to include additional command functions and four new classes of fire-fighting resources.

Two of the new classes of resources are water and fuel trucks. Water trucks supply fire trucks with water, and obtain water from water stations. Fuel trucks supply both fire trucks and water trucks with fuel and obtain fuel from fuel stations. Both water trucks and fuel trucks are fully mobile but their tanks have a limited capacity. The third and fourth new classes are the water and fuel stations. Stations cannot move but have an unlimited supply. The addition of water and fuel trucks and stations makes the logistics of the simulation emulate some of the complications experienced by members of an OSOCC.

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 fire trucks. If different people have control over these different resources, their actions are mutually constraining. This provides ample opportunity for conflicts to arise.

We, as experimenters, did not establish an organizational structure for communication and control that the teams were to follow. E-mail communication and the allocation of tasks were not constrained by either the experimenters or the C3Fire software. As a result, all participants could (1) communicate with all other members of their team (individually or as a team), (2) command all trucks (all fire, water, and fuel trucks), and (3) override commands made by other participants. In short, all decisions regarding task allocation, goal formation, and team structure were left to the teams.

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

### Scenarios

We created eight different experimental scenarios by systematically manipulating three factors: map, map rotation, and initial fire size. Two different maps (1 and 2) with differing configurations of forests and houses, etc., form the foundation for the eight scenarios. Four scenarios were based on map 1 and four on map 2. Each map was presented four times, at four different rotations (0°, 90°, 180°, and 270°), to make the maps appear different. As no participant mentioned that the same map had been used more than once, this manipulation appears to have been effective. Initial fire size refers to the size of the fire, in squares, at the beginning of the scenario. This was manipulated at two levels (2x2 and 3x3). The larger the fire, the greater the challenge.

## Procedure

The participants signed up to report to the laboratory in culturally homogeneous (and same-gender) groups of eight. As shown in Table 7, there were days when only seven or six of the eight volunteers actually showed up. In the laboratory, the participants were randomly and anonymously assigned to two teams of 4 (4 and 3, 3 and 3) decision makers. The two teams worked in parallel in two different simulated OSOCCs. This arrangement made it possible to gather data on two teams (two units of analysis) simultaneously. 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. Two Indian groups consisted of seven participants and played in teams of four and three. One Bosnian group consisted of six (female) participants and played in teams of three. In what follows, the word 'team' signifies the four participants working together 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 were brought together or to the larger national group with which they identified. Table 7

itemizes the experimental groups, the number of participants in each group, and how many games of C3Fire were played.

**Table. 7** Overview of the experimental groups.

| Group | Nationality | Participants | C3Fire sessions |
|-------|-------------|--------------|-----------------|
| 1 | Swedish | 8 | 16 |
| 2 | Swedish | 8 | 16 |
| 3 | Swedish | 8 | 16 |
| 4 | Swedish | 8 | 16 |
| 5 | Bosnian | 8 | 14 |
| 6 | Bosnian | 8 | 16 |
| 7 | Bosnian | 6 | 16 |
| 8 | Indian | 7 | 16 |
| 9 | Indian | 8 | 16 |
| 10 | Indian | 8 | 16 |
| 11 | Indian | 7 | 14 |
| 12 | Pakistani | 8 | 16 |
| 13 | Pakistani | 8 | 16 |
| 14 | Pakistani | 7 | 14 |
| 15 | Pakistani | 6 | 16 |
|  |  | 114 | 234 |

## The cycle of activities

The experimental procedure consisted of eight cycles, each including three activities (see Figure 13). The first activity was a C3Fire experimental session. Each participant sat at a separate client computer and was linked to his teammates by C3Fire. 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 session concurrently. Each session lasted until the fire had been put out, or until 20 minutes had passed. After playing the game, the team watched a replay of the experimental session. During these after action reviews, the teams engaged in open-ended conversations about their play. Most teams discussed how responsibilities were to be allocated in the next session and debated alternative strategies for playing the game. Due to differences in the laboratory settings when the experiment was moved from Linköping to Skövde, these data have not been analyzed in any detail. The third activity was to answer the self-report instruments. After each session, the participants were asked to identify which trucks they had maneuvered during the session. They were also asked to fill out one of the six questionnaires in our test battery. Appendix 3 describes the six questionnaires.
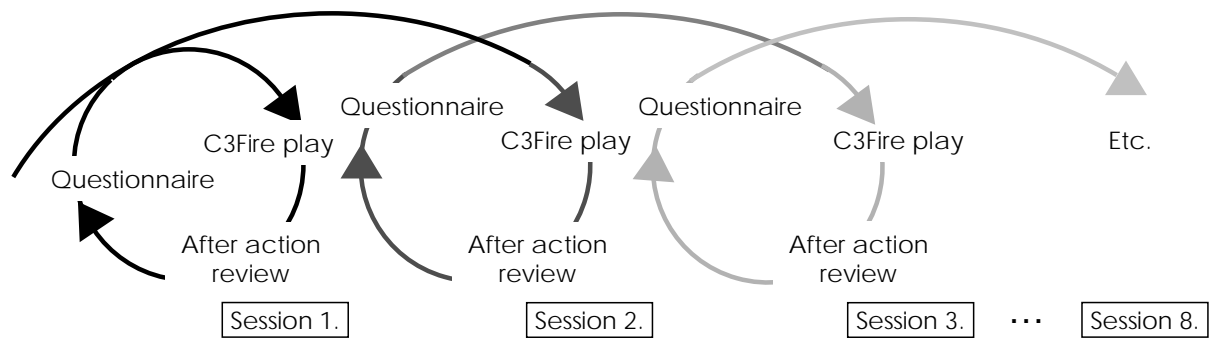
**Fig. 13.** The experiment consisted of eight sessions, each cycling through three activities: C3Fire play, an after action review, and filling in a questionnaire.

# Results – Team-level measures

In this section we present data on team behavior captured by the C3Fire system. The data concern (1) what and when the teams communicated using the email tool in C3Fire, (2) how the teams allocated tasks and responsibilities to team members, and (3) the correlations between their patterns of communication and task allocation. The unit of data collection is the team of four (or three), not the individual participant and not the national group. Data from the teams are aggregated by national group to infer culturally-driven sources of diversity and potential group faultlines.

We start with the teams' performance and goals. We then turn to the teams' task allocation structures and then continue to their email communication and the correlations between task allocation and communication. A total of 15 topics are discussed and, for each topic, one of the faultline representations shown in Figure 7 is used to summarize the implications for cross-cultural faultlines.

## Performance and goals

One of the first questions that we have been asked when presenting this study at conferences is invariably "Which group did best?" Our answer is unequivocally "They all did." We explain by pointing out that the three groups pursued different goals. The Swedes tried to stamp out the fire as rapidly as possible. The Bosnians and Pakistanis tried to contain the fire within regions of the map where there were no houses, schools, or fast-burning woods. The Indians parked their trucks next to the houses and schools and waited for the fire to come to them. Given the similarity in goals established by the Bosnians and Pakistanis, and the unique goals set by the Swedes and the Indians, the appropriate faultline map postulates a pair of faultlines in the pattern shown in Figure 14.
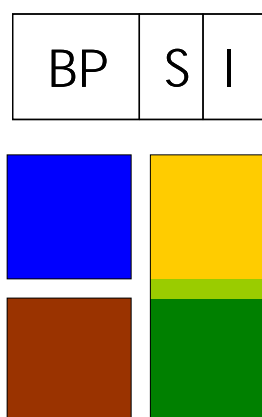


**Fig. 14.** The faultline map for goals established during C3Fire play.

This difference in goal-setting across national groups does not lend itself to meaningful statistical analysis. Every team within each of the national groups established the same (but culturally divergent) goals. Every team worked hard to attain its goal and often succeeded. Accordingly, there is no one criterion for "best" that can be used to assess all four groups' performance. They all did well, as judged by their own standards.

It remains to be seen whether this diversity in goal-setting generalizes beyond the teams we studied and the C3Fire microworld. Nevertheless, it has a serious implication for people working with multinational teams: It is not safe to assume that everyone on a multinational team has equivalent expectations about the goals the team is to attain. Goal-setting is accordingly ripe for the formation of group faultlines.

## Task allocation

We have analyzed the allocation of responsibilities across the four participants (A, B, C and D) using a matrix representation of the relative frequency of commands issued to the 12 trucks (F1, F2, F3, etc.). Figure 15 presents an example of the matrix. Rows represent participants, columns represent trucks. A fully black cell represents the highest percentage of commands sent to a truck during the session. At the other extreme, a purely white cell means that no commands were sent to that 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 15, we can see that participant A issued no commands, 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.

A matrix for each of the 234 C3Fire sessions was printed in 9 x 13 cm format. All self reports regarding which trucks the participants maneuvered during the sessions were read and all self/team designated leaders were marked in the matrixes. This enabled a categorization of leadership structures. The matrixes were then shuffled. It was not possible to ascertain which national group, team, or C3Fire session generated the matrix. This was done to reduce the likelihood of coder bias. Strict rules for seven different task allocation categories were set and written down (see Table 8). The right-hand column in Table 8 presents representative matrixes for each category. Two coders were used to ensure the coding was conducted according to the categories. The coders went through the matrixes separately, reviewed their disagreements, and converged on the assignments of the matrices to the seven categories.
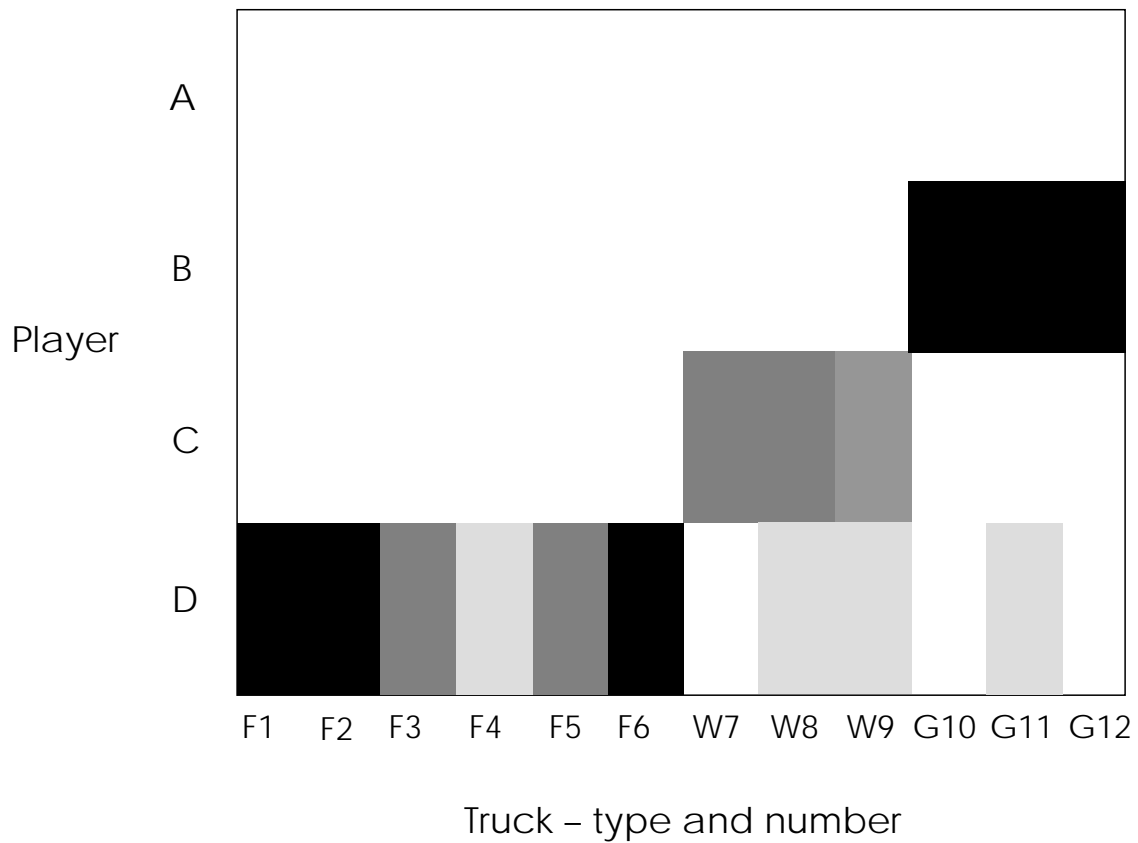
**Fig. 15.** Example of the matrix used to illustrate the relative frequency of commands from participants to trucks during a session. Rows represent the four team members. Columns represent the 12 trucks: Fire trucks 1-6, water trucks 7-9, and fuel trucks 10-12. Cell darkness increases with the frequency of commands.

**Table 8.** The task allocation categories.

| Category | Description | Examples |
|---|---|---|
| Partitioned according to 'convenience' | The participants command three trucks each. The partition is based on participant name and truck number: Participant A - trucks 1-3; B - trucks 4-6; C - trucks 7-9, D - trucks 10-12. (In teams with 3 participants: A – fire trucks 1-6; B – water trucks 7-9; C – gas trucks 10-12). |  |
| Partitioned according to 'preference' | The participants command three trucks each. The partition is based on the participants' preferences. This partition requires an active statement from at least one participant in which he/she asks for a specific set of trucks. (In teams with 3 participants, the participants maneuver one truck type each, but not in the order of A – fire trucks 1-6; B – water trucks 7-9; C – gas trucks 10-12). |  |
| Assistant | One participant coordinates the others' actions through email communication and actively commands trucks as he deems appropriate. |  |
| Coordinator | One participant coordinates the others' actions through email communication. The leader actively commands trucks 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. |  |
| Open structure | There is no visible structure. Most participants send commands to a large number of trucks. |  |

The first category, 'Partitioned by convenience', is a command structure in which the participants command three trucks each. The partition is based on participant name and truck number. The 'Partitioned by preference' looks very similar to the 'convenience' structure. But conceptually they are different. The 'preference' structure implies that someone has asked to be responsible for a specific type of truck (e.g. 'I want to take care of fuel'). There is evidence of an active statement of preference in this allocation structure.

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.

There are two categories with a clear leader. The more hierarchic leadership structure is called 'Assistant' and the more egalitarian 'Coordinator'. In the Assistant distribution, the leader actively commands both participants and trucks. This is the most formally hierarchic task allocation of responsibilities observed during the C3Fire sessions. The Assistant often overrode the other participants' commands. In contrast, the Coordinator category represents a more egalitarian distribution of task allocation. Here, a nominal leader monitors the game and sends emails to team members recommending what needs to be done. The Coordinator sometimes controls the trucks, but no more than three trucks during the whole session.

The 'Open structure' represents matrixes in which there is absolutely no visible structure. The pattern of relative frequency resembles a quilt-like pattern. Many of the sessions resembled organized chaos. In others, the organization was less clear.

Table 9 summaries the distribution of task allocation categories across the national groups. The partitioned by preference structure was used frequently by all four groups. The partitioned by convenience structure was by far the most frequent type of truck distribution in the Swedish group and was regularly used by the Pakistanis. The chi-square test rejects the null hypothesis that the utilization of partitioned structure was the same across groups, $\chi^2(3, N = 8) = 16.0$, $p < .001$. The Swedes used a partitioned structure significantly more often than would be expected and the Indians used it less. Both the Bosnians and Pakistanis used a partitioned structure in approximately the expected ratio.

**Table 9.**  The counts and frequencies of task allocation categories across national groups.

| Categories | Swedes | % | Bosnians | % | Indians | % | Pakistanis | % |
|---|---|---|---|---|---|---|---|---|
| Partitioned by convenience | 37 | 57.8 | 5 | 10.9 | 2 | 3.2 | 14 | 22.6 |
| Partitioned by preference | 8 | 12.5 | 15 | 32.6 | 14 | 22.6 | 12 | 19.4 |
| Shared fire trucks | 4 | 6.3 | 0 | 0.0 | 0 | 0.0 | 10 | 16.1 |
| Shared fuel | 0 | 0.0 | 0 | 0.0 | 4 | 6.5 | 5 | 8.1 |
| Assistant | 12 | 18.8 | 3 | 6.5 | 7 | 11.3 | 2 | 3.2 |
| Coordinator | 3 | 4.7 | 0 | 0.0 | 2 | 3.2 | 1 | 16 |
| Open structure | 0 | 0.0 | 23 | 50.0 | 33 | 53.2 | 18 | 29.0 |

The Pakistanis frequently often adopted one of the two shared approach much more often than the other groups.  It appears that our Pakistani volunteers were more willing to work in a relatively unstructured but fully collaborative manner than the other three groups.

The hierarchic Assistant distribution was used by all three groups, but mostly by the Swedish participants.  None of the groups adopted the more egalitarian Coordinator distribution often

The last distribution of trucks and roles, the Open structure, is dominant in the Bosnian and Indian groups.  Everyone drove a little bit of everything.  It is not clear from the task allocation data whether the Indians and Bosnians distrusted organization or were truly cooperative or were comfortable with spontaneous chaos.

In sum, the Swedes preferred a non-partial partitioned division of tasks based on convenience rather than preference.  The Swedes' ability to assign tasks and stick to them clearly differentiates them from the other groups.  The other three groups appeared to try to establish a partitioned structure but often lapsed into the spontaneous chaos of the open structure.  The Swede's unique ability to adhere to a fixed task allocation structure suggests that Swedes who participate in multinational groups can expect to encounter individuals who have a much more flexible attitude toward task allocation.  The corresponding faultline map, Figure 16, has one strong faultline that segregates the Swedes from the other national groups.
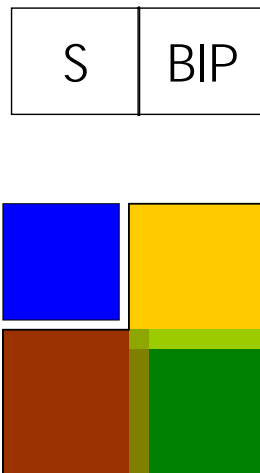
**Fig. 16.** The faultline map for task allocation strategies adopted during C3Fire play.

## Communication

The only way the participants were allowed to communicate during C3Fire play was by sending emails to each other using the C3Fire communication tool. As a result, email communication was their only tool for establishing and maintaining cooperation. C3fire captures a record of the emails sent by each participant and flags at what time and to whom the email was sent. We have analyzed how the teams used the communication tool and classified the information they sent. This section describes the categorization scheme for their email communication and enumerates the results for those categories for which there are significant differences across national groups.

The record of emails is a kind of protocol (Ericsson & Simon, 1984). As with any verbal data, it is necessary to establish a reliable coding scheme prior to scoring the data. After numerous iterations, we settled upon a list of 16 categories for scoring the email data. The categories and the criteria given to independent scorers are listed in Table 10. Most of the categories reflect constraints of the C3Fire microworld (e.g., Status report on the fire) that would readily generalize to many emergency management tasks.

The Indians wrote emails in English and were categorized by a native English speaker (coder 1). The Swedish emails were written in Swedish and categorized by a native Swedish speaker (coder 2). The Bosnian emails were written in Swedish and Bosnian. The emails written in Swedish were categorized by coder 2 and the emails written in Bosnian were categorized by a native Bosnian speaker (coder 3). The emails written in Bosnian was translated to English by coder 3 and categorized by both coders 1 and 2 to enable a calculation of Cohen's kappa, a measure of intercoder reliability. The result, $\kappa=0.79$, indicates a satisfactory level of agreement between the two coders (Cohen, 1960). The Pakistani wrote emails in English and Pakistani and were categorized by a Pakistani fluent in English (coder 4) under the supervision of coder 1.

**Table 10.** The categories used to classify email content during C3fire sessions.

| | Category | Definition |
|---|---|---|
| 1 | Truck allocation | Discussing who is going to be responsible for which trucks |
| 2 | Fire tactics | Proposing or discussing a strategy for fighting the fire or positioning trucks |
| 3 | Question | Asking a question |
| 4 | Request help or resources explicitly | Message concerning the status of a truck that contains a verb that specifies the desired action. The requested action is generally for assistance or resources. |
| 5 | Request help or resources implicitly | Message concerning the status of a truck that does not contain a verb specifying a desired action. The desired action must be inferred by the reader. |
| 6 | Command other players to act | Message containing a direct order to perform a specific action. Often given to a specific player. |
| 7 | Ja, response to a request or command | Reply indicating a message (request or command) had been received. |
| 8 | Action report | Reply or message indicating that a specific action has been initiated or is in progress. Generally a delayed but positive response to a request or command by a player who is referring to a truck he commands. |
| 9 | Monitoring (echoing) the resources screen | Message containing a statement of information that was likely extracted directly from the resource panel (bottom left of the C3Fire display). Issued by a player not moving trucks |
| 10 | Status report on the fire | Message containing a statement that indicates the progress of the fire or the fire-fighting effort |
| 11 | Positive feedback | Message meant to enhance camaraderie. |
| 12 | Negative feedback | Message meant to disparage a player, the team, or their performance. An explicit indication of impatience, displeasure, or a bad attitude. |
| 13 | Empty message | Hitting the return key without typing anything. From context, many of these messages can be inferred to express impatience, displeasure, or a bad attitude. These can also be interpreted as displaying an inability to understand the features of the game. |
| 14 | Native language | Message not in English or Swedish. From context, many of these statements can be inferred to express displeasure or a bad attitude. |
| 15 | Game | Message about the experiment as such, e.g., "The other team is better than us" |
| 16 | Other | Unintelligible message. |

### The frequency of communication

Since the games differed in time depending on whether the teams put out the fire or not, it is not particularly informative to count the number of emails sent during each session. It is more telling to determine how many emails (in each category) were sent per minute of a session and whether this frequency differed across groups. Table 11 itemizes the percentages of emails by category. The discussion that follows focuses on categories where the differences across groups is statistically significant.

**Table 11.** Frequencies with which the national groups used the email categories.

|                    | Swedes | Bosnians | Indians | Pakistanis |
|--------------------|--------|----------|---------|------------|
| Task allocation    | 9.62   | 8.37     | 10.54   | 8.91       |
| Fire tactics       | 13.29  | 6.47     | 8.94    | 3.53       |
| Question           | 2.78   | 2.99     | 5.89    | 6.62       |
| Explicit request   | 32.91  | 27.78    | 7.76    | 24.54      |
| Implicit request   | 1.07   | 2.30     | 4.17    | 6.65       |
| Command            | 4.19   | 8.61     | 11.42   | 9.70       |
| Ja – ok            | 4.10   | 3.84     | 9.31    | 3.35       |
| Action report      | 13.25  | 8.90     | 11.37   | 12.77      |
| Monitor            | 0.04   | 0.00     | 5.45    | 0.74       |
| Status             | 4.79   | 9.46     | 7.39    | 5.41       |
| Positive feedback  | 10.21  | 7.32     | 3.51    | 2.49       |
| Negative feedback  | 1.62   | 6.59     | 3.73    | 4.54       |
| Empty message      | 1.11   | 3.40     | 8.43    | 7.99       |
| Native language    | 0.00   | 0.00     | 1.04    | 0.86       |
| Game               | 0.56   | 2.47     | 0.53    | 0.58       |
| Other              | 0.47   | 1.50     | 0.51    | 1.32       |

Figure 17 show the mean and standard errors of the frequency of total emails sent by each national group. A two-way (group X session) ANOVA indicates that national group was significant, $F(3, 202) = 2.67$, MSE = 0.78, $p < .05$, power = .63. Experimental session and the interaction of group and session were not found to be significant. The Tukey HSD procedure indicates that there are insufficient data to discriminate which pairs of groups differed significantly. The null result of the post-hoc test reveals a lack of clear differences across groups. Even though Swedes are reputed to be reserved and Bosnians to be loquacious, their rates of email communication did not differ significantly. This finding has a clear implication regarding group diversity and faultlines: the rate of communication may be an unlikely provenance for the development of group faultlines.

Figure 18 illustrates the average frequency of email across the 20 minutes of a C3Fire session. There is a clear pattern that can be seen in all four groups. Most emails were sent during the first two minutes of the game. Thereafter, the email frequency decreased in an asymptotic manner. Second-order multiple regressions were fit to each data set individually. All pairings of the 95% confidence limits for both the linear and quadratic coefficients overlap. Thus, the same equation applies equally well to all four national groups. There is no evidence in these data of any difference across the national groups in how they allocated their time to communicating during the sessions. All four groups began a session with flurry of communication that tapered to a steady level as the work progressed. Once again, this null result may be auspicious for people who establish and work in multinational teams.
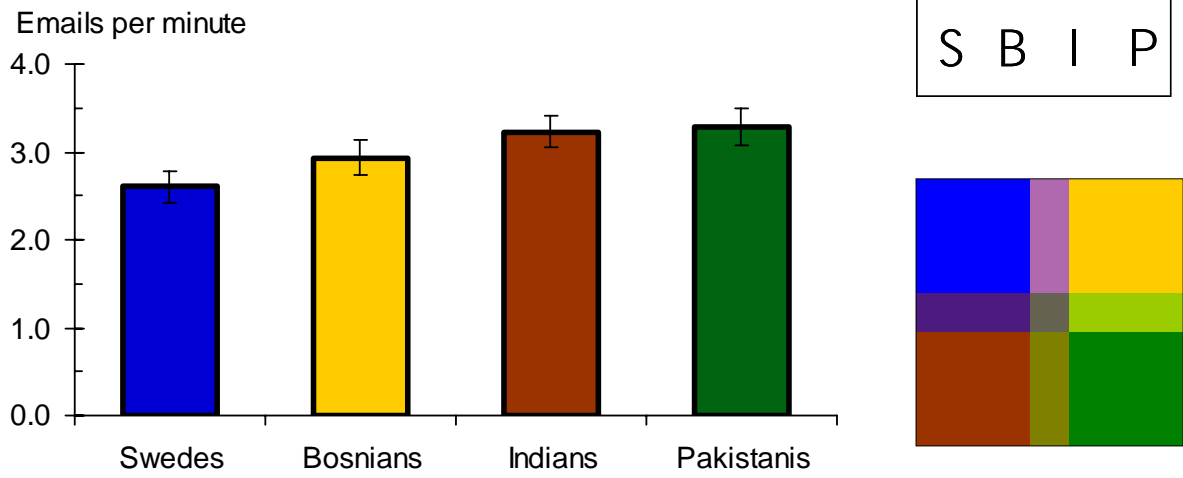
**Fig. 17.** The frequency of communication (emails sent per minute) and the corresponding faultline maps.
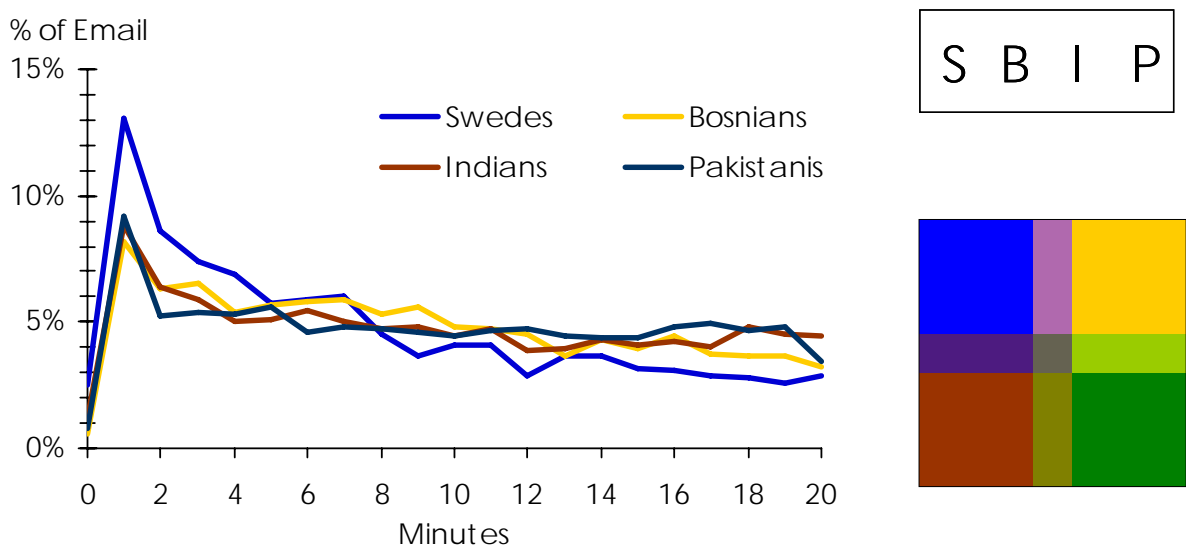


**Fig. 18.** The distribution of emails across the 20 minutes of the session and the corresponding faultline maps.

    Email about task allocation

There are 12 trucks in the C3Fire world (6 fire trucks, 3 water trucks, and 3 fuel
trucks). The three classes of trucks correspond to three interdependent classes of
tasks (putting out the fire, keeping the fire trucks filled with water, keeping all
trucks filled with fuel). Each team was composed of three or four participants.
Even though the instructions to subjects (see Appendix 2) contained no directives
regarding the allocation of trucks (tasks), every team discovered during the first
session that it would be desirable to divide the tasks amongst themselves in some
way. Task allocation was, accordingly, a major topic of conversation. Figure 19
shows the percentage of total communication that focused on task allocation.

The two-way (group X session) ANOVA indicates there are significant differences
in the frequency of communication about task allocation both across national
groups, $F(3, 202) = 4.02$, MSE = .009, $p < .01$, power = .84, and experimental
sessions, $F(7, 202) = 6.18$, MSE = .009, $p < .001$, power > .98. The interaction
was not found to be significant. The Tukey HSD procedure indicates that both
the Swedes and Indians differed significantly from both the Bosnians and
Pakistanis, that the Swedes did not differ from the Indians, and that the Bosnians
did not differ from the Pakistanis. The corresponding faultline map shows a single
strong faultline separating the two dominantly Islamic cultures from the two non-
Islamic cultures. The alignment of religion with the frequency of communication
about task allocation may or may not be coincidence. The nature of the linkage,
were one to exist, is not clear. Coincidence or not, these data suggest that
members of a multinational team may have different expectations about the need
for communication about task allocation. Such differences in expectations, if
unacknowledged, might develop into an active faultline that could split the group
into divisive subgroups.

Participants were (re-)assigned to teams prior to sessions 1, 2, 5 and 6 to emulate
the ad hoc nature of OSOCC team formation. Because team membership during
these scenarios was largely anonymous, the allocation of tasks across team
members had to be renegotiated during these sessions. As shown in Figure 20, all
three groups displayed a pattern of communication about task allocation that
reflects this manipulation of team membership. During the first and second
sessions, there was much conversation about how to divide tasks. This category of
communication received less attention during the third and fourth sessions and
rebounded in the fifth and sixth, when the teams were reassigned once more.
Communication about task allocation then declined again to approximately the
same level for all four groups. More generally, there was a flurry of
communication as team members got to know one another that decreased steadily
as familiarity increased. Even though the Bosnians and Pakistanis talked less about
task allocation than the Swedes and Indians, Figure 19, all three groups
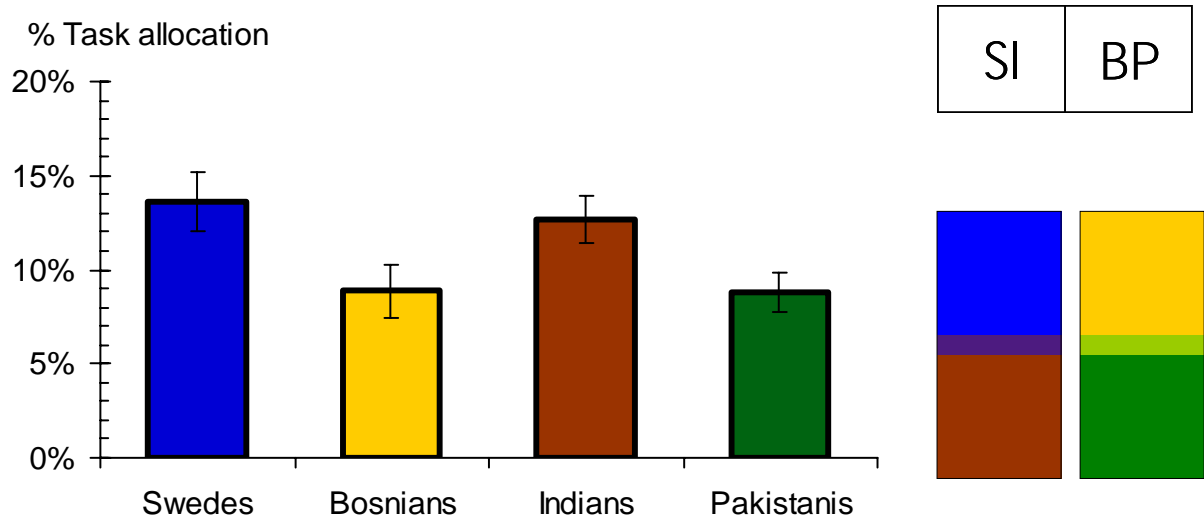accommodated to each other in much the same way, Figure 20.

**Fig. 19.** The relative frequency of emails concerning task allocation and the corresponding faultline maps.
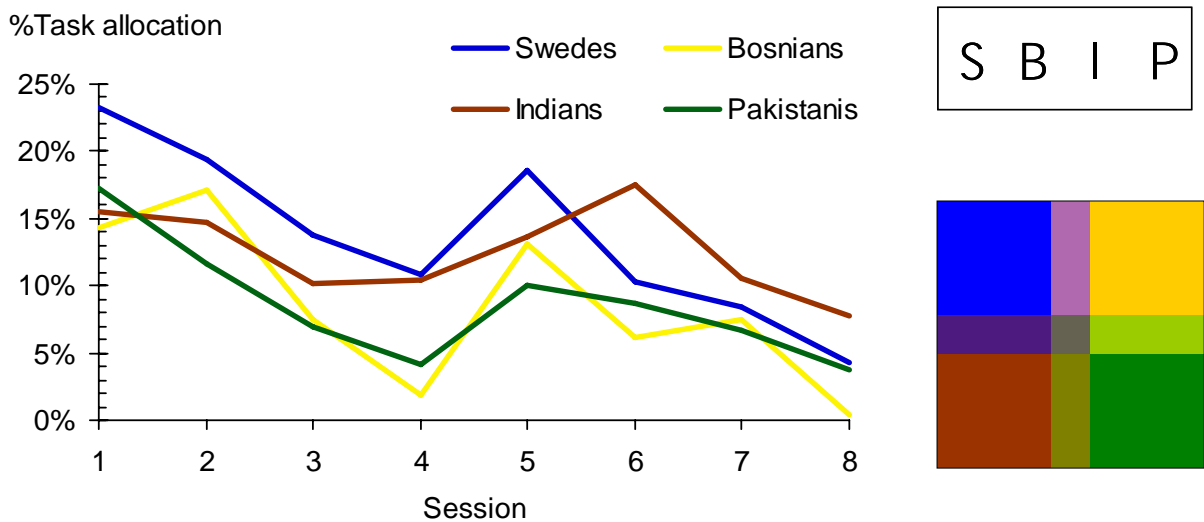


**Fig. 20:** The relative frequency of emails concerning task allocation across the eight sessions and the corresponding faultline maps.

Figure 21 shows the average time when the last email about task allocation was sent during a session. The graph indicates how quickly the groups were able to establish a division of responsibility. The two-way (group X session) ANOVA indicates there are significant differences in the latest time during a session when the groups communicated about task allocation both across national groups, $F_{(3, 202)} = 13.9$, MSE = 23.8, $p < .001$, power $> .98$, and experimental sessions, $F_{(7, 202)} = 10.1$, MSE = 34.5, $p < .001$, power $> .98$. The interaction was found not to be significant. The Tukey HSD procedure indicates that the Bosnians and Pakistanis did not differ but that all other pairs differed significantly. The Swedes completed their conversations about task allocation within the first two minutes of a session. The Indians discussed task allocation for a longer time than the Bosnians and Pakistanis. The corresponding faultline map contains two faults that

reflect the alignment of the Bosnians and Pakistanis and that isolate the Swedes and Indians.

Figure 22 shows how these differences play about across time within a session. The Swedes approached the task of deciding who is to do what in an entirely different way than the other three national groups. The Swedes rarely talked about how they would allocate tasks after the second minute. In contrast, the other three groups sent emails about task allocation throughout the entire 20 minute session. This finding reinforces the hypothesis that cultural differences in expectations about the need for communication about task allocation might, without due diligence, become manifest as group faultlines. Swedes who participate in multinational groups can expect to encounter individuals who have a much more flexible attitude toward task allocation.
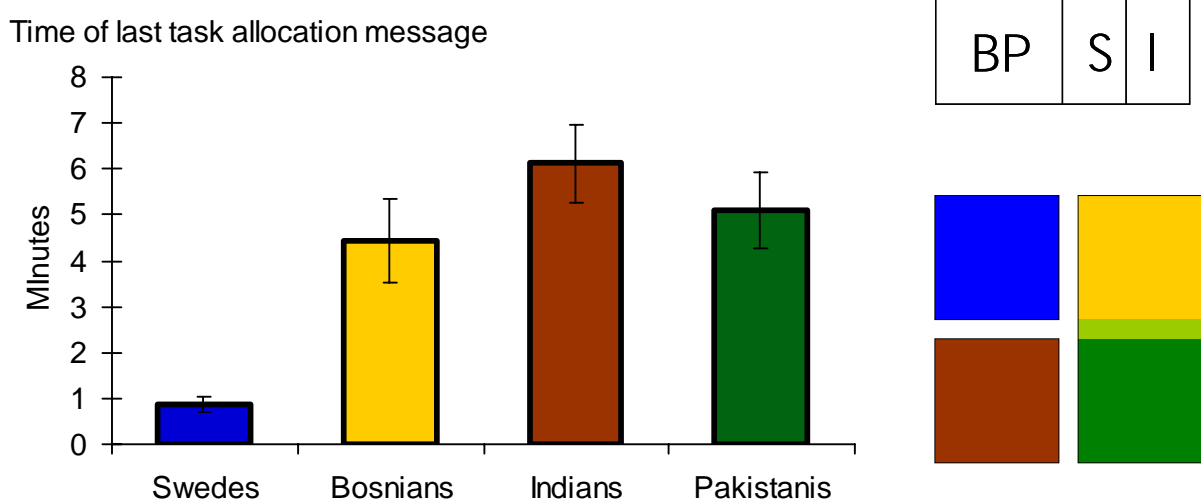


**Fig. 21.** Time interval, in minutes, when the last email discussing task allocation was sent and the corresponding faultline maps.
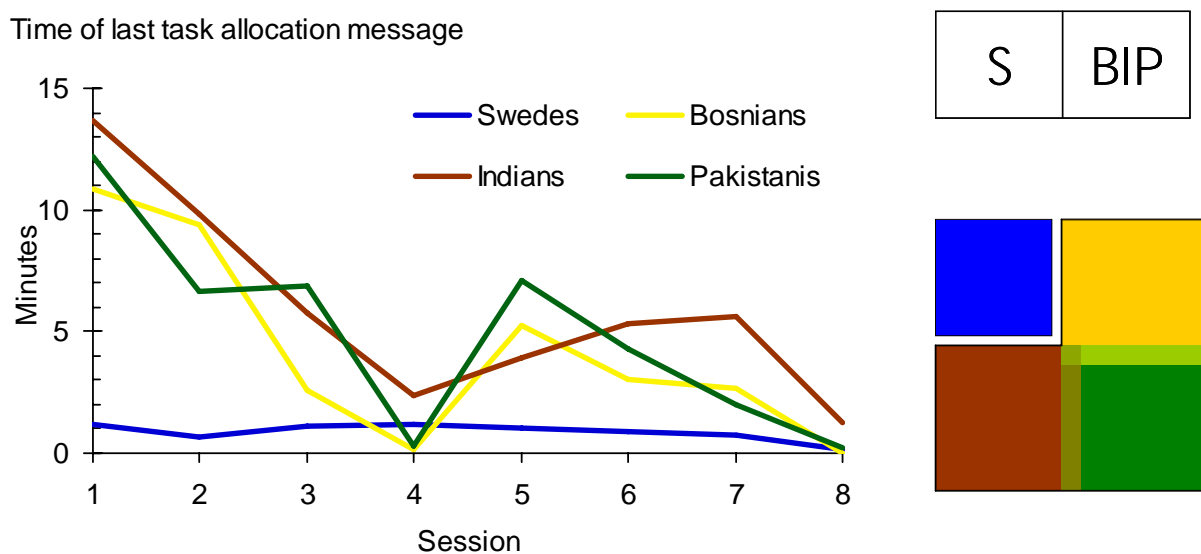


**Fig. 22.** Time of the last email discussing task allocation across sessions and the corresponding faultline maps.

<u>Requests</u>

Given the interdependencies among the types of trucks, drivers of fire trucks frequently asked for water and fuel. Participants responsible for driving water trucks also asked for fuel. Figure 23 shows the percentage of the total number of emails that were requests. The Indians did not make many requests. Their predilection for an open structure suggests that they may have preferred to fetch water and fuel themselves rather than to ask for help. It is interesting to note that this reticence was not shared by the Pakistanis. Whether this finding generalizes beyond the experimental setting and whether it reflects a uniquely Indian reticence to requesting assistance is not known. It is tempting to wonder whether it may reflect a more deep-seated cultural difference that contributes to the tradition of hostility between India and Pakistan.

The two-way ANOVA (group X session) on the frequency of requests indicates that national group was significant, $F(3, 202) = 30.0$, MSE $= 0.021$, $p < .001$, power $> .99$. Experimental session and the interaction of group and session were not found to be significant. The Tukey HSD procedure indicates that the Swedes and Bosnians did not differ from each other but that all other pairings differed significantly. The corresponding faultline map contains two faultlines. One separates the two European cultures from those from the Indian subcontinent. The other divides the Indians and Pakistanis.

Our scoring of the emails distinguished between explicit and implicit requests. The distinction lies in the specificity of the request. An explicit request asks for a particular resource to be delivered to a particular truck, e.g., "Truck 5 has no fuel!", whereas a more general remark, "Fuel, please!", is an implicit request because it does not explicitly identify the truck that needs the fuel. This distinction is important because there are more ways to interpret an implicit request than an explicit request. Explicit remarks are easily interpreted. For example, the message "Fuel to truck F3" has clear implications for the team member responsible for fuel trucks. He must (a) find where on the map truck F3 is, (b) find the nearest fuel truck, (c) ascertain if the fuel truck has the fuel to reach truck F3 and refuel it, and if so (d) direct the fuel truck to truck F3. In contrast, if this player received the message "Fuel!", much more interpretation is needed. It could be interpreted as either a derogatory remark or a bona fide request. If it is a request, the fuel truck driver must first try to identify which trucks need fuel and infer which of those trucks the message might concern. Sending explicit requests thus saves time and reduces the risk of misunderstandings.

Figure 24 is a stacked bar graph showing the percentages of explicit requests and implicit requests during the C3Fire sessions. The Swedes sent almost no implicit requests. In contrast, a third of the Indians' (few) requests were implicit. The two-way ANOVA (group X session) indicates that national group was significant, $F(3, 202) = 21.5$, MSE $= 0.065$, $p < .001$, power $> .99$. Experimental session and the interaction of group and session were not found to be significant. The Tukey

HSD procedure indicates that all four groups differed significantly from each other. The corresponding faultline map contains two cross-cutting faults that separate all four groups.

If the data shown in Figures 23 and 24 generalize beyond our subject pool, it appears that different cultures may have significantly different attitudes towards the appropriateness of and the appropriate manner for asking for assistance. This finding might have serious consequences in any multinational cooperative operation. Swedes, who are accustomed to explicit requests, must learn to listen for the nuances in implicit requests that may help translate them into explicit requests. People from cultures that make relatively few requests and, when they do, phrase them implicitly must learn not to be offended by the seemingly imperious attitude of those who are accustomed to making explicit requests. The mode and manner of making requests is a potential minefield. The opportunities for misunderstanding are rife. All members of multinational teams need to be aware of and be prepared to accommodate to this potentially inflammatory dimension of cultural diversity.
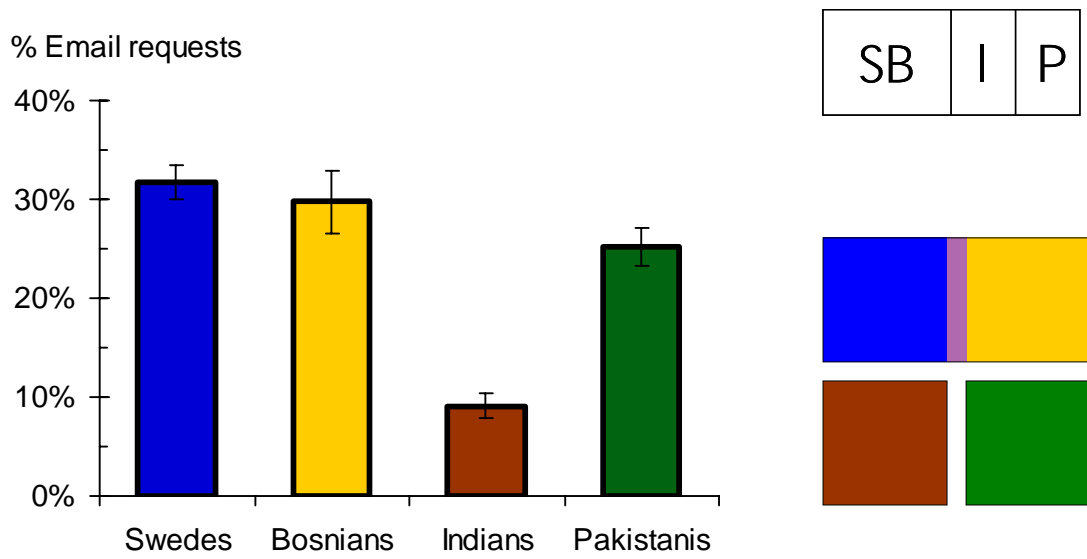
**Fig. 23.** The relative frequency of requests (both explicit and implicit) in email and the corresponding faultline maps.
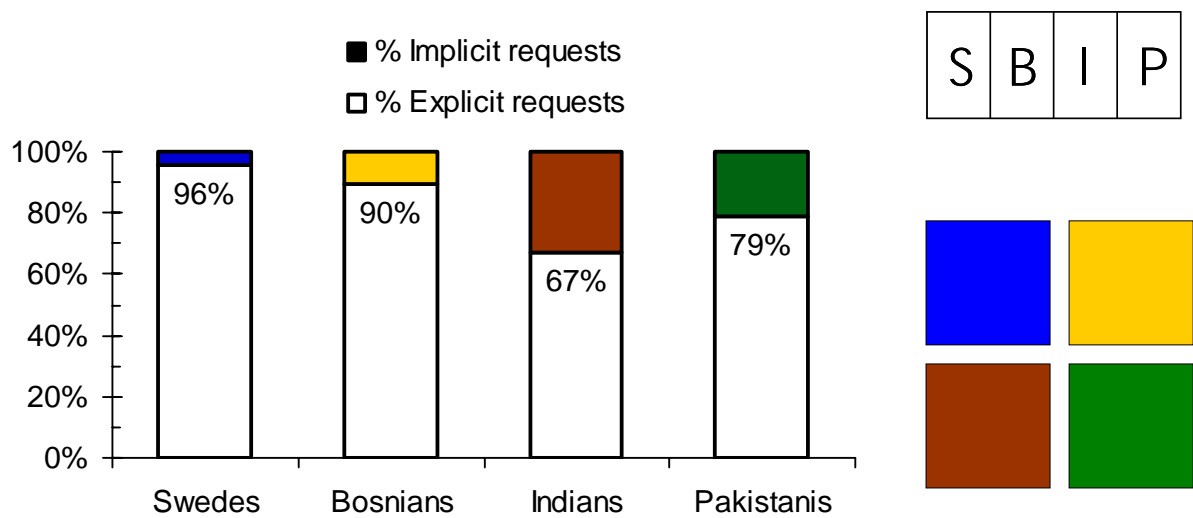


**Fig. 24.** The relative frequency of implicit and explicit requests in email and the corresponding faultline maps.

Tactics

C3Fire is all about fighting a fire. The fire spreads at different rates depending on differences in vegetation. The team must therefore make decisions on how to address the fire, i.e., from what direction and with which trucks. Figure 25 shows the percentage of the total number of emails concerned with fire tactics. The Pakistanis talked about fire tactics less than the Bosnians who talked about fire tactics less than the Indians who, in turn, talked about fire tactics less than the Swedes. The two-way (group X session) ANOVA indicates there are significant differences in the relative frequency of communication about fire tactics both across national groups, $F(3, 202) = 22.0$, MSE $= 0.009$, $p < .001$, power $> .99$, and experimental sessions, $F(7, 202) = 2.75$, MSE $= .009$, $p < .01$, power $= .92$. The interaction was found not to be significant. The Tukey HSD procedure indicates that the Swedes differed significantly from all other groups and that the other groups did not differ from each other. Once again, the Swedes stand alone. The faultline map has one strong faultline that isolates the Swedes from the other three national groups.

Goals and tactics are tightly coupled. The difference seen in Figure 25 and the isolation of the Swedes in the faultline map may reflect the different goals set by the different national groups. As noted in the section on performance and goals, the Swedes adopted the goal of putting the fire out as fast as possible. Achieving this goals requires a clear strategy which is formulated and adjusted by communicating frequently about fire tactics. Discussing tactics appears to have been less important for the goals set by the Bosnians and Pakistanis (containing the fire) and by the Indians (protecting houses and schools). Figure 26 shows how these differences play about across sessions. As they gained experience with C3Fire, the Swedes put more and more emphasis on how to address the fire. The other three groups did not.

At this juncture it may be appropriate to reiterate that every team worked hard to attain its goal and often succeeded. Accordingly, there is no one criterion for how often tactics should be discussed. This documentation of what appear to be culturally-dependent differences in both goals and tactics underscores the potential for group faultline activation in multinational teams. Insuring that a team agrees upon a goal is not enough. The team must also agree on how to reach it.
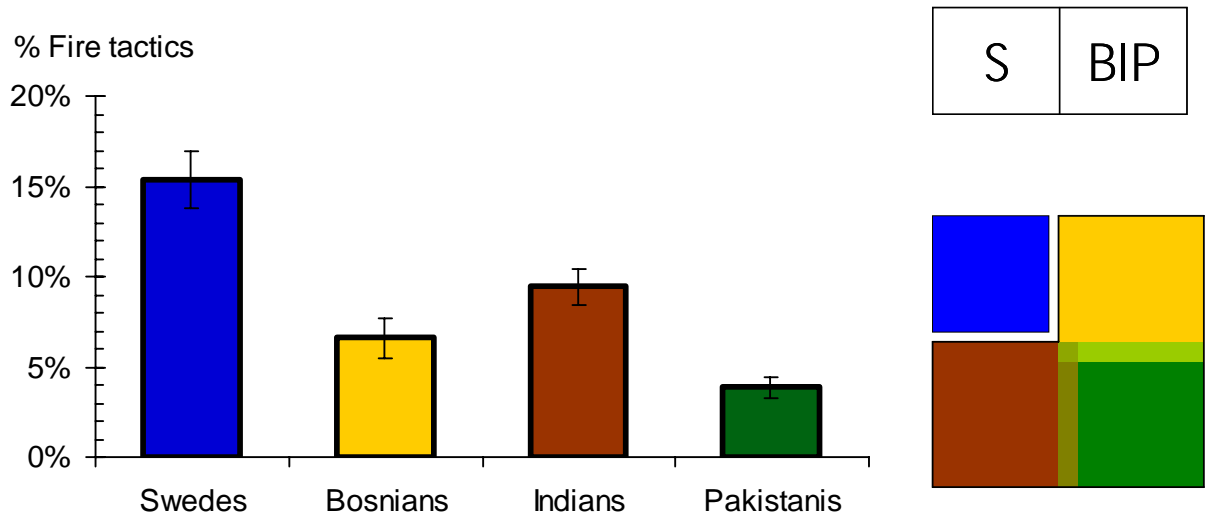
**Fig. 25.** The relative frequency of communication about fire tactics and the corresponding faultline maps.
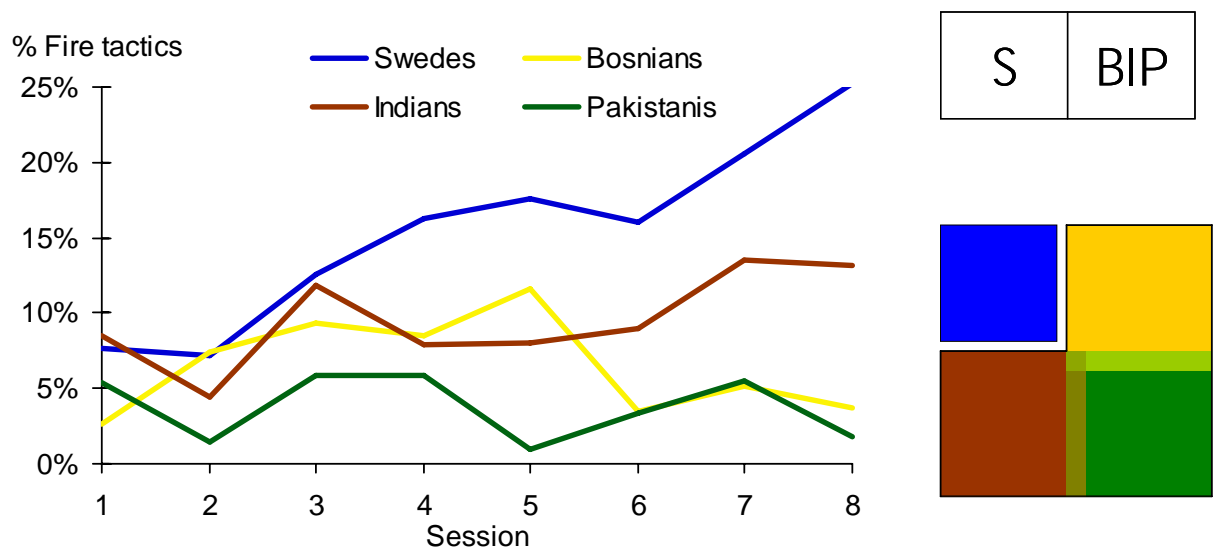


**Fig. 26.** The relative frequency of emails concerning fire tactics across sessions and the corresponding faultline maps.

Feedback

Members of cohesive teams tend to give each other positive feedback. Negative feedback is a clear sign of discontent. Accordingly, the scoring of the emails distinguishes between positive and negative feedback. Figure 27 is a stacked bar graph showing the percentages of implicit and explicit feedback in email. The Swedes sent few negative statements. In contrast, approximately a half of the feedback sent by the other three groups was negative. The two-way (group X session) ANOVA indicates that national group was significant, $F_{(3, 202)} = 7.82$, $MSE = 0.009$, $p < .001$, power $> .98$. Experimental session and the interaction of group and session were not found to be significant. The Tukey HSD procedure indicates that the Swedes differed significantly from all other groups and that the other groups did not differ from each other.

The difference in the rates of positive and negative feedback may merely be a byproduct of task allocation structure. Because the Swedes were uniquely able to allocate tasks quickly and adhere to them, they had little reason to be confrontational. Meanwhile, it is clear that the other groups do not possess Swedish reserve. Swedes could perceive the abundant negative feedback generated by team members from other nations as strong barrier to cooperation.

Figure 28 aggregates all forms of feedback to show the percentage of email that contained feedback. The two-way (group X session) ANOVA indicates that national group was significant, $F_{(3, 202)} = 7.30$, $MSE = 0.153$, $p < .001$, power $> .96$. Experimental session and the interaction of group and session were not found to be significant. The Tukey HSD procedure indicates that the Swedes and Bosnians did not differ from each other, that the Indians and Pakistanis did not differ from each other, and that the two European groups both differed from the two groups from the Indian subcontinent. The corresponding faultline map contains one strong faultline that divides the groups geographically. The data shown in Figures 27 and 28 suggest that multinational groups might develop faultlines on the basis of divergent attitudes towards the appropriateness of and the appropriate manner for expressing feedback.
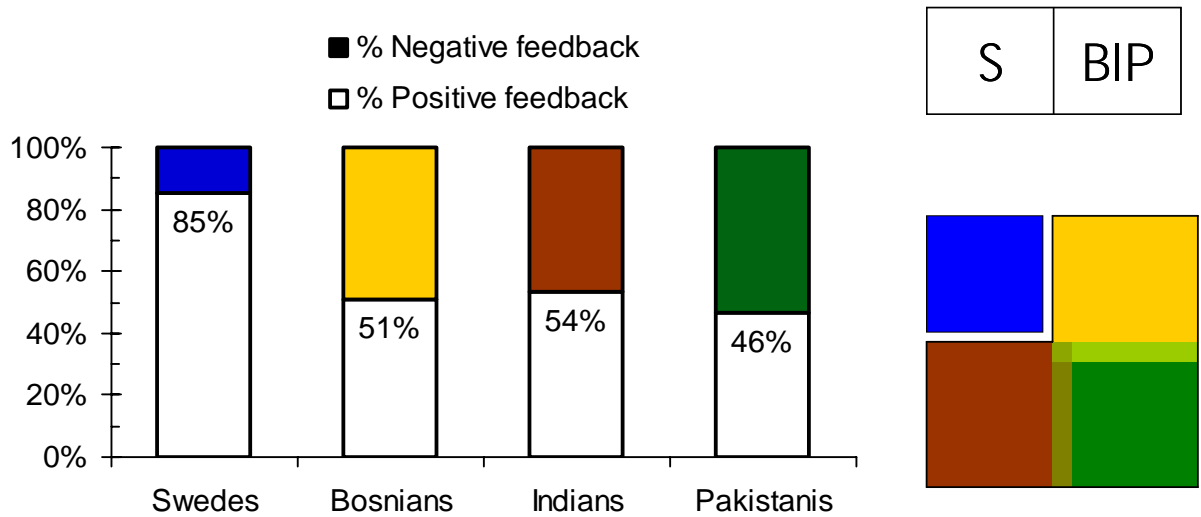
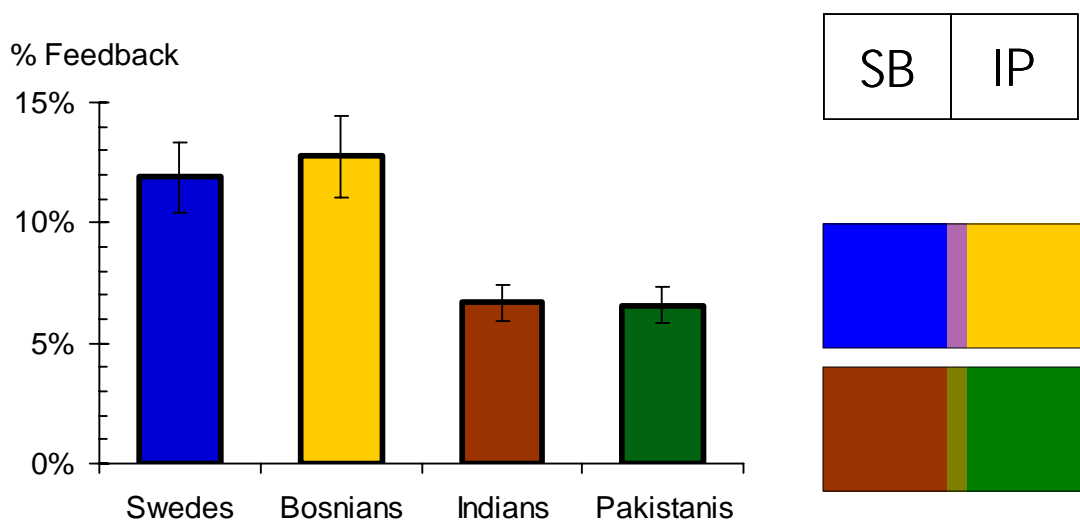**Fig. 27.** The ratio of positive and negative feedback in email and the corresponding faultline maps.



**Fig. 28.** The relative frequency of emails concerning feedback (positive and negative combined) and the corresponding faultline maps.

## Intercorrelations

The analyses to this point indicate that (1) four broad classes of task allocation structure (partitioned, shared, with a leader, and open) describe how the teams allocated roles and responsibilities to team members, (2) the Swedes were unique in their ability to adhere to a partitioned structure for task allocation, (3) the teams communicated about a wide variety of topics while working to together, and (4) the relative frequency of these topics varied consistently across national groups. Here we address the relationship between the alternative structures for task allocation and the topics of communication.

Correlation is a measure of the strength of relationship between pairs of variables. Table 12 lists the correlations between the four classes of task allocation, the 12 primary categories of communication topics, and the time of the last task allocation message (Last TA). The asterisks indicate correlations that are highly statistically significant. The discussion proceeds column by column.

The first column lists the four classes of task allocation structure. The fifth entry is the last task allocation time. The second column shows the correlations between the last task allocation time and the four classes of task allocation structure. These correlations show the relationship between the data in Table 9 and Figure 21. There two strong correlations, a negative correlation with the partitioned structure and a positive correlation with the open structure. The negative correlation indicates that the (mostly Swedish) teams that decided to adopt a partitioned structure and were able to adhere to it did most of their talking about task allocation early in the C3Fire session. Highly structured teams did not (feel the need to) continue to discuss their team structure. They established the team's structure early, stuck with it, and did not revisit it. In contrast, the positive correlation indicates that teams that adopted the open structure continued to talk about task allocation throughout the session. It appears that the relatively unstructured teams continually tried to reassess or establish a structure. This, in turn, suggests that these teams may have wanted more structure but for some reason were unable to settle upon a more structured alternative.

The third column lists the correlations between the percentage of email about task allocation (TA) and the four classes of task allocation structure and the time of the last task allocation message. As expected, there is a positive correlation between the frequency and timing of task allocation messages.

The columns labeled FT and S list the correlations with the percentage of email about fire tactics and status reports, respectively. The only significant finding is the positive correlation with task allocation with a leader. It appears that the teams felt that establishing and communicating tactics and informing team members about ongoing progress are two of the responsibilities of a leader.

The column labeled Q lists the correlations with questions. The last column, labeled –F, lists the correlations with negative feedback. The pattern of

correlations in these two columns matches that for the time of the last task allocation message. The negative correlation in the first row indicates that partitioned teams did not ask many questions or say negative things to each other. This suggests that all the members of partitioned teams were secure in their knowledge of each others' roles and actions. Each team member knew what they were all supposed do and did not feel the need to ask for instructions or clarifications or to assess others' actions. In contrast, the positive correlations suggest that members of open teams asked a lot of questions and were not inhibited about expressing displeasure. The positive correlations with the time of the last task allocation message suggests that the discussion of task allocation late in a session may have been associated with questions about and challenges to roles and responsibilities. These findings reinforce the interpretation that teams that adopted the open structure were not particularly happy about it.

Precisely the opposite pattern of correlations is seen with the frequencies of explicit requests (ER) and commands (C). The correlations are positive with the partitioned structure and negative with the open structure and the time of the last task allocation message. The positive correlation suggests that teams that self-organized into a partitioned structure frequently made specific requests for assistance or directed team members to do a particular thing. The implication is that a strict partitioning of roles enables directed communication about task-relevant activity. When team members know who is doing what, they can ask (or instruct) each other to offer assistance. In contrast, teams that operate with no clear structure do not know whom to ask for assistance. It is likely difficult to make an explicit request when no one knows who might provide the assistance.

This analysis of the patterns of correlations seen in Table 12 suggests that there are many benefits associated with adhering to a strictly partitioned task allocation structure. Task allocation does not remain an issue for long. It is possible to ask for assistance directly and little need for questions or confrontation. Table 9 and Figure 16 indicate that the Swedes were uniquely able to adhere to a partitioned structure. It remains an open question whether the Swedes opted for the partitioned structure to obtain its benefits or whether the Swedish predilection for speaking directly and aversion for confrontation molded their behavior into a compatible structure.

**Table 12.** Intercorrelations between task allocation (TA) category, time of the last task allocation message, and percentages of email by category.

| TA category | Last TA | TA | FT | Q | ER | IR | C | OK | A | M | S | + F | - F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Partitioned | -.31** | -.18 | .08 | -.21* | .36** | -.03 | .33** | -.25** | -.12 | .24** | -.18 | -.07 | -.27** |
| Shared | .01 | .03 | -.17 | .03 | .02 | .15 | .08 | .13 | .12 | -.01 | .01 | -.16 | -.05 |
| Leader | -.08 | .14 | .19* | -.14 | -.06 | -.10 | -.09 | .09 | -.03 | -.13 | .20* | -.12 | -.13 |
| Open | .38** | .07 | -.11 | .31** | -.36** | .01 | -.33** | .13 | .07 | -.16 | .04 | .27** | .41** |
| Last TA | — | .31** | -.10 | .29** | -.36** | -.08 | -.36** | .11 | .16 | -.20* | .01 | .14 | .32** |

Note:  Abbreviations for email categories shown in Table 10.  N = 234

* p < .005,  ** p < .001

# Results – Measures at the level of the National Group

In this section we discuss the questionnaire data and the light they shed on dimensions of cultural diversity and group faultlines. Individual participant's responses were aggregated within national groups to make the group the unit of analysis. The group-level data are used to infer sources of diversity and potential faultlines in small multinational teams like those in an OSOCC. A total of 10 topics are discussed and, for each topic, one of the faultline representations shown in Figure 7 is used to summarize the implications for cross-cultural faultlines.

The primary tool for data analysis is the partial correlation between responses to the Schwartz Value Survey (1992, 1994) and to the other questionnaires. The partial correlation procedure minimizes the impact of individual differences by taking into account each individual's mean scale use. The resulting partial correlation more accurately reflects group-wide relationships between variables.

## Value structure ratings and rankings

Figure 29 illustrates why the partial correlation procedure is needed. The graph shows the average raw response of the four national groups to the Schwartz Value Survey. The horizontal axis lists the 10 value types in the value scale (see Figure 3 and Table 3). This sequence of value types is created by splitting the circular configural model of Figure 3 between stimulation (ST) and hedonism (HE) and unrolling the circle to form a continuum of value types. The vertical axis in Figure 29 is the average rating given each value type. The extreme values (-1, 7) are the anchors in the ratings scale developed by Schwartz (see Figure 2).

Inspection of Figure 29 reveals that the Swedes used the rating scale differently than the other three national groups. The Swedes assigned lower ratings to every value type. This consistent difference is an example of response bias. If the raw data were used without correcting for this bias, the Swedes would appear to differ on every measure. The partial correlation procedure removes this effect and, in essence, levels the playing field for the four groups.

Hidden in Figure 29 is a simple but profound lesson for all future SRSA research in the international arena: Swedes may be likely to respond to questionnaires with significantly lower scores than many other national groups. All analyses of self-report data should consider taking this type of response bias into account.

Figure 30 centers the raw ratings data of Figure 29 to provide a better visual comparison of how the four national groups rated the 10 value types. Centering the data reveals the fundamental similarity in response patterns across all four groups. All groups give relatively high scores to benevolence (BE) and universalism (UN) and low scores to power (PO). This finding is compatible with the analysis of an extensive multicultural survey conducted by Schwartz and Bardi (2001). The take-home message is clear: People from all four national groups

have fundamentally similar value structures. Their differences, while real, are much more subtle than their underlying compatibility. This lesson should be among the first in any training on diversity and its impact on multinational teams.
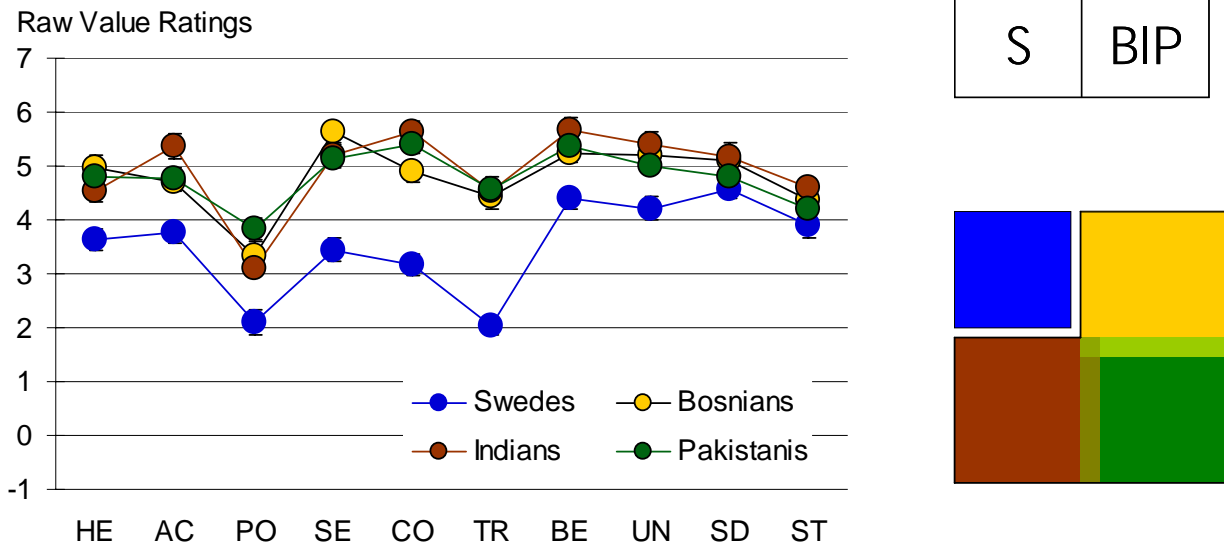


**Fig. 29.** Average and standard errors of the ratings given the 10 Value Types and the corresponding faultline maps.
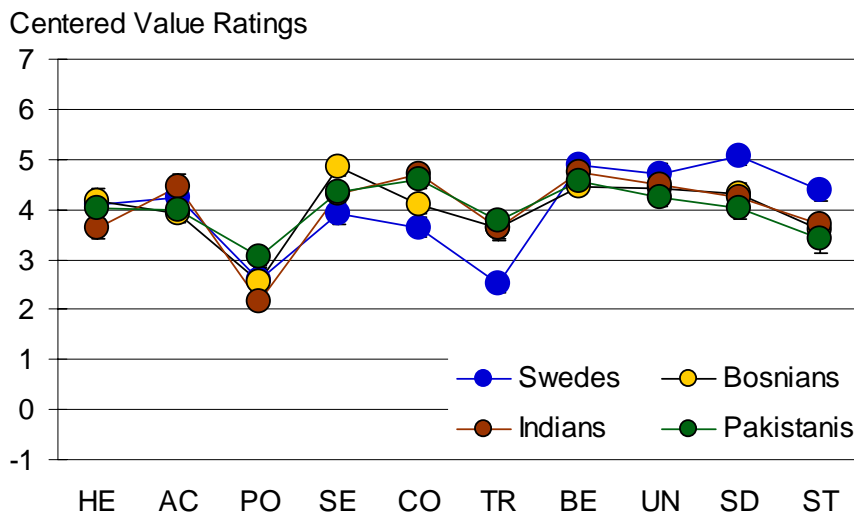


**Fig. 30.** Centered value ratings for the 10 Value Types allow comparison across the 4 national groups.

The subtle differences in value structure are shown in Table 13. The table shows the rank (from 1 to 10 with 1 being the highest rank) of the ratings shown in Figures 29 and 30. The highest (lowest) rating receives the highest (lowest) rank. For example, the Indians gave benevolence (BE) the highest rating and gave the lowest rating to power (PO). The Swedes gave self-direction (SD) the highest rating and tradition (TR) the lowest. The first column in Table 12 lists the rank order of ratings across the 56 cultures sampled by Schwartz and Bardi (2001).

Their analysis indicates that this rank order, with benevolence (BE) at the top and power (PO) at the bottom, reflects the relative emphasis placed on the 10 value types by 83% of cultures. This finding indicates that people from most cultures respond to the items in the Schwartz Value Survey by emphasizing the relative importance of benevolence and self-direction in their lives and downplaying the importance of tradition and power.

**Table 13.** Rankings of the average ratings for the 10 values types compared with global averages.

| Value type | | Global Average | Swedes | Bosnians | Indians | Pakistanis |
|---|---|---|---|---|---|---|
| Benevolence | BE | 1.5 | 2 | 2 | 1 | 2 |
| Self-Direction | SD | 1.5 | 1 | 4 | 6 | 5 |
| Universalism | UN | 3 | 3 | 3 | 3 | 4 |
| Security | SE | 5.5 | 7 | 1 | 5 | 3 |
| Conformity | CO | 5.5 | 8 | 6 | 2 | 1 |
| Achievement | AC | 4 | 5 | 7 | 4 | 7 |
| Hedonism | HE | 7 | 6 | 5 | 6 | 6 |
| Stimulation | ST | 8 | 4 | 9 | 7 | 9 |
| Tradition | TR | 9 | 10 | 8 | 8 | 8 |
| Power | PO | 10 | 9 | 10 | 10 | 10 |

Note: Global averages from Schwartz and Bardi (2001).

The four remaining columns list the rank order of ratings provided by participants in our study. Our sample of Swedes fits the global average well. They deviate from the paradigm only twice: They rank stimulation (ST) much higher than the norm and conformity (CO) much lower. Similarly, the Indians deviate from the norm twice: They rank conformity much higher than the norm and self-direction (SD) much lower. The Bosnians and Pakistanis deviate three and four times, respectively, and in much the same way. Both of these traditionally Islamic cultures rank security (SE) much higher than the norm and self-direction and achievement (AC) much lower.

Figure 31 uses the configural model of value types to highlight the subtle differences in how the four national groups ranked the 10 value types. Like Table 13, it emphasizes ranks rather than raw scores. It uses dark colors to highlight the value types in the top four ranks for each national group. The middle two ranks are shown in pale colors. The bottom four ranks have no color.

Inspection of Figure 31 reveals that all four national groups assigned top ranks to value types in the upper right-hand quadrant of the configural model shown in Figure 3, that is, to values associated with self-transcendence. This finding aligns with the results reported by Schwartz and Bardi (2001). The salient finding revealed by Figure 31 is that the value structure held by the Swedes differs markedly from the other three. For the Swedes, the six most highly-ranked value types form a contiguous section of the circle that excludes the quadrant associated with conservation. This sample of Swedes was focused on openness to change, novelty, and doing the right thing both for themselves and the world. They were

little interested in tradition or in other archetypically collectivist values. Whether and how this result might generalize to Swedes at large is an issue worthy of more study.

The two national groups with a strong Islamic tradition, Bosnia and Pakistan, generated essentially identical patterns of ranks. Both groups emphasized value types on the right half of the circle that are associated with self-transcendence and conservation and gave little weight to value types associated with self-enhancement. This pattern reveals a strongly collectivist orientation: It appears that our samples of Pakistanis and Bosnians valued the good of the group more than the good of the individual.

The Indians differed from the two Islamic groups in only one regard. Our sample of 30 Indian graduate students assigned a top rank to achievement, a value type firmly centered in the quadrant associated with self-enhancement. This result may reflect the self-selection inherent in drawing a sample from graduate students studying in a foreign country.

The value structures illustrated by the patterns of colors in Figure 31 are generated from relatively small samples. Nevertheless, as shown in Table 13, they largely adhere to the global norm. They deviate from that norm in directions that are consistent with those found by studies using much larger samples (e.g., Hofstede, 1981; Schwartz, 1992). Accordingly, the value structures shown in Figure 31 would probably be replicated by a study that obtained a larger sample of individuals from these four national groups.

**Fig. 31.** Comparison of rankings of the 10 Value Types. Dark colors indicate the top four ranked value types. Light colors indicate the middle two value types. The four lowest ranked value types are shown without color.

These considerations underscore the significance of the major finding: Swedes differ dramatically from the other three groups. Figure 32 presents the faultline map for value structure. SRSA personnel who are training to work in multinational teams should be made fully aware of just how unique their value structure is likely to be. Indeed, everyone who trains to work in a multinational team should be made aware of their own value structures and of how they might differ from others'.
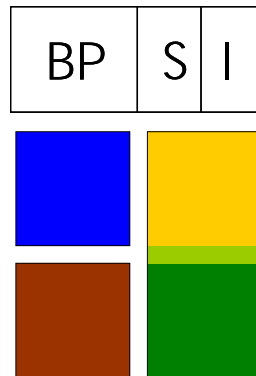


**Fig. 32.** Faultline maps for value type rankings.

After a brief technical review, the rest of this section discusses how these differences in value structure correlate with other closely held beliefs and personality traits.

## On correlograms and least-squares sinusoidal regression models

The procedure used to investigate the relationships between value structures and dimensions of cultural diversity is correlation. The correlation procedure determines whether there is a consistent variation between pairs of variables. A positive correlation indicates that when one of the variables increases (decreases), the other variable tends to increase (decrease) too. A negative correlation indicates that when one increases, the other tends to decrease. A correlogram is a graph that shows the pattern of correlations between one variable and several others. Figure 33 is an example. It shows the correlations between the Swedes' response to the questionnaire on conflict avoidance and their responses to the 10 value types. The horizontal axis shows the 10 value types. The vertical axis is the value of the partial correlation between the index of conflict avoidance and the value types. In the example of Figure 33, the correlations between conflict avoidance and both conformity (CO) and tradition (TR) are positive and strong. In contrast, the correlation between conflict avoidance and stimulation (ST) is negative and strong. Thus, the correlogram shows how the correlations between conflict avoidance the 10 value types change as a function of location in the configural model. Here, the correlation varies from strongly positive in the quadrant associated with conservation to strongly negative at the opposite side of the circle in the quadrant associated with openness to change.

The roughly sinusoidal curve traced by the series of correlations shown in Figure 33 is fully consistent with Schwartz's configural model of value types. If correlations are positive in one quadrant, they are expected to be negative in the opposite quadrant. Correlations in the two intermediate quadrants are expected to be closer to zero (no correlation). Similarly, if the positive correlations are strong (weak), the negative correlations should be strong (weak) too.

The likelihood of observing a clean sinusoidal pattern of correlations between the 10 value types and another variable (like conflict avoidance) increases with the number of respondents. The sample sizes in our experiment were relatively small. The data can be expected to be noisy and, indeed, they generally are.
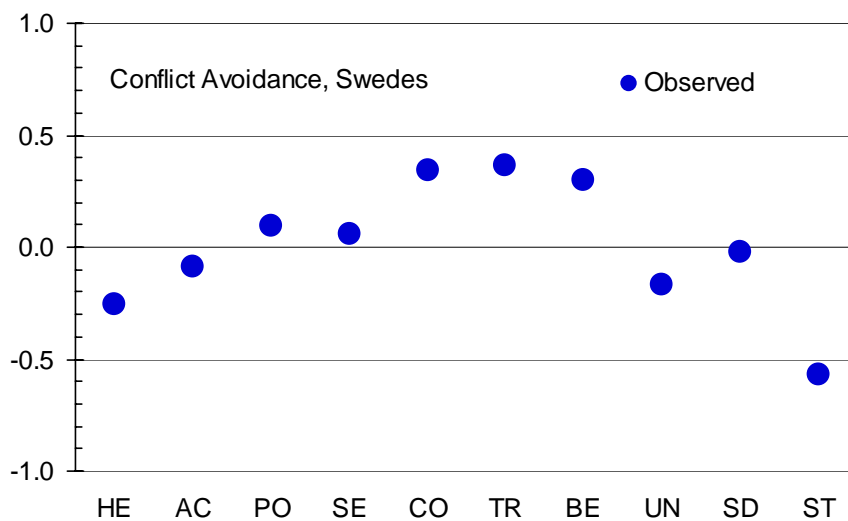


**Fig. 33.** Correlogram showing the 10 partial correlations of the Swedes' responses to (a) the questionnaire on conflict avoidance and (b) the Schwartz Value Survey.

We have used least-squares sinusoidal regression to extract the sinusoidal signal from our relatively noisy data. Figure 34 presents an example. The regression model has two free parameters that influence its interpretation. The first parameter ($B_1$) is the amplitude of the sine wave defined as the peak value of correlation in the best-fit model to the observed data. The statistical significance of this parameter determines the utility of the model as a predictor and descriptor of the data. The second parameter is the phase angle of the best-fit model defined as the distance in degrees from the left side of the correlogram (the ST/HE boundary) to the zero intercept of the rising limb of the sine wave. The phase angle determines the location of the peak and is central to the interpretation of the patterns of correlation captured by the model. (A third free parameter, $B_0$, is the vertical offset of the model from the zero correlation baseline. If the data are well-behaved, its value is close to zero. It contributes no other information to the interpretation of the model.).

Figure 35 shows both the observed data of Figure 33 and the model of Figure 34 to illustrate the goodness-of-fit of the model to the data. The parameters for the model in Figure 35 are listed in the top row of Table 14. The model has a phase

angle of 85 which shifts the peak positive correlation to conformity (CO) and the negative peak (trough) to stimulation (ST). The $R^2$ value indicates that the model explains more than three-quarters of the variance (noise) in the observed data. The value of $B_1$ reveals that the peak amplitude of the model is approximately .35. The ratio of $B_1$ to its standard deviation (SD $B_1$) indicates that the likelihood of getting such a good fit to the data by chance is less than 1 in 100, $p < .01$. In sum, the least-squares sinusoidal model shown in Figure 35 is an excellent idealization of the noisy pattern of observed partial correlations.
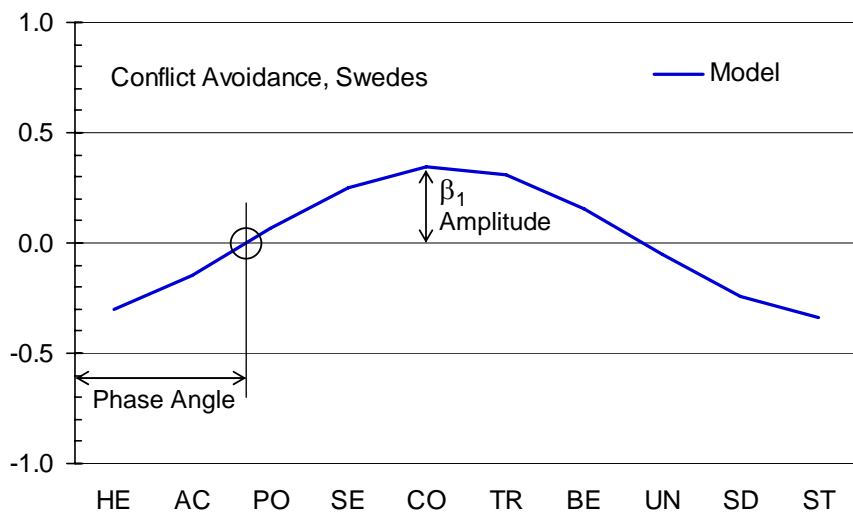
**Fig. 34.** Correlogram showing the best-fit least-squares sinusoidal regression model to the observed data of Figure 33 and the two free parameters in the regression model that guide its interpretation.
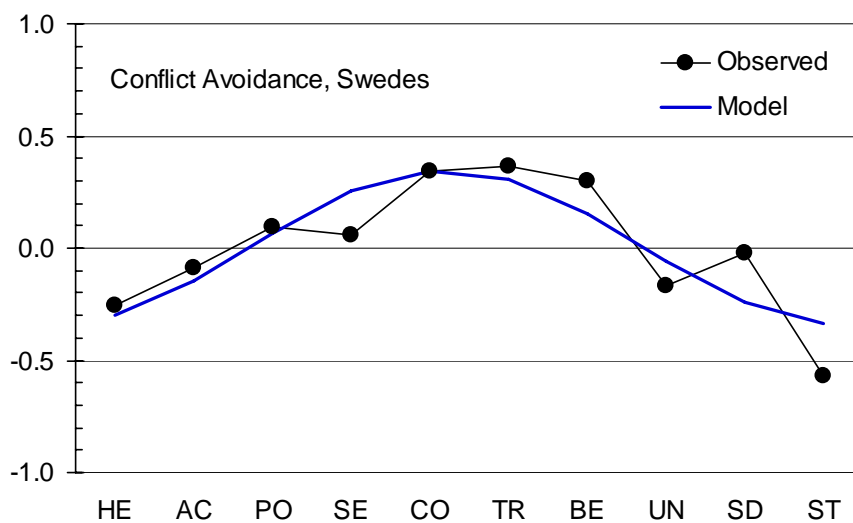


**Fig. 35.** Correlogram showing the goodness of fit of the sinusoidal model of Figure 34 to the observed partial correlation data of Figure 33.

**Table 14.** Summary of the best-fit least-squares regression models to the partial correlations between responses to the Schwartz Value Survey and other measures.

| Scale / Measure | Group | $B_0$ | $B_1$ | SD $B_1$ | Phase angle | $R^2$ |
|---|---|---|---|---|---|---|
| Conflict Avoidance | Swedes | .005 | .347** | .060 | 85 | .77 |
| | Bosnians | -.042 | .060 | .065 | 180 | .08 |
| | Indians | -.012 | .325** | .088 | 85 | .57 |
| | Pakistanis | .008 | .280** | .055 | 315 | .72 |
| Time Horizon | Swedes | .079 | .516** | .090 | 40 | .77 |
| | Bosnians | .020 | .251** | .057 | 345 | .66 |
| | Indians | .020 | .088 | .090 | 95 | .09 |
| | Pakistanis | -.001 | .051 | .091 | 325 | .03 |
| Tolerance of Uncertainty | Swedes | -.045 | .523** | .091 | 235 | .77 |
| | Bosnians | -.007 | .167* | .066 | 155 | .39 |
| | Indians | .007 | .215** | .059 | 285 | .57 |
| | Pakistanis | .005 | .133 | .091 | 90 | .17 |
| Openness | Swedes | -.074 | .485** | .065 | 215 | .85 |
| | Bosnians | -.038 | .341** | .063 | 155 | .74 |
| | Indians | .016 | .212* | .074 | 165 | .45 |
| | Pakistanis | -.013 | .209 | .116 | 50 | .04 |
| Conscientiousness | Swedes | .050 | .316* | .096 | 30 | .52 |
| | Bosnians | .015 | .170 | .119 | 75 | .17 |
| | Indians | .005 | .078 | .039 | 165 | .29 |
| | Pakistanis | .011 | .078 | .113 | 200 | .05 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Extraversion | Swedes | -.032 | .291** | .057 | 225 | .72 |
| | Bosnians | .067 | .406** | .076 | 320 | .74 |
| | Indians | -.009 | .127 | .065 | 230 | .28 |
| | Pakistanis | -.004 | .178** | .046 | 135 | .58 |
| Agreeableness | Swedes | -.029 | .220* | .060 | 190 | .57 |
| | Bosnians | -.022 | .363** | .101 | 125 | .56 |
| | Indians | .009 | .284** | .041 | 95 | .83 |
| | Pakistanis | -.014 | .127 | .067 | 320 | .26 |
| Neuroticism | Swedes | -.007 | .057 | .055 | 55 | .10 |
| | Bosnians | -.023 | .327** | .096 | 235 | .54 |
| | Indians | -.003 | .104* | .038 | 210 | .43 |
| | Pakistanis | .010 | .100 | .093 | 215 | .10 |
| % Emails Sent | Swedes | .028 | .127* | .044 | 350 | .45 |
| | Bosnians | .058 | .135 | .100 | 275 | .16 |
| | Indians | -.022 | .069 | .057 | 195 | .13 |
| | Pakistanis | -.013 | .081 | .114 | 85 | .05 |
| % Commands Issued | Swedes | -.017 | .179 | .082 | 260 | .32 |
| | Bosnians | -.003 | .181 | .074 | 205 | .37 |
| | Indians | .027 | .189* | .062 | 295 | .48 |
| | Pakistanis | .010 | .094 | .073 | 165 | .15 |

Note: $B_0$ is the vertical offset of the sine wave. $B_1$ is the amplitude of the sine wave. Phase angle indicates the location of the ascending zero-intercept of the sine wave as measured in degrees from an arbitrary zero defined by the boundary between ST (stimulation) and HE (hedonism). Each of the 10 value types is assigned an arc length of 36º. * $p < .05$, ** $p < .01$

## Conflict avoidance

Figure 36 is the correlogram of the partial correlations between participants' responses (aggregated by national group) to the questionnaire on conflict avoidance and their responses to the Schwartz Value Survey. The Swedish data of Figures 33 and 35 are shown in blue. Because all four data sets are rather noisy, it is more informative to inspect the corresponding best-fit least-squares sinusoidal regression models of Figure 37.

The models for the Swedes (in blue) and the Indians (in orange) are virtually identical. The peak correlation is with tradition (TR) and the negative peak is with stimulation (ST). The pattern suggests that, in both cultures, highly traditional people may seek to avoid conflict whereas people who seek stimulation may not avoid conflict. As shown by the high values of $R^2$ in Table 14, both models fit the data well.

The model for the Pakistanis (in green) is equally robust but tells a different story. The pattern suggests that traditional Pakistanis do not avoid conflict. This does not mean that they seek conflict. Rather, it suggests that they do not place much value in attempting to avoid it. This sense of fatalism is a theme in our analysis of the Pakistani data.

The Bosnian data (in yellow) are the first example of consistently weak correlations that have no clear underlying sinusoidal signal. The model fit is poor ($R^2 = .08$) and does not warrant detailed interpretation other than conjecture about the cause of the consistently weak correlations. Could it be that these refugees from a genocidal civil war have been inured to conflict and, as a result, they all, whether traditional or not, believe that conflict cannot be avoided? Do all refugee groups display similarly weak and pattern-free correlations between an index of conflict avoidance and the 10 value types?

The corresponding faultline maps are shown on the right side of Figure 37. The Swedes and Indians are aligned. This alignment was relatively unexpected. Sweden and India do not share a continent or a religious heritage. There are two potentially strong faultlines separating the Bosnians and Pakistanis from each other and from the Swedes and Indians. There are at least two take-home messages here for anyone who plans to lead or work in multinational teams. First, people from different national groups think about conflict differently. More generally, alignments of dimensions of cultural diversity (e.g., attitudes toward conflict) can and do link seemingly disparate national groups.
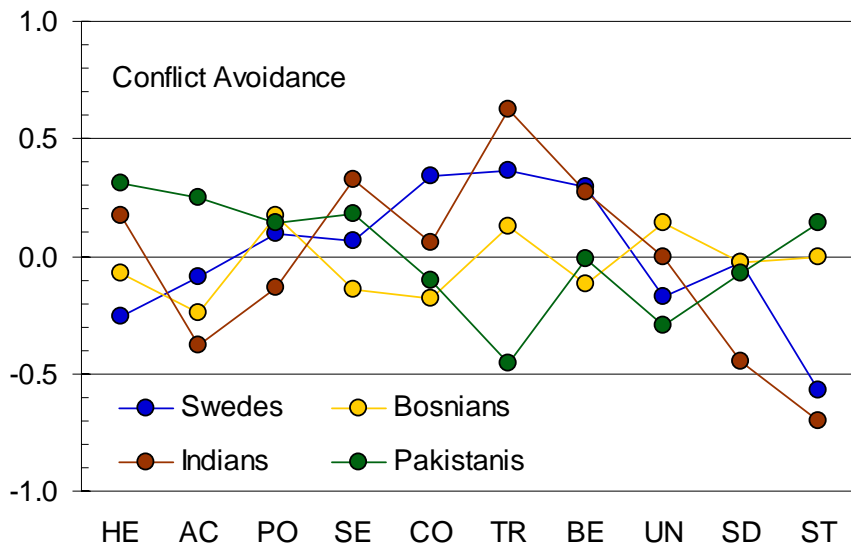
**Fig. 36.** Partial correlations between responses to the questionnaire on conflict avoidance and the Schwartz Value Survey.
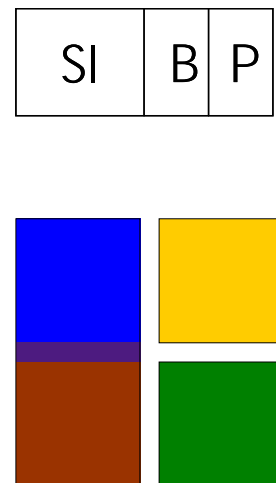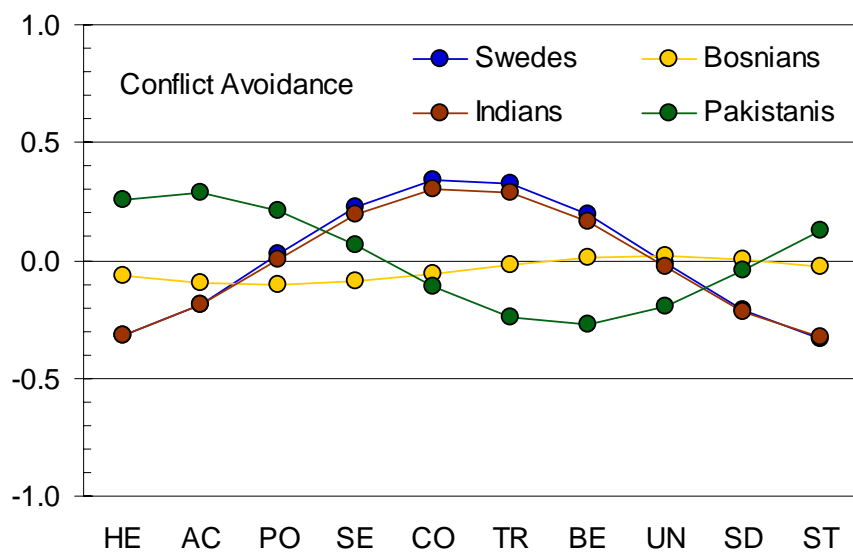


**Fig. 37.** (A) Best-fit sine wave models of the correlations between conflict avoidance and the 10 value types and (B) the corresponding faultline maps.

# Time horizon

Figure 38 is the correlogram of the partial correlations between responses to the questionnaire on time horizon and the Schwartz Value Survey. The time horizon instrument asks respondents to assess how far ahead they plan and how much control they feel they have over their own lives. Longer time horizons and the sense of control yield positive correlations with strongly held values and negative correlations with values that are less important. The best-fit least-squares sinusoidal regression models are shown in Figure 39. The models fit the Swedish and Bosnian data well.

The peak positive correlation for the Swedes is with the value type security (SE). The peak negative correlation is with self-direction (SD). This pattern suggests that Swedes may associate security with planning ahead and a sense of control over their lives. On the other hand, it is entirely possible that our sample of young, independent, free-thinking Swedes may not place a particularly high value on planning. These two interpretations are entirely compatible. Many Swedes undoubtedly value both security and planning. Many other, more self-directed, Swedes do not. This example illustrates how the correlogram and the configural model of value types make it possible to take profound individual differences into account and construct a model of cultural norms.

The peak correlation for the Bosnians lies between achievement (AC) and power (PO) and the negative peak is between benevolence (BE) and universalism (UN). This pattern can be interpreted two ways, depending upon the direction of causality. Our sample of Bosnians either thought of planning as a means to achievement and power or viewed power as a means to gaining control over their lives (or both).

The models do not fit the Indian and Pakistani data very well. There are no meaningful correlations between time horizon and value types in the Indian and Pakistani data. Once again, this null result has pragmatic significance. Our samples of groups from the Indian subcontinent appear to share either a disdain for long-term planning or the belief that they do not have control or their lives or both. It is tempting to speculate that the common ground for this disdain and sense of helplessness has its foundation in a fatalism that may be inspired by Hindu tradition. This speculation is, of course, open to scrutiny and re-evaluation.

In sum, the Bosnians' association of planning with power differs from the Swedes' association of planning with security. Both of these strong associations contrast sharply with the Indians' and Pakistanis' shared sense of fatalism. The corresponding faultline maps contain two potentially strong faultlines. Any multinational team assigned a planning task would be well served if they knew in advance about these categorical differences in attitudes toward planning.
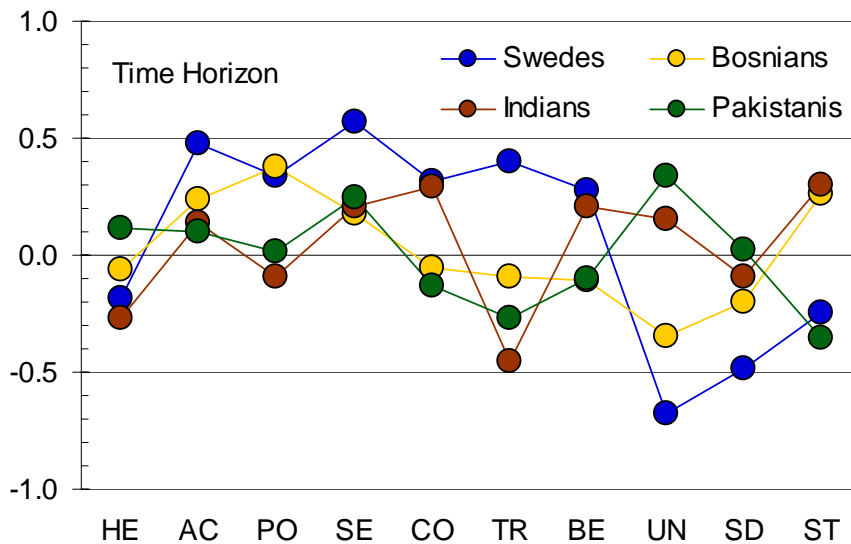
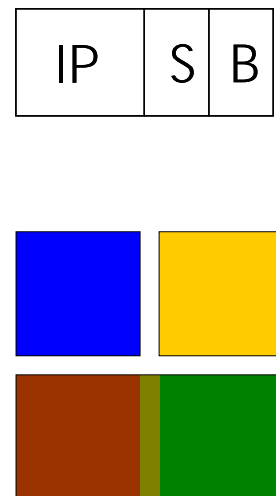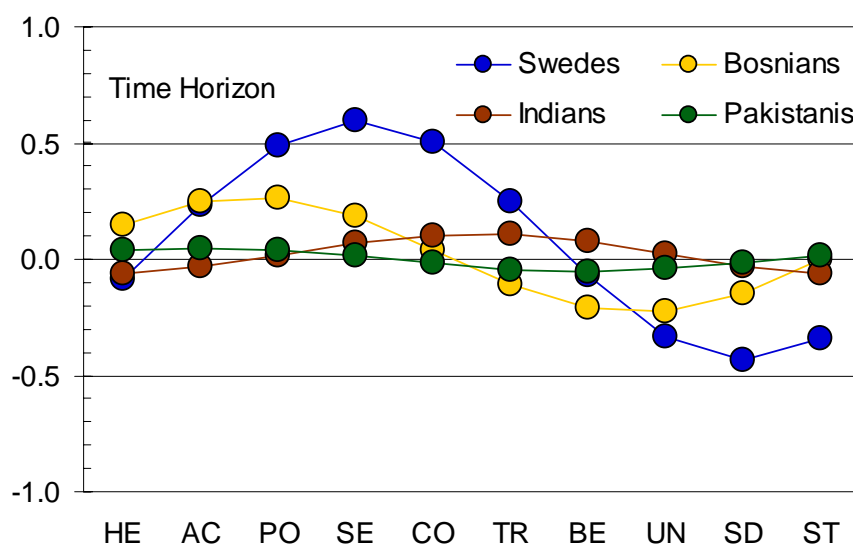**Fig. 38.** Partial correlations between responses to the questionnaire on time horizon and the Schwartz Value Survey.



**Fig. 39.** (A) Best-fit sine wave models of the correlations between time horizon and the 10 value types and (B) the corresponding faultline maps.

## Tolerance of uncertainty

Figure 40 is the correlogram of the partial correlations between responses to the questionnaire on tolerance of uncertainty and the Schwartz Value Survey. The tolerance of uncertainty instrument asks respondents to assess their degree of comfort in making decisions with incomplete information and in unfamiliar situations. Greater comfort with uncertainty and unfamiliar situations yields positive correlations with strongly held values. Conversely, aversion for uncertainty produces negative correlations with strongly held values. The best-fit least-squares sinusoidal regression models are shown in Figure 41. The fits to all but the Pakistani data are good.

Each group has a unique perspective on uncertainty. The Swedes strongly associate their aversion for uncertainty with their goal of security (SE). It appears that a safe Swedish society may seek to avoid sources of uncertainty. The Bosnians associate their aversion for uncertainty with the goals power (PO) and achievement (AC). It appears that Bosnians who seek self-advancement and prestige may try to avoid sources of uncertainty. The Indians associate their aversion for uncertainty with tradition (TR) and benevolence (BE). A traditional Indian may seek to avoid unfamiliar situations and other sources of uncertainty. In contrast a traditional Pakistani may tolerate uncertainty.

Tolerance for uncertainty emerges from this analysis as a dimension of cultural diversity for which there is no common ground among these four national groups. Accordingly, the cross cutting faultlines in the faultline maps are likely to be weak. Since there is no alignment of national groups, this is one dimension that may not become a source of friction in a small multinational team. This hypothesis lends itself to testing.
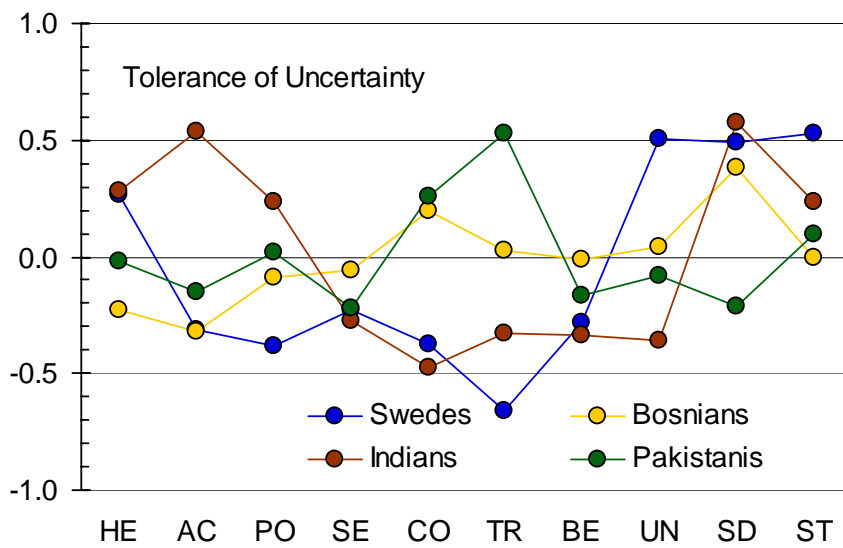
**Fig. 40.** Partial correlations between responses to the questionnaire on tolerance of uncertainty and the Schwartz Value Survey.
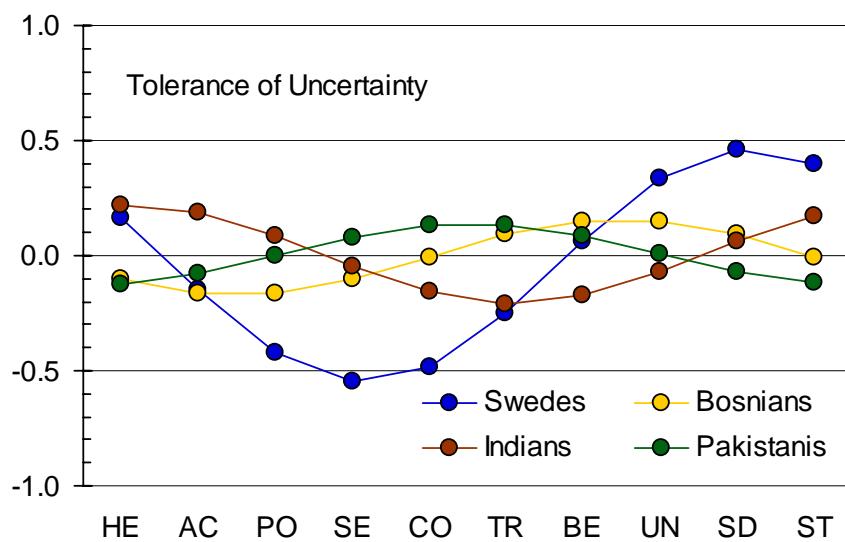


**Fig. 41.** (A) Best-fit sine wave models of the correlations between tolerance of uncertainty and the 10 value types and (B) the corresponding faultline maps.

# Intellect/Openness

Intellect/Openness is the first of the five items in the NEO-FFI instrument that we discuss. The NEO-FFI is designed to measure the 'Big Five' domains of adult personality: intellect/openness, conscientiousness, extraversion, agreeableness, and emotional stability. Responses to this instrument provide insights into the respondent's personality. Correlating responses to the NEO-FFI with those from the Schwartz Value Survey links participants' goals to aspects of their personalities.

Figure 42 is the correlogram of the partial correlations between responses to intellect/openness and the value survey. Intellect/openness assesses intellectual curiosity and openness to change. High levels of curiosity and openness yield positive correlations with strongly held values and negative correlations with values that are less important. The best-fit least-squares sinusoidal regression models are shown in Figure 43. The fits to all but the Pakistani data are good. The Pakistanis data are too noisy to extract an underlying sinusoidal model.

The Swedes strongly associate openness and intellectual curiosity with the value types universalism (UN) and self-direction (SD). Self-direction is one of the values in the openness-to-change quadrant. Thus, the Swedes responded similarly to items in both the Schwartz Value survey and the NEO-FFI related to openness and the acceptance of change. This result provides a culturally-dependent validity check on the two questionnaires.

The Indians and Bosnians respond similarly to the Swedes but with a greater emphasis on benevolence (BE). The Bosnians and Indians appear to perceive openness and intellectual curiosity as necessary elements in appreciating family and working for the greater good.

The faultline map shows the alignment of the Indians and the Bosnians and contains two faultlines. To represent this unexpected alignment, the mapping convention of Figure 6 had to be modified. The right side of the map in Figure 43 flips the positions of the Bosnians and Pakistanis. The need to modify the map to fit the data underscores one of the overarching conclusions of this study: Seemingly disparate national groups may align and find themselves together on the opposite side of a faultline from their neighbors. Cultural diversity is not neatly predictable and is not necessarily divisive.
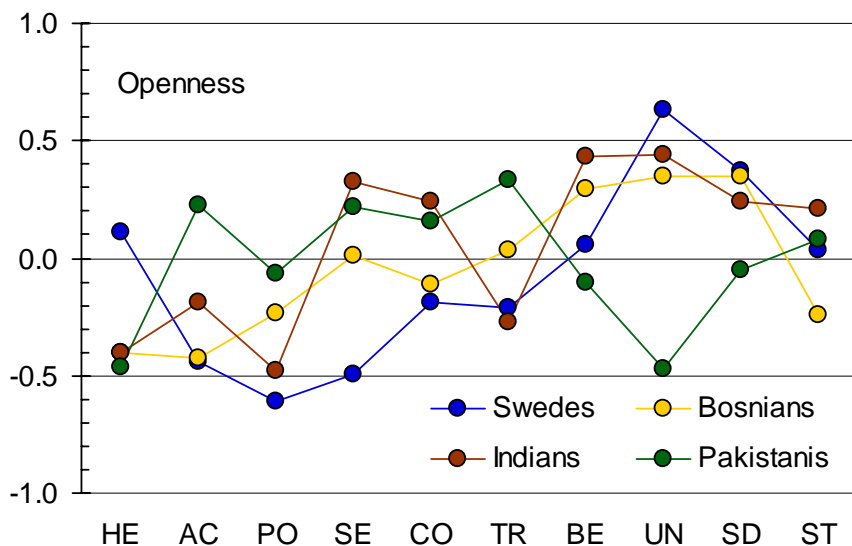
**Fig. 42.** Partial correlations between responses to the NEO-FFI scale for openness and the Schwartz Value Survey.
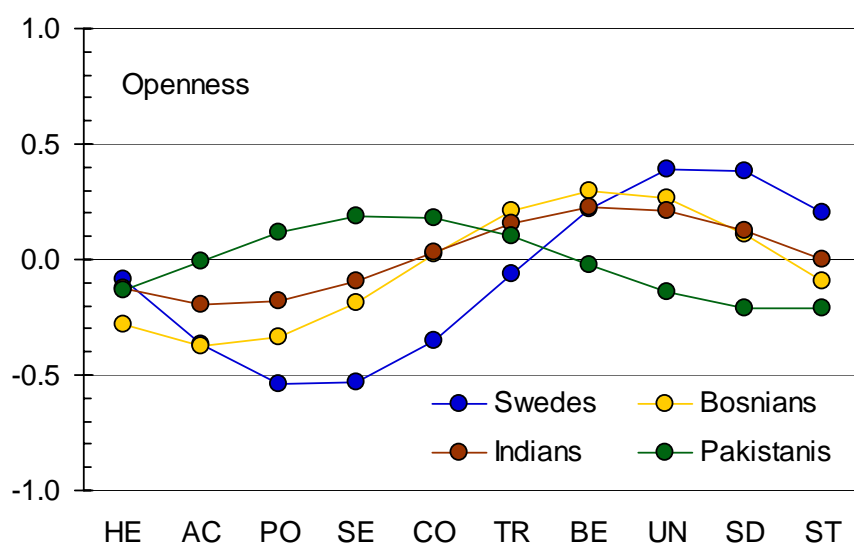


**Fig. 43.** (A) Best-fit sine wave models of the correlations between openness and the 10 value types and (B) the corresponding faultline maps.

## Conscientiousness

Conscientiousness is the second item from the NEO-FFI. Conscientiousness assesses punctuality and following through on commitments. High levels of conscientiousness yield positive correlations with strongly held values and negative correlations with values that are less important. Figure 44 is the correlogram of the partial correlations between responses to conscientiousness and the value survey. The best-fit least-squares sinusoidal regression models are shown in Figure 45. The fit is good only to the Swedish data.

Correlations between conscientiousness and value type are noisy for both the Indians and Pakistanis. A Western interpretation of this result might suggest that the two groups from the Indian subcontinent may share a disdain for punctuality and following through on commitments. This would be a harsh judgment that is undoubtedly unfair. The data presented in Figures 44 and 45 need an additional, non-Western, set of eyes for better interpretation. It is, nevertheless, tempting to speculate once again that the untidy correlations between goals and conscientiousness may reflect a shared sense of fatalism. This speculation is, of course, open to scrutiny and re-evaluation.

The Swedes strongly associate conscientiousness with security (SE). The peak negative correlation is with self-direction (SD). The Swedes generated essentially the same pattern of correlations for time horizon, Figures 38 and 39. The model suggests that some Swedes may associate conscientiousness with security. On the other hand, it is entirely possible that some of the young Swedes in our sample may not place a particularly high value on conscientiousness. The configural model makes it possible to take these individual differences into account.

The fit to the Bosnian data is poor, largely because of the anomalously high value given to self-direction (SD). If it weren't for this data point, the model would likely be similar to the Swedish model. If that were the case, there would be one clear continental divide in the faultline maps. However, given the data, the maps contain two faultlines that show the alignment of the two groups from the Indian subcontinent and the apparent split between the two groups from Europe. The poor fits to all but the Swedish data make it inappropriate to put much weight on these interpretations or the faultline maps.
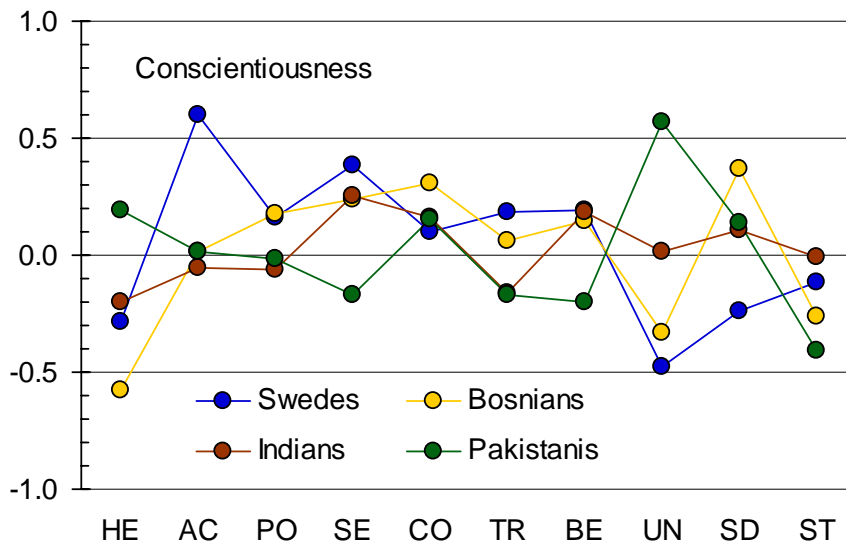
**Fig. 44.** Partial correlations between responses to the NEO-FFI scale for conscientiousness and the Schwartz Value Survey.
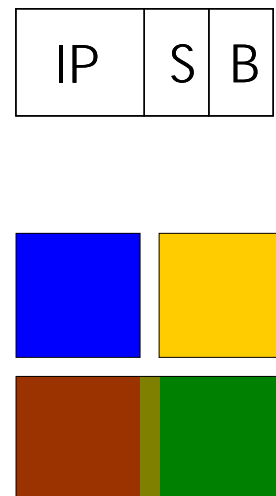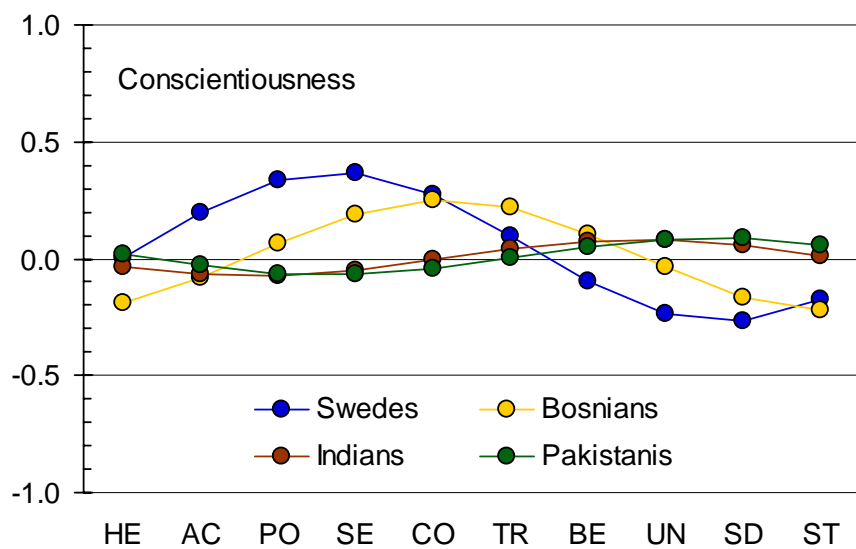


**Fig. 45.** (A) Best-fit sine wave models of the correlations between conscientiousness and the 10 value types and (B) the corresponding faultline maps.

## Extraversion

Extraversion is the third item from the NEO-FFI. Extraversion assesses confidence and self-assuredness. High levels of extraversion yield positive correlations with strongly held values and negative correlations with values that are less important. Figure 46 is the correlogram of the partial correlations between responses to extraversion and the value survey. The best-fit least-squares sinusoidal regression models are shown in Figure 47. The fits to all but the Indian data are good.

The Bosnians strongly associate extraversion with achievement (AC). The peak negative correlation is with self-direction (SD). The correlations with all values in the self-enhancement quadrant are strongly positive. All correlations with values in the self-transcendence quadrant are strongly negative. This pattern has a clear and unsubtle message: Self-confident Bosnians value self-enhancement. If they think they have what it takes, they go for it.

The Pakistani model could not be more different. As shown in Table 14, the Pakistani and Bosnian models are nearly 180° out of phase. They are mirror images. The correlations with all values in the self-transcendence quadrant are strongly positive. All correlations with values in the self-enhancement quadrant are strongly negative. This pattern has a clear but subtle message: Self-confident Pakistanis value working for the common good. If they think they have what it takes, they try to help others.

Once again there is a close alignment between the Swedes and the Indians. As was the case with conflict avoidance, Figures 36 and 37, the models for the Swedes and Indians are virtually identical. The amplitude of the Swedish model is much greater than that of the Indian model and the fit to the data is much better. The peak positive correlation is with self-direction (SD) and the peak negative correlation is between security (SE) and conformity (CO). It appears that self-confident Swedes (and Indians) are likely to be open to change.

The faultline maps link the Swedes and Indians and contain two faultlines. If faultline strength were related to the phase angle between models, the rift between Bosnian and Pakistani attitudes towards self-confidence would be wide and deep. The lack of alignment between Bosnians and Pakistanis is the obverse of the unexpected alignment between Swedes and Indians seen elsewhere. As a result, it puts a new spin on a familiar theme: Cultural diversity is not neatly predictable. Seemingly similar national groups may find themselves on opposite sides of a faultline.
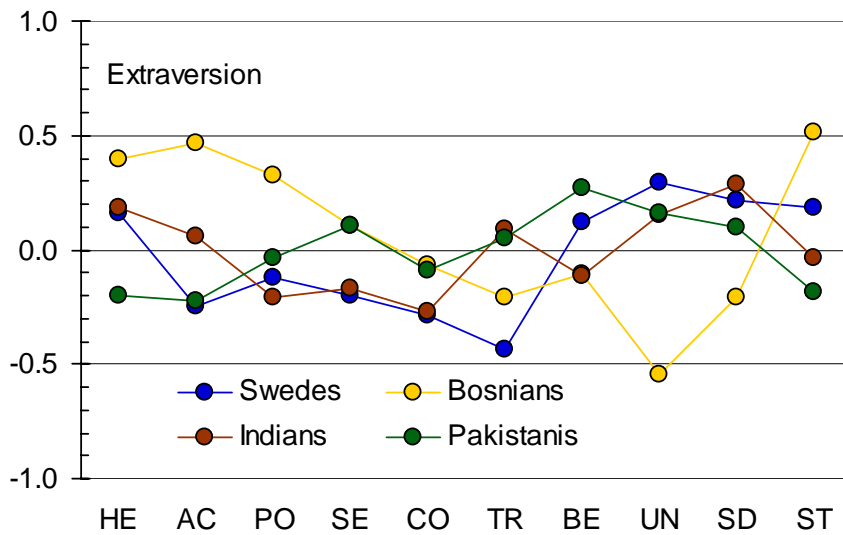
**Fig. 46.** Partial correlations between responses to extraversion and the Schwartz Value Survey.
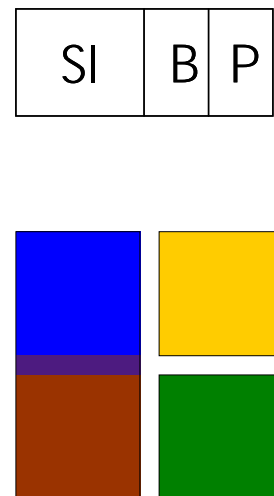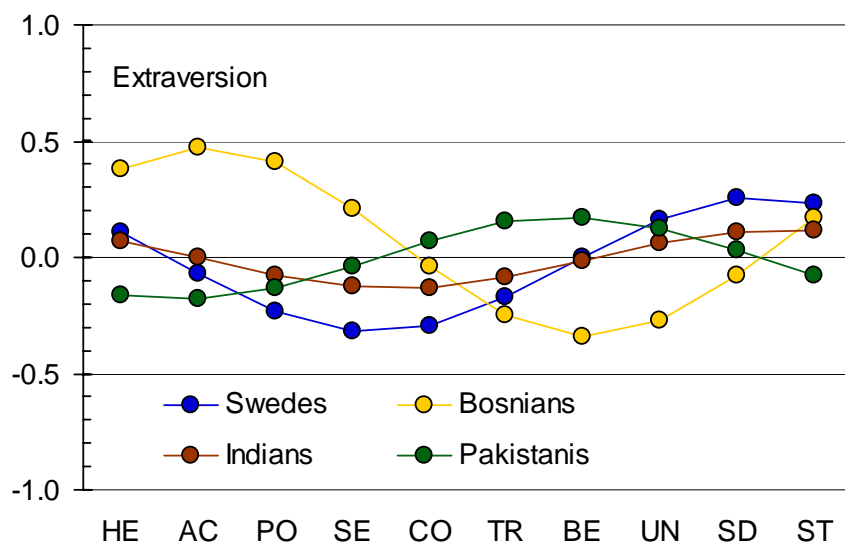


**Fig. 47.** (A) Best-fit sine wave models of the correlations between extraversion and the 10 value types and (B) the corresponding faultline maps.

## Agreeableness

Agreeableness is the fourth item from the NEO-FFI. Agreeableness assesses willingness to get along with people who are different or have different opinions. High levels of agreeableness yield positive correlations with strongly held values and negative correlations with values that are less important. Figure 48 is the correlogram of the partial correlations between responses to agreeableness and the value survey. The best-fit least-squares sinusoidal regression models are shown in Figure 49. The fits to all but the Pakistani data are good. The Pakistani data are dominated by near-zero correlations which make the model unstable and unsuitable for interpretation.

The Indian and Bosnian models are similar. Both strongly associate agreeableness with tradition (TR) and find it antithetical to hedonism (HE). Once again, interpretation of this pattern depends upon the direction of causality. These diverse national groups appear to agree either that traditional people are easy to get along with or that people who are easy to get along with do not pursue their own self-interest and pleasure (or both).

In contrast, the strongest correlates with agreeableness in the Swedish model are universalism (UN) and self-direction (SD). This sample of young Swedes appears to associate tolerance and good will with independent thinking and care for the environment.

The faultline map shows the alignment of the Indians and the Bosnians and contains two faultlines. This is the same unexpected alignment as that seen in the analysis of openness, Figure 43. Bosnians and Indians appear to agree on the goals of being agreeable and to disagree with the Swedes.

The observation that faultline maps are identical for different dimensions of cultural diversity increases the likelihood the faultline will activate when the team is assigned a task that stresses (emphasizes and strains) both dimensions. For example, a culturally diverse team might split if charged with a task that emphasizes both intellectual curiosity and tolerance for differing opinions (e.g., evaluating proposals for funding for basic research). Managers who assemble multinational teams to perform a particular task should, if possible, select individuals from cultures that align along the relevant dimensions.
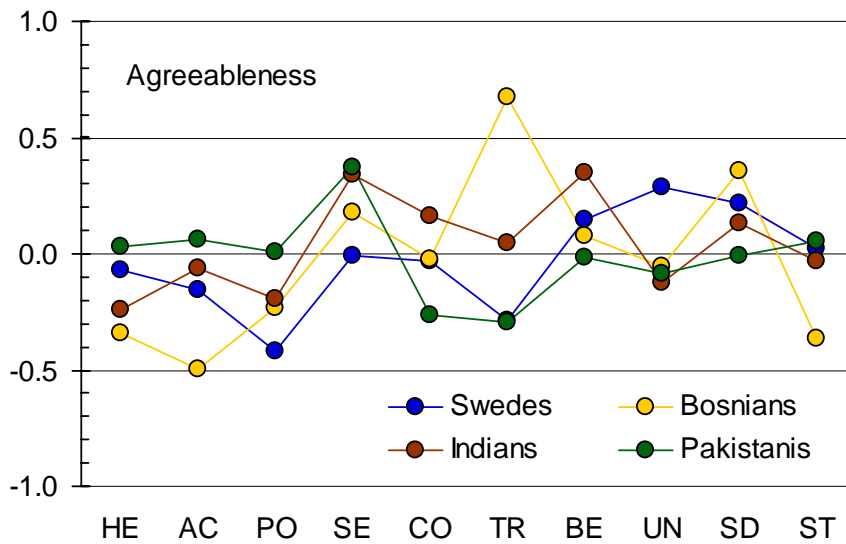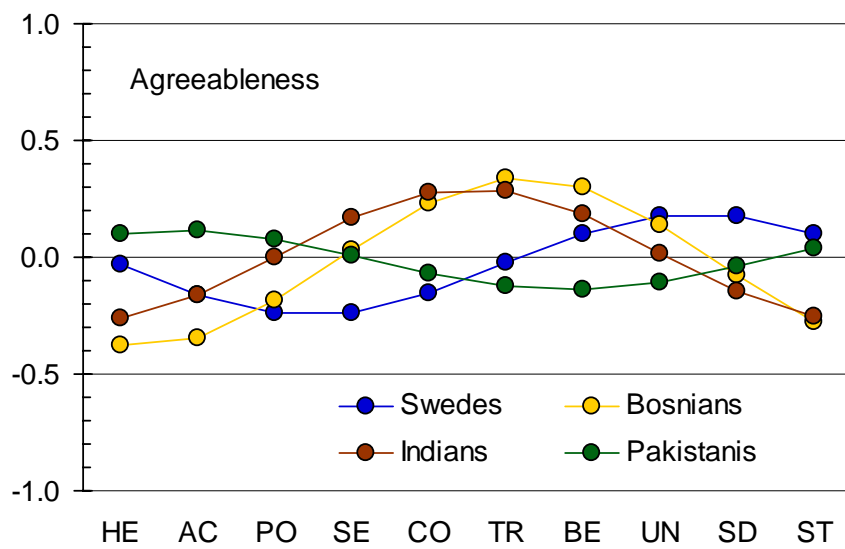
**Fig. 48.** Partial correlations between responses to the NEO-FFI scale for agreeableness and the Schwartz Value Survey.
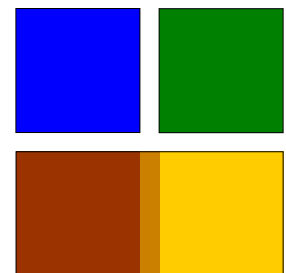


**Fig. 49.** (A) Best-fit sine wave models of the correlations between agreeableness and the 10 value types and (B) the corresponding faultline maps.

## Emotional stability

The final item from the NEO-FFI is emotional stability, also known as neuroticism, its inverse. High levels of emotional stability yield positive correlations with strongly held values and negative correlations with values that are less important. Figure 50 is the correlogram of the partial correlations between responses to agreeableness and the value survey. The best-fit least-squares sinusoidal regression models are shown in Figure 51. Only the Bosnian model provides a good fit to data that vary significantly from zero.

The lack of good fit to the Swedish and Pakistani data and the consistently near-zero observations in the Indian data are reassuring. They imply that these groups do not perceive there to be a relationship between emotion stability and any particular value type. Given that emotional stability is good, it stands to reason that its benefits accrue in all quadrants of the configural model of value types.

The Bosnian data tell an odd story. All correlations with values in the conservation quadrant (SE, CO, TR) are strongly negative. All correlations with values in the neighboring quadrant self-transcendence quadrant (BE, UN) are strongly positive. This juxtaposition of strong correlations of opposite sign in neighboring quadrants violates the assumptions of the sinusoidal model. Nevertheless, the message appears to be clear. Well-adjusted Bosnians value working for the good of others. Poorly-adjusted Bosnians seek the comfort of security, conformity, and tradition. Could this pattern of correlations be another product of their history? Do other groups of refugees from civil wars display this pattern? The faultline maps contain one faultline that reflects the unique Bosnian response to the instrument on emotional stability.
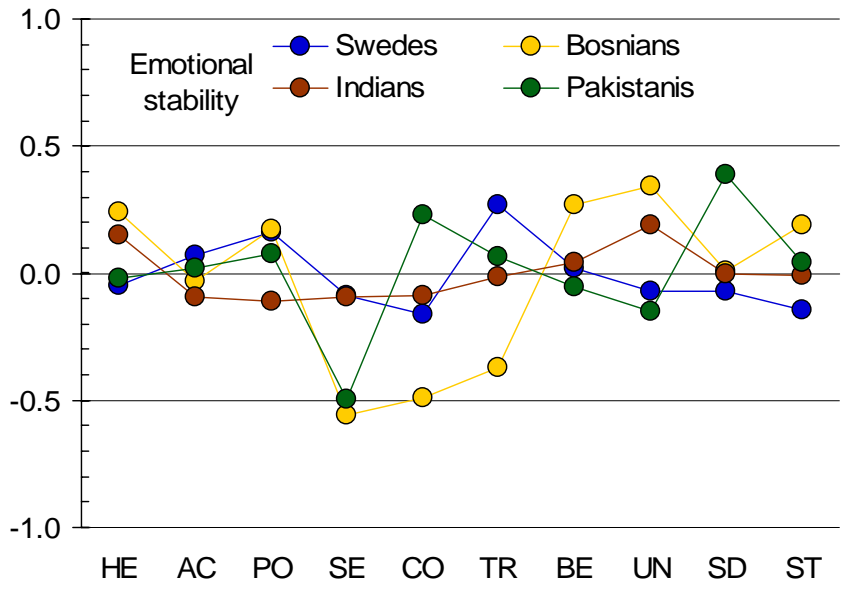
**Fig. 50.** Partial correlations between responses to the NEO-FFI scale for emotional stability and the Schwartz Value Survey.
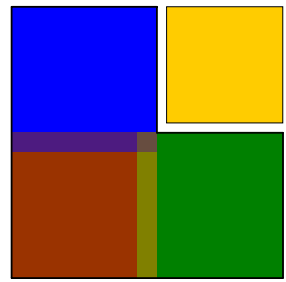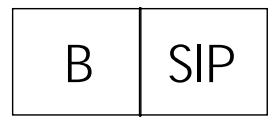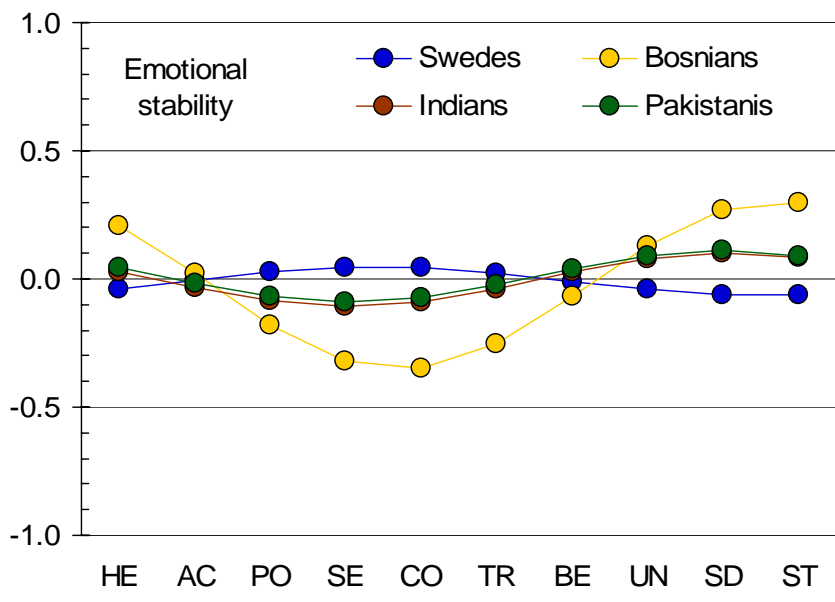


**Fig. 51.** (A) Best-fit sine wave models of the correlations between emotional stability and the 10 value types and (B) the corresponding faultline maps.

## Percent emails sent and commands issued

C3Fire captures the identity (e.g., Player A, B, C or D) of the sender of every email message and of every command to a truck. Some participants sent more emails than others; some issued more commands. We have calculated number of emails and commands sent by each participant and the percentages of the total number of emails and commends sent by the group (of 7 or 8) aggregated across all 8 sessions. The resulting percentages are individual level measures that can be aggregated within the national group and correlated with responses to the Schwartz Value Survey.

Figure 52 is the correlogram of the partial correlations between the percentage of emails sent and the value survey. The best-fit least-squares sinusoidal regression models are shown in Figure 53. As shown in Table 14, only the Swedish model provides a good fit to the data. Swedes who indicated that power was highly important in their lives sent the highest percentages of email. This finding is consistent with the observation that sending email is the only way that a participant can attempt to exercise power and control over the team.

Figure 54 is the correlogram of the partial correlations between the percentage of commands issued and the value survey. The best-fit least-squares sinusoidal regression models are shown in Figure 55. The fit to the data is good only for the Indian data. Indians who indicated that hedonism and stimulation were highly important in their lives issued the highest percentages of commands. This finding is consistent with the observation that commanding a truck is the only direct way for a participant can to influence the outcome of a session.

The models shown in Figures 53 and 55 are different for all four groups. The relatively poor fits to the data do not justify detailed interpretation of the models beyond those given above. The dissimilarity in the models suggests that there is no alignment across national groups of the relationship between these two behavioral measures and the 10 value types. The faultline maps contain cross-cutting faultlines that are likely to be weak. Both these dimensions appear unlikely to become a source of friction in a small multinational team.
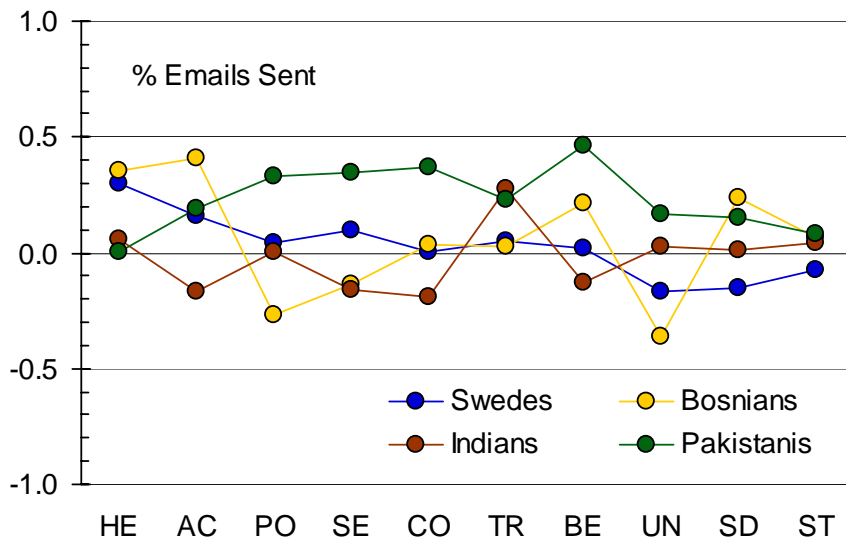
**Fig. 52.** Partial correlations between the percentage of the total number of emails sent and the Schwartz Value Survey.
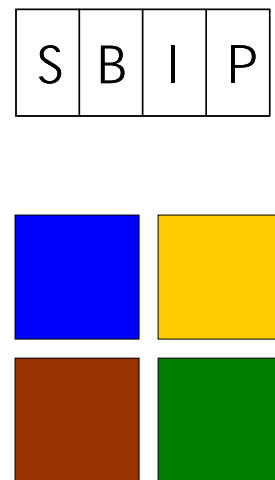


**Fig. 53.** (A) Best-fit sine wave models of the correlations between the percentage of the total number of emails sent and the 10 value types and (B) the corresponding faultline maps.

**Fig. 54.** Partial correlations between the percentage of the total number of commands sent and the Schwartz Value Survey.
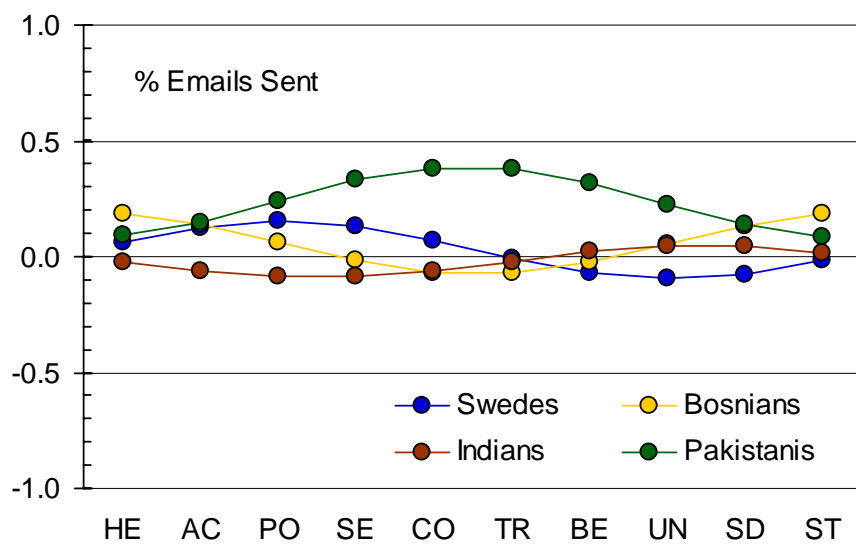


**Fig. 55.** (A) Best-fit sine wave models of the correlations between the percentage of the total number of commands sent and the 10 value types and (B) the corresponding faultline maps.
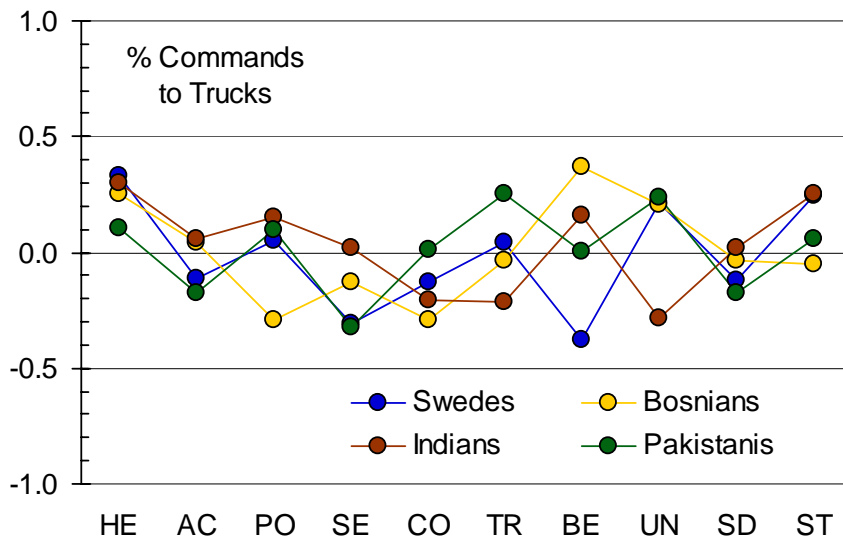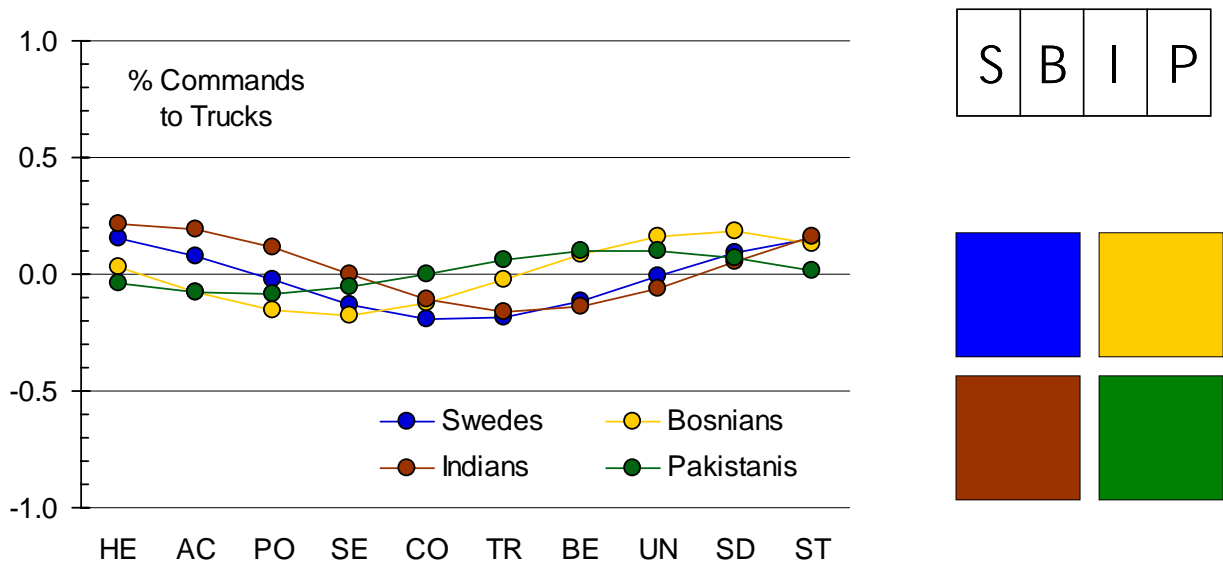
# Discussion

In this final section we analyze the data and distill implications for the SRSA's international operations, Swedish society, the scientific community, and future work. The discussion starts with a review of the findings, that is, of the observed alignments of dimensions of cultural diversity and the associated faultlines. Salient among these findings are the many dimensions along which the behavior and value structures of the Swedish participants differed significantly from those of the Bosnian, Indian, and Pakistani participants. These differences have clear implications for at least two arenas of the SRSA's international activities, training and OSOCC operations.

The training arena stands to benefit from this research in at least three ways. First, diversity training would surely be enhanced if it were to include exercises and classroom sessions covering the dimensions of diversity, the patterns of their alignment, and the associated faultlines. Second, SRSA instructors who are familiar with the faultline concept could use it to predict and explain why some teams fall apart and why others appear to be able to work seamlessly. The faultline concept would provide them with a technical and theoretically-grounded vocabulary for addressing sources of friction in the small teams they train and for making those sources self-evident to their trainees. Dimensions of cultural diversity, their alignment, and their faultlines should all become an integral part of every instructor's diversity curriculum.

Third, SRSA instructors who are familiar with the faultline concept could use it to their advantage when designing training exercises. For example, if diversity itself were the focus of the exercise, instructors could intentionally assemble teams that are likely to contain strong faultlines. The inevitable rifting and its causes would likely be compelling topics for group discussion and beneficial for everyone's self-awareness. In contrast, if team effectiveness were the focus of the exercise, instructors could assemble teams composed of individuals who are likely to align along the relevant dimensions of diversity. By reducing the likelihood of faultline activation, the instructors would improve the odds that the team would be able to focus on the task at hand.

OSOCC (and all multinational) operations would likely benefit if SRSA personnel were to arrive on the scene armed with knowledge of the dimensions along which they are likely to differ from their colleagues. People who are aware of the potential for faultline formation and are on the lookout for it are better equipped to forestall or reverse the negative consequences of rifting. The knowledge that is required is self-knowledge, not an extensive study of cross-cultural psychology. It is more important to know your own norms and how you are likely to act than to know how colleagues from other cultures are likely to act and believe. People who are aware of their own norms for decision making, collaboration, and communication will have little trouble spotting how others deviate from those

norms. They should also be better prepared to deal with that diversity by bridging the faultlines before they rift in order to forge a strong, effective multinational team.

## Summary of findings

The results discussed here are derived from observations of four specific national groups: Swedes, Bosnians, Indians, and Pakistanis. No claim is made that these results generalize to every individual from these countries. No claim is made that our participants are representative of the full diversity of their cultures. Indeed, our participants are largely drawn from a self-selected pool of university students pursuing advanced degrees. Their literacy and drive are meant to be representative not of their nations at large but of those people who are likely to work in an OSOCC or in other multinational operations and organizations.

We make two claims. The first is that the differences in behavior and values observed in our laboratory are in large part explained by the diverse cultural heritage of our participants. The second is that these differences and the faultlines they define are prototypical of those that can be expected to occur in small teams conducting multinational operations. The focus is less on these particular national groups and more on the generality of the observed dimensions of cultural diversity.

To characterize accurately any one of these four groups would require a substantially larger study using different methods that cast a wider net. Some of the alignments and faultline maps that we present would undoubtedly change given larger samples. Again, any lessons that might be based on this research should emphasize the dimensions along which cultures appear to differ more than the particular faultlines.

In spite of these disclaimers, we feel compelled to discuss the Swedish data as if they were truly representative of SRSA personnel. Our sponsors at SRSA need to know how Swedes are likely to differ from their OSOCC colleagues from other countries. Our characterization of Swedes will undoubtedly change once we find the opportunity to gather additional data. We offer this characterization as an informed attempt at conveying the type of self-knowledge that OSOCC personnel would likely need to bridge group faultlines before they rift and to forge strong, effective multinational teams.

## Cultural influences on decision making

We looked for three broad classes of cultural influence on decision making - communication, task allocation, and values - and found diversity in all three. There are undoubtedly other classes of cultural influence that shape dimensions of diversity. These are the three that we expected (1) to be central to small team collaboration, (2) to be likely to reflect differences in cultural norms for decision making, and (3) to emerge during the initial stages of team formation. These

predictions were confirmed. The topics we discuss here emerged spontaneously during C3Fire play. As such, they constitute a set of dimensions of cultural diversity that all members of small multinational teams can expect to encounter from time to time during the initial stages of team formation. Table 15 uses the symbolic faultline map to organize the set of dimensions into seven rows corresponding to seven clusters of faultlines. The discussion proceeds row by row.

**Table 15.** Summary of the observed alignments of dimensions of cultural diversity.

| Row | Faultline representation | Dimensions | Figure |
|---|---|---|---|
| 1 | S B I P | Participants' age | 8 |
|   |   | Experience of computer use | 11 |
|   |   | Frequency of communication (emails sent per minute) | 17 |
|   |   | Distribution of emails across the 20 minutes of the session | 18 |
|   |   | The relative frequency of emails concerning task allocation across the eight sessions | 20 |
| 2 | S B I P | The relative frequency of implicit and explicit requests in email | 24 |
|   |   | Tolerance for uncertainty | 41 |
|   |   | Percent emails sent | 53 |
|   |   | Percent commands issued | 55 |
| 3 | S  BIP | Task allocation strategy adopted during C3Fire play | 16 |
|   |   | Time of last email discussing task allocation across sessions | 22 |
|   |   | The relative frequency of communication about fire tactics | 25 |
|   |   | The relative frequency of emails concerning fire tactics across sessions | 26 |
|   |   | The ratio of positive and negative feedback in email | 27 |
|   |   | Average and standard errors of the ratings given the 10 value types | 29 |
| 4 | B  SIP <br><br> I  SBP <br><br> P  SBI | Emotional stability | 51 |

| Row | Faultline representation | Dimensions | Figure |
|---|---|---|---|
| 5 | SB \| IP | Participants' years of education | 9 |
| | | The relative frequency of emails concerning feedback (pos. & neg.) | 28 |
| | SB \| I \| P | The relative frequency of requests (both explicit and implicit) in email communication | 23 |
| | IP \| S \| B | Participants' employment | 10 |
| | | Time horizon | 39 |
| | | Conscientiousness | 45 |
| 6 | SI \| BP | The relative frequency of emails concerning task allocation | 19 |
| | SI \| B \| P | Conflict avoidance | 37 |
| | | Extraversion | 47 |
| | BP \| S \| I | Established goals during C3Fire play | 14 |
| | | Time interval when the last email discussing task allocation was sent | 21 |
| | | Value type rankings | 32 |
| 7 | SP \| BI | | |
| | SP \| B \| I | | |
| | BI \| S \| P | Intellect/Openness | 43 |
| | | Agreeableness | 49 |

### Complete alignment

The map in the top row contains no vertical lines - all national groups aligned along these five dimensions; there is no apparent faultline. The first two dimensions, age and experience with computers, characterize our participants and are included only to reinforce one of our primary methodological concerns: homogeneity of participants along all demographic variables other than national identity.

The four national groups aligned along the three remaining dimensions in the first row of Table 15. These dimensions cover the distribution and frequency of the total communication within a team. There appears to be no significant difference in when and how often people from these different cultures attempted to communicate with team members. The teams communicated about different things but the total amount and distribution of communication did not differ. This finding contravenes the folk wisdom that Swedes tend to be impassively mute and that people from Mediterranean cultures tend to be excessively voluble. Our data suggest that OSOCC personnel need not worry about one group attempting to dominate or overload communication channels. This finding could readily be tested by conducting observations of multinational training exercises or of actual operations.

### Faultlines everywhere

The four national groups were as different as they could be along the four dimensions listed in the second row in Table 15. The potential for diversity was maximized along these dimensions. Lau and Murnighan (1998) suggest that faultlines should be weak in teams characterized by high levels of diversity. These dimensions afford the opportunity to test that hypothesis. The prediction would be that the multitude of differences we observed in, for instance, tolerance for uncertainty would be too weak to cause the team to split into subgroups. Testing this hypothesis would require the careful formation of teams composed of individuals from the four national groups and the presentation of a task that emphasizes, e.g., tolerance for uncertainty. Such a test could be conducted either in the C3Fire laboratory or by observation of multinational training sessions.

### Faultlines that isolate the Swedes

The third row of Table 15 highlights the dimensions for which there is one potentially strong faultline that isolates the Swedes from the other three national groups. These are the dimensions along which our teams of Swedes showed themselves to be unique. The first dimension - task allocation strategy - is perhaps the most telling result of all. Every one of our Swedish groups (1) quickly settled upon a partitioned structure for task allocation and (2) adhered to it throughout

every session and for all eight sessions. None of the other national groups were able to establish and maintain a partitioned structure.

To understand the significance of this faultline, it helps to analyze what a team must do to sustain a partitioned task structure. First, the team must be comfortable with the process of allocating tasks and roles amongst themselves. Second, all members of the team must be willing to accept whatever role they are assigned with a minimum of complaint. Third, they must all be willing and able to stick to their roles. Fourth, they cannot attempt to perform a teammate's role. These requirements are fairly strict. If any member of the team is unable to adhere to any one of these requirements, the partitioned structure will lose its integrity and quickly degenerate to the open structure.

Only the Swedes were able to meet these requirements. We argue that this finding may reflect the Swedish tradition of decision making by consensus. Swedish decision making is renown for its drive for consensus (Daun, 1998) and for how exasperatingly slow the process can be. In spite of the tradition of languor, our Swedish C3Fire teams were able to reach consensus on the allocation of tasks quickly. The speed with which they reached consensus is reflected in the second dimension along which the Swedes were unique, the time of the last email message concerning task allocation. The Swede's drive for consensus about task allocation eliminated the need to continue to talk about it and gave them the luxury of focusing their communication on tactics for fighting the fire.

With few exceptions, all members of every Swedish team accepted their roles and performed the tasks they were allocated. They did not stray into other tasks. They did not write disparaging emails. This convergence of observations suggests that adhering to the team's decision without complaint may be an under-reported but integral part of Swedish decision making by consensus.

By this interpretation, the Swedish tradition of decision making by consensus had a profound impact on how the teams approached the C3Fire sessions. A hypothesis to be tested in follow-up research is that SRSA personnel will approach OSOCC team formation with similar norms for decision making: they may not necessarily seek to establish consensus, but they might (1) seek to allocate tasks and roles and (2) expect everyone to perform (only) the tasks they were allocated. The obverse hypothesis is equally compelling and open to empirical testing. Swedish members of small multinational teams may become quite rattled if team members stray from their assigned roles. The hypothesis here is that this potentially strong faultline might activate if a team containing a Swede fails to adhere to the norm of consensus and to all its behavioral consequences. Both these hypotheses are open to testing by observation of Swedish members of multinational OSOCC teams.

It is also informative to survey the terrain on the other side of the faultline. The Bosnians, Indians and Pakistanis all found it difficult to establish and maintain a partitioned structure. However, the preponderance of negative feedback in their email communication provides abundant indirect evidence that they wanted to

establish and maintain a partitioned structure but were, for some reason, unable to. Accordingly, the faultline associated with task allocation may be more associated with either the willingness or ability to adhere to a partitioned structure than with the desire or effort expended to create one.

The final dimension in the third row of Table 15 is unrelated to the faultline associated with task allocation and decision making by consensus. The Swedes used the ratings scale for the Schwartz Value Survey differently than the other three national groups. Their responses were consistently less positive. The American author of this report is unwilling to commit to paper any speculations regarding this reflection of the rather dour side of the Swedish disposition. Whatever its cause, the implication is clear for future research that uses self-report instruments and Swedish participants. The consistently negative bias must be factored out before comparative analyses are made.

#### Faultlines that isolate the other national groups

The fourth row of Table 15 contains three faultline maps and only one entry, the item for emotional stability. The contrast with the number of items in row 3 is striking and remarkable.

The Bosnian data suggest that well-adjusted Bosnians value working for the good of others while poorly-adjusted Bosnians seek security. This is an odd and unexpected story that may or may not generalize to other refugee groups. The finding must be replicated with a much larger sample before publication or other dissemination. The correlation between emotional stability and value structure is clearly worthy of more focused research by Migrationsverket or some other agency concerned with the growing population of refugees in Sweden.

#### The faultlines between the Europeans and the 'Subcontinentals'

The fifth row of Table 15 contains three faultline maps. Each map contains a faultline that separates the two European groups from the two groups from the Indian subcontinent. The first contains only that one faultline. The other two contain a second faultline that splits either the two European groups or the two subcontinental groups.

The four groups aligned to form one geographically-relevant faultline along two dimensions. The first, the participants years of education, is a byproduct of our process for selecting participants and has no generality beyond this study. Because the difference in educational experience is minimal, we do not expect that it contaminates the demographic uniformity of the four national groups.

The second dimension - frequency of feedback - may appear inconsequential but in fact creates a faultline that could easily be activated and that might tear a small team apart. Members of teams from the two European groups sent each other feedback (positive and negative combined) much more frequently than did

members of the two groups from the Indian subcontinent. Thus, the Europeans and subcontinentals exhibited profoundly different norms for the appropriateness of feedback.

The faultline formed by these divergent norms for the appropriateness of feedback could be inadvertently activated by misunderstandings on either side. On the one hand, team members like our Swedes and Bosnians who are comfortable giving feedback might become upset if they receive none, especially after working hard or well or both. On the other hand, team members like our Indians and Pakistanis who appear to be less comfortable with feedback are likely to feel overwhelmed if they receive what they perceive to be a barrage of feedback.

The danger here is that it would be easy to contravene another culture's norms simply by acting naturally. Accordingly, this is a dimension that needs to be included in any seminar on cultural diversity. SRSA (UN/EU/NATO) personnel and instructors need to know that some cultures are much more averse to feedback than Swedes (Europeans). They also need to know that they should not expect to receive it as often as they might like. Similarly, personnel training for multinational missions need to be forearmed with this knowledge so that they can attempt to work with their teammates to find the middle ground, that is, the amount of feedback that is neither too much for those on one side of the faultline nor too little for those on the other.

A parallel story is appropriate for the next dimension of cultural diversity - the frequency of explicit requests. Here there are two faultlines, one that separates the Europeans from the subcontinentals and one that splits the Indians and Pakistanis. The Indians sent relatively few explicit requests to their teammates. The Europeans sent quite a lot. The Pakistanis were more like the Europeans but significantly different from them. Here again the groups exhibited profoundly different norms for the appropriateness of a particular kind of communication. The faultlines formed by this difference in norms could be inadvertently ruptured by misunderstandings. The danger once again is that it would be easy to contravene another culture's norms simply by acting naturally. The different norms for the appropriateness of asking for help is another dimension that needs to be included in any cultural diversity training.

The third faultline map in row 5 of Table 15 contains two faultlines, one that separates the two groups from the Indian subcontinent from the Europeans and one that divides the Swedes and Bosnians. There are three dimensions of diversity that align in this pattern. The first concerns our participants' employment. This is the one dimension of demographic diversity that we were unable to control to our satisfaction. Many of the Bosnian participants and some of the Swedes worked for living. All of the Indians and Pakistanis were students. It is not possible to ascertain the impact this dimension of demographic diversity had on our data. The similarity in their ages and computer (chat) experience may bridge these faultlines.

The dimension of time horizon refers to the strength of correlation between the 10 value types and responses to questions about the value of planning and the sense of control. These correlations were strong (but different) for the Swedes and Bosnians and weak for both the Indians and Pakistanis. The alignments shown in the faultline map reflect the statistical equivalence of the null correlations in the Indian and Pakistani data and the significance of the different models for the Swedes and Bosnians.

It is the null result for the groups from the subcontinent that deserves attention. Our groups of Indians and Pakistanis appear to have shared either a disdain for long-term planning or the believe that they do not have control over their lives or both. We interpret this result to be the hallmark of a fatalism that may be endemic to the subcontinent. The speculation that this fatalism is inspired by Hindu tradition is open to scrutiny and re-evaluation.

Regardless of its source, a sense of fatalism is a dimension of cultural diversity that has the potential to open wide rifts in small teams. The rift might form immediately, at the team's first meeting. All it would take would be for some members of the team to want to direct the team's efforts to planning ahead and for others to fail to see the point. Accordingly, the potential for severe friction between subgroups with differing norms for the utility of long-term planning needs to be explicitly addressed in any seminar on diversity training. OSOCC personnel from European (and other) cultures that value long-term planning need to be made aware that people from other cultures may have a radically different norm for this element of collaborative decision making.

This finding suggests the hypothesis that diversity along the dimension of time horizon will quickly split a small team assigned a planning task. To test this hypothesis, it would be informative to create small teams composed of a mix of individuals from fatalistic cultures and from European cultures. The prediction is that the planners will rapidly become frustrated by the fatalists and retreat into a subgroup. Further, the fatalists will feel alienated by both the futility of planning and by the persistence of the planners. This hypothesis could readily be tested either in the C3Fire laboratory or by observations of multinational training exercises.

The dimension of conscientiousness refers to the strength of correlation between the 10 value types and responses to questions that assesses the importance of punctuality and of following through on commitments. These correlations were weak in the Indian and Pakistani data. This null result is statistically equivalent to that for time horizon. If the data for conscientiousness were less noisy, it would be appropriate to point to a sense of fatalism as the likely source for the observed diversity. The two groups from the subcontinent appear to share a disdain for punctuality as well as for planning. Because planning and punctuality appear to be two sides of the same coin, measures of punctuality and conscientiousness could be used as dependent variables when testing the hypothesis about time horizon.

Faultlines that isolate the dominantly Islamic cultures

The sixth row of Table 15 contains three faultline maps and six dimensions of cultural diversity. Each map contains a faultline that separates the Bosnians and Pakistanis from the Swedes and the Indians. The former groups both come from predominantly Islamic nations. The latter groups are from nations without this religious heritage. The alignment of the two Islamic groups along the six dimensions may or may not be causally related to their shared religion. Because our ignorance of Islamic tradition precludes interpretation that might draw upon the Quran or other Islamic texts, none will be offered. We did, however, expect to observe alignments along religious lines. It would be odd if there were none.

 The first faultline map contains one faultline that separates the Islamic from the non-Islamic national groups. Communication about task allocation consumes a smaller percentage of Bosnian and Pakistani email than of the Swedish and Indian email. The alignment suggests there may be a linkage between religion and the frequency of communication about task allocation. What that linkage might be is unclear.

The second faultline map in row 6 of Table 15 contains a second faultline that splits the two dominantly Islamic groups. The Bosnian and Pakistani groups differed from the non-Islamic groups and from each other. The Swedish and Indian data support virtually identical models for the pattern of correlations between the 10 value types and responses to the questionnaire on conflict avoidance and to items in the NEO-FFI related to extraversion. These results indicate that Swedes and the Indians align along the dimensions of conflict avoidance and extraversion. In both cultures, people who value tradition seek to avoid conflict and people who are self-confident are open to change.

Swedes and Indians do not share a common heritage but they do think alike about the value of avoiding conflict and the utility of self-confidence. These findings can be used by SRSA instructors as exemplars of diverse cultures that have essentially identical values (along selected dimensions). The pedagogic message is clear: people who come from opposite ends of the world are often very much alike. This message should be the first message in any seminar on the impact of cultural diversity on multinational operations.

The third faultline map in row 6 of Table 15 contains two faultlines. The Islamic groups align on one side of the major faultline. A secondary faultline splits the Swedes and Indians. The first of the three dimensions captured by this map concerns the diversity in the goals the groups pursued during the C3Fire sessions. The Swedes attacked the fire directly. The Indians protected the dwellings. The Bosnians and the Pakistanis tried to contain the fire to areas without dwellings or fast-burning trees. It would take an anthropologist to make sense of these findings. We are ill-prepared to speculate about why the Swedes attacked the fire or why the Indians protected the houses or why the two Islamic groups sought to contain the fire. What we know is what they did and that they did it relatively

consistently. This diversity in goal-setting is worthy of continued study by a research team with the appropriate knowledge and credentials.

We do not need to know the causes of this diversity to craft its message for the SRSA. Once again, we have an exemplary case study for discussion in the classroom. These four national groups were given the same task and chose to address three different goals. Their C3Fire play was radically different because they pursued different goals. There is every reason to expect that this finding will generalize whenever different national groups are given an ill-structured problem like that posed by the C3Fire sessions.

Instructors of multinational teams need to stress that the team must set explicit goals and get everyone on the team to agree on those goals prior to committing to a course of action. Failure to do so increases the odds that different groups will make different assumptions about what the goals should be and then proceed to take divergent courses of action. Collaboration becomes virtually impossible when subgroups pursue uncoordinated goals.

The fifth dimension in row 6 of Table 15 concerns the time during a C3Fire session when the four groups sent their last email about task allocation. Statistically, the Swedes and Indians are different than each other and from the two Islamic groups. Pragmatically, the Indians are similar to the Bosnians and the Pakistanis. As with all dimensions related to task allocation, it is the Swedes who are unique. Only the Swedes were able to converge quickly on a distribution of roles and then stick to it. The profound difference in the time of the last task allocation message is a byproduct of this manifestation of (what appears to be) the uniquely Swedish tradition of decision making by consensus.

The final dimension in row 6 is likely to be strongly influenced by religious heritage. The Bosnians and the Pakistanis ranked the 10 value types is essentially the same order. Both groups emphasized values associated with a strongly collectivist orientation. They, like their religion, appear to value the good of the group more than the good of the individual.

Our sample of Indian graduate students differed subtly but significantly from the two Islamic groups. They too exhibited a strong collectivist orientation but also gave a high rank to achievement, a fiercely individualistic value type. In contrast, our sample of Swedish students reveals an individualistic focus that entails doing right by the world and themselves. Once again, it is the Swedes who were radically different from the other three groups. The Indians differed from the Bosnians and the Pakistanis much less than they differed from the Swedes.

The cross-cultural research community has written volumes of often contentious debate contrasting collectivism and individualism and their impact on societies (e.g., Hofstede, 1980; Kanagawa, et al., 2001; Triandis, 1996). The distinction is complex but real. It is not our place or our mission to cover that ground. It should suffice for us to say that our data are consistent with placing Swedes near

the individualist end of the continuum and placing Islamic nations near the collectivist end.

### Unexpected alignments

When we constructed the template for the spatial faultline maps, Figure 6, we took into consideration our expectations for alignments along geographic and religious lines. We did not expect to uncover many alignments between pairs of national groups that have no clear common ground. Specifically, we did not expect to see a faultline with the Bosnians and Indians on one side and the Swedes and the Pakistanis on the other. But we did and the alignments are strong for the two dimensions shown in the seventh and bottom row of Table 15.

The Bosnian and Indian data support virtually identical models for the pattern of correlations between the 10 value types and responses to items in the NEO-FFI related to intellect and agreeableness. In both cultures, intellectual curiosity is rewarded by valuing the common good and people who value tradition are seen as agreeable. Bosnians and Indians do not share a common heritage but they do think alike about the best use of a sharp mind and the values that make someone agreeable. It is fitting to conclude this survey of results with the message that people who come from markedly different parts of the world are often very much alike.

## Applying the group faultlines concept to international emergency management training

This research has much to contribute to the domain of emergency management training. SRSA instructors have extensive experience and have developed sound working knowledge about many aspects of small team formation. They know about the processes that are typically active during the initial stages of team formation and about the potentially negative impact of dimensions of demographic diversity (e.g., as nationality, profession, gender, age). However, we suspect that their knowledge of dimensions of cultural diversity is less extensive and that they would welcome a vocabulary for describing, explaining, and leading discussions about them. The results presented in this report outline an initial course that SRSA instructors and personnel need to know and communicate to OSOCC trainees about dimensions of cultural diversity. The faultline concept provides a vocabulary for understanding the potential of impact of cultural diversity on small teams and for talking about it.

We see three salient applications of the group faultline concept that should be beneficial for the SRSA (UN, EU, NATO/PfP, etc.) multinational training courses. The first is the implementation of our recommendations concerning specific dimensions of cultural diversity. The second concerns the design of small teams prior to a course or exercise. The third concerns interventions that might be beneficial to make during a course or exercise.

Items for the diversity curriculum

The SRSA's diversity training would clearly be enhanced if it were to include exercises and classroom discussions covering some or all of the 30 dimensions of demographic and cultural diversity identified in this study.  The introductory session might cover the concept of diversity itself and the research (by others) that outlines its benefits and perils to small team formation.  A second introductory topic might be the idea that these dimensions can align themselves within a team and, in the process, become a source of friction and generate faultlines.  The second session might focus on the trainees' responses to our questionnaire battery and what they reveal about their cultures' norms for decision making, communication, and collaboration.  This would involve covering specific dimensions, how they align, and their implications for efficient and effective teamwork.  In-class exercises could be designed to activate faultlines and, then, to initiate conversations on how to bridge them in an after action review.

Two key points to be covered in any diversity training are (a) that people who come from different parts of the world often think and act alike (along some but not all dimensions) and (b) that different national groups can be given the same task and elect to pursue radically different goals.  Points to be covered whenever Swedes are among the trainees are the behavioral by-products of the Swedish tradition of decision making by consensus (e.g., strict partitioning of roles and tasks and unwavering adherence to those roles).  Items that will likely be useful to people from many cultures include the diversity in norms for the utility of long-term planning and for the frequency of feedback and of making requests.

The purpose of this training would be to instill in all participants the self-knowledge that they will need to deal with cultural diversity when they encounter it in the field and to bridge any faultline before it rifts.

Team design prior to a course / exercise

The ability to build upon knowledge of the dimensions, either demographic or cultural, along which faultlines might rift could be a powerful pedagogical tool if used strategically.  In multinational emergency management training, teams are often designed to be as diverse as possible (Becker, personal communication).  This diversity creates tension and increases the potential for conflict.  The underlying assumption appears to be that letting the trainees experience tension during training prepares them for handling diversity before they go out into the field.  If, however, it is important that the trainees learn specific procedures and facts (e.g. rules and legislation), conflict might be detrimental to learning.  Little learning occurs when the team has to focus its effort on getting along.

Instructors who know how dimensions of cultural diversity can align and produce faultlines can apply this knowledge when assigning personnel to a multinational team and to its tasks.  If the team's main task is to learn how to resolve conflicts,

the team could be composed of individuals who form two homogeneous subgroups (e.g. a team with low diversity and characteristics that align along one very strong faultline). Examples are shown in rows 3 and 4 of Table 15 and in the first faultline map in rows 5, 6, and 7. In contrast, if cohesion is desirable, the team could be designed to create an overlap of demographic or cultural characteristics like that shown in row 2 of Table 15 (e.g. a team with high diversity with many weak faultlines). If the application forms for OSOCC training courses contained questionnaires like those used in our study, SRSA instructors would be better equipped to assemble teams for training.

In this report we have emphasized how several dimensions of cultural diversity can align in often unexpected ways. For example, Bosnians and Indians do not share a common heritage but do think alike about what makes someone agreeable. Knowledge of these alignments and their associated faultlines can be used to guide the assignment of individuals to OSOCC teams in order to construct subgroups that can work together to approach the task at hand.

Because we have yet to conduct research with teams composed of individuals from a mix of cultures, we offer hypotheses about how faultlines might form in a small multinational team composed of individuals from the four national groups we have studied. We illustrate these hypotheses with the four teams shown in Table 16 (modified from Table 5). These teams are meant to serve as examples of how the faultline concept can guide a instructor's thinking when designing a multinational team. The examples rely on dimensions of demographic, rather than cultural, diversity to simplify the illustration. The discussion here applies equally well to any and all of the 30 dimensions enumerated in Table 15.

**Table 16:** Example of team design according to the faultline model.

| Team 1 | Fireman Man 29 Swede | Fireman Man 35 Swede | Fireman Man 32 Swede | Fireman Man 31 Swede | Fireman Man 37 Swede | Minimal diversity. No faultline. |
|---|---|---|---|---|---|---|
| Team 2 | Physician Man 35 Bosnian | Physician Man 30 Bosnian | Fireman Man 29 Bosnian | Fireman Man 32 Swede | Fireman Man 35 Swede | Low diversity. Two faultlines with moderate strength. |
| Team 3 | Fire chief Man 50 Swede | Fire chief Man 55 Swede | Press officer Woman 31 Pakistani | Press officer Woman 31 Pakistani | Press officer Woman 35 Pakistani | Low diversity. One very strong faultline. |
| Team 4 | Fireman Man 31 Indian | Fireman Man 33 Swede | Physician Woman 55 Swede | Physician Woman 52 Bosnian | Physician Man 50 Bosnian | High diversity. Many weak, imbricate faultlines. |

Team 1 is a team composed of Swedish firemen. All are young Swedish men; there is minimal diversity and no faultline. Regarding demographic characteristics, there are none that could potentially split the group. Since they are all from the same culture, culturally-driven differences in behavior are also not likely. If this group were to split into subgroups, the rift would probably be due to personal interests, ideology, or personality traits. The downside of any culturally homogeneous team is that can suffer from uniformity in ideas and, with time, group think (Janis and Mann, 1977).

The second team is an example of how a multicultural team could be designed for success. It is also an example of how one individual can belong to several subgroups. The one Bosnian fireman can interact with his countrymen and he can also relate to the Swedes since they, too, are firemen. One can imagine how the one Bosnian fireman could become a conduit for information flow between the Bosnian physicians and the Swedish firemen. Even though there are only two nationalities in this group, we hypothesize that the members in this group are more likely to have functioning communication than the members of Team 3. Since there is a full alignment along all four attributes in group 3, the group has one very strong faultline. It is likely that this group will split into two subgroups. If it is desirable for trainees to practice conflict management, this would be a good design.

Multinational emergency management teams are often more diverse than Team 2. Team 4 illustrates a more diverse team. There are several very weak faultlines in Team 4: there are two professions, two sexes, two generations, and three nationalities. The team could split along any one of these potential rifts. Nevertheless, everyone has something in common with everyone else making it relatively unlikely that any one faultline would activate. For instance, the team could split based on gender, but then the two female physicians would still have the same profession and age as the one Bosnian man. Although the Indian man's nationality is unique, he and the Swedish man share a profession and are the same age. The multitude and weakness of faultlines suggests that, if subgroups were to form, the boundaries between them would likely be quite fuzzy. This is probably a very good type of team design if little conflict is desired. It is important to note how the alignments and faultlines would change, if the Indian or Swedish fireman were to leave or be left out of the team.

### Manipulation of teams during the exercise

We believe that knowledge about alignments of dimensions of diversity and their associated faultlines could help instructors to know when (not) to intervene in group conflicts. Dyck and Starke (1999) suggested that new members in a team are likely to redefine the faultlines in a group. The managers of emergency management training exercises need to be attentive to the participants' interactions and conflicts that could be signs of impending subgroup formation. Subgroups are not necessarily a problem for the team as long as they continue to communicate and cooperate to achieve a common goal. If, however, there are conflicts between

subgroups that make cooperation in the team as a whole difficult, the trainees might be exposed to a learning situation in which they learn nothing more than conflict resolution.

We suspect also that instructors could inadvertently (or intentionally) predispose a team to form conflicting subgroups. Several dimensions of cultural diversity, e.g., expectations concerning feedback, appear to be particularly vulnerable to inadvertent manipulation.

A technique to resolve malfunctioning interactions within a team is to force the team to reassign the tasks within the team. During an exercise observed by one of the authors, an instructor forced his team to reassign tasks every evening at the end of the day's training. This reorganization made the team members more interdependent and probably made it more difficult for the team to split into subgroups. In addition, each individual learned to handle several roles. It would be valuable to study whether recurrent reorganization during training is indeed an efficient technique for increasing team cohesion and effectiveness and for defusing potential conflicts and rifts.

In summary, we are convinced that the group faultline concept has the potential to become a influential pedagogical tool and that its potential could be realized by continuing this line of empirical research, by interviewing people returning from international emergency management training and operations, and by conducting observations of multinational training sessions.

## Contributions to Swedish society

The implications of our work extend beyond the OSOCC and SRSA training to domestic emergency management. It is an unfortunate fact that many immigrants to Sweden are quite isolated from mainstream Swedish society. In large cities such as Stockholm, Malmö and Göteborg, large areas have emerged where the vast majority of inhabitants are first and second generation immigrants. These areas are characterized by relatively high unemployment and isolation from the rest of the Swedish society. An unfortunate byproduct of this isolation is that it can serve as an incubator of faultlines. Since the inhabitants in these areas lead their lives quite independently from the rest of the Swedish society, their expectations for entire classes of behavior may differ remarkably from the expectations of the Swedish people in general. In addition, many inhabitants in these areas have poor Swedish language skills and, as a result, do not receive or attend to public broadcasts of critical information like those issued during emergencies (Hagström & Sundelius, 2003). Support for this claim comes from the fire in a discotheque in Göteborg in 1998 in which many young people died. The fire and the following rescue operation was an eye-opener for the Swedish emergency management system. Many of the victims of the fire were immigrants or second generation immigrants. The rescue operation became very problematic due to language difficulties and

cultural differences in expectations for the interaction between rescue personnel and the people in the discotheque (Hagström & Sundelius, 2003).

To prevent clashes between emergency management personnel and civilians with culturally diverse backgrounds, lectures on culturally-driven differences in behavior and norms for decision making should be given to prepare emergency personnel for multicultural encounters. Multicultural encounters are no longer only an issue of international cooperation, they happen every day of every year within our own boarders. Emergency management personnel need to stand fully prepared.

## Contributions to the scientific community

This study demonstrates that microworld simulations can be a productive tool for studying collaborative behavior in small teams and the group dynamics that are active during small team formation. Further, the data captured by the microworld support comparison of team and individual behavior across national and cultural groups.

The initial and critical challenge we faced was to find an appropriate method to capture human behavior in a dynamic and complex work situation like an OSOCC. Our approach was to use the C3Fire microworld (Granlund, 2003) to simulate an emergency management task and to conduct dynamic laboratory experiments with culturally homogeneous groups of individuals from four different countries. We are not the first to conduct cross-cultural studies using a microworld but we are the first to study the behavior of small teams. Strohschneider and Güss (1999) used the Moro microworld to study decision making across cultures, but their unit of data collection and analysis was the individual and not teams. At Linköping university and Försvarshögskolan, microworld studies have been used frequently to study various features of collaboration (e.g. Brehmer & Dörner, 1993; Granlund, 2002; Johansson et al., 2003; Svenmarck, 1998; Woltjer, 2005), but none of these studies have investigated collaboration across cultural groups. Thus, to our knowledge, this study is the first to use a microworld to study collaborative behavior across cultures.

An advantageous feature of C3Fire is that its design can be easily altered to fit the research question at hand. Based on the features of the work in an OSOCC, C3Fire and the experiment as a whole was designed to elicit and capture spontaneous but collaborative emergency-services decision making in response to a simulated emergency, and to emulate the ad-hoc nature of team formation. By using an experimental approach, a strict experimental procedure, and a matched group sample, we have been sensitive to confounding factors in the environment. This design has made it possible to generate data that reveal similarities and differences in roles and responsibilities in distributed collaborative decision making, goal-setting, communication, and value structure.

This study has merged theory from cross-cultural psychology (e.g. Schwartz, 1992, 1994; Smith et al., 2006; Triandis, 1996) with literature on group faultlines (e.g. Lau

& Murnighan, 1998, 2005; Thatcher et al., 2003). When we publish our results, this merger may influence progress in both fields. The faultline literature, which derives from the management literature and is somewhat applied in its orientation, has focused on several demographic characteristics simultaneously. In contrast to the faultline literature, the literature produced by the cross-cultural psychology community has relatively little applied emphasis. There the emphasis is on building theoretical frameworks for understanding differences and universals across cultures and a range of topics. We can discern little effort by the community of cross-cultural psychologists to conduct applied research that could be used in practice. We believe that the faultline concept has the potential to take cross-cultural research into the applied domain. Moreover, the faultline concept could made stronger by taking cross-cultural theories into account. By combining these two fields of research, we have made our findings relevant to people in multinational organizations.

## Hypotheses and future work

In the discussion of findings we outlined four specific hypotheses that lend themselves to testing by some combination of (a) experimentation in the C3Fire laboratory, (b) by observation of multinational teams in the field and during training exercises, and (c) interviews with and retrospective reports from personnel returning from OSOCC missions. We plan to send the SRSA a proposal for funding to continue the line of research begun here by testing the following hypotheses:

- The multitude of norms for the tolerance of uncertainty makes this dimension of cultural diversity an unlikely source for the development of faultlines.

- The complete alignment of norms concerning the total amount of task-relevant conversation makes this dimension an unlikely source for the development of faultlines.

- The Swedish tradition of decision making by consensus has multiple and profound behavioral by-products that are all probable sources for the development of faultlines that isolate the Swedes from other national groups.

- Faultline rifting is likely whenever a team is given a planning task and is composed of a mix of individuals from fatalistic cultures and from cultures that value long-term planning.

In addition, we plan to submit to the Humanitarian Operations Department of the SRSA a more detailed proposal for the design and conduct of cultural diversity training. This training will initially be tailored to OSOCC or similar multinational operations but, in time, could be modified and extended for domestic emergency management personnel.

# Final comments

We do not claim that the results from these individuals can be generalized to all individuals in their countries of origin. Rather, we assume that the differences in their behavior can be in part explained by their cultural heritage. The generalizations we make across the four national groups must be seen as pedagogical tools rather than immutable facts. They are presented to help SRSA instructors and personnel interact with people from different cultures. It is important to remember that, in every day interactions, every person must be understood and seen as an individual with individual characteristics rather than a representative of a culture or national group. It is also important to keep in mind that every culture has developed norms for behavior generally and for decision making specifically that correspond to what is important and valuable to its members. One culture is not better or worse than any other. Cultures are just different. And most of the time, they are not even different at all. But when they are different, we need a vocabulary to describe it, discuss it, and train people to recognize it. Our claim is that group faultlines provide a theoretically-ground vocabulary for addressing sources of friction in small teams and for making those sources self-evident. OSOCC personnel who are aware of group faultlines and of their own norms for decision making, collaboration, and communication should be better prepared to deal with diversity in small teams by bridging faultlines before they rift in order to forge strong, effective multinational teams.

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# Appendix 1 – Details about the four national groups

This section discusses the participants in the four national groups and modifications to the experimental procedure designed to accommodate them.

**Swedes**

The 32 Swedish participants were recruited using email invitations sent to students in the Mechanical Engineering and Cognitive Science programs at Linköpings universitet. They reported to the experiment in four groups of eight. The Schwartz Value Survey was sent to the participants via mail in a stamped return envelop. Of 32, 23 replied (72% answer rate). Table SWE summarizes the demographic information about the Swedish participants.

**Table SWE:** Summary demographic characteristics of the 32 Swedish participants.

| | |
|---|---|
| Gender | All male |
| Age | Range 19-37, Mean 24.56, SD 3.53 |
| Urban/Rural upbringing | No information |
| Religion | No information |
| How religious? (1=very religious, 5=not religious at all) | No information |
| Mother tongue | 30 Swedish |
| Other languages | All speak and write English. |
| | 16 are familiar with one additional language (e.g. French or German) |
| | 13 are familiar with two additional languages (e.g. German and French) |
| | 1 is familiar with three additional languages (e.g. Spanish or Finish) |
| | 1 is familiar with four additional languages (e.g. Spanish or Finish) |
| Work/profession | 20 students / 7 employed / 5 part-time students |
| Military experience | 9 yes / 23 no |
| Education level | 12 - 19.5 years, M = 14.4, SD = 1.70 |
| Computer use | 32 yes / 0 no |
| Word processing skills | 30 yes / 2 no |
| Game play | 20 yes ( 2 – 25 hr/wk, M = 9.65, SD = 7.77) / 12 no |
| Chat use | 30 yes / 2 no |

## Bosnians

The Bosnian participants were recruited in Skövde by personnel at Skövde Högskola with Bosnian heritage. All three Bosnian experiments were therefore conducted at Skövde Högskola. The first two groups were made up by eight men each. The third group consisted of six women. Table BOS summarizes the demographic information about the Bosnian participants.

The experiments with the Bosnian groups were conducted during one eight-hour session per group. The demographic questionnaire was altered to fit the participants' background.

**Table BOS:** Summary of the demographic characteristics of the 22 Bosnian participants.

| | |
|---|---|
| Gender | 16 men, 6 women |
| Age | 18 - 49 years,  M = 25.77, SD = 7.30 |
| Urban/Rural upbringing | 7 large city / small cities / 0 rural |
| Age when coming to Sweden | 5 - 38 years,  M = 13.93, SD = 7.65 |
| Years in Sweden | 4 - 15 years,  M = 11.93, SD = 3.06 |
| Religion | 19 Islam / 1 Christian / 2 none |
| How religious? (1=very religious, 5=not religious at all) | M = 3.8, SD = 1.16 |
| Mother tongue | 20 Bosnian, 1 Serbo-Croatian, 1 Serbo-Croatian and Swedish |
| Language spoken at home | 15 Bosnian only, 2 Bosnian and Swedish; 3 Bosnian and German, 1 Serbo-Croatian 1 only; 1 Swedish only |
| Work/profession | 11 students, 10 employed, 1 unemployed |
| Military experience | 1 yes / 21 no |
| Education level | 10-23 years; M = 14.4, SD = 2.86 |
| Computer at work | 19 yes / 3 no |
| Word processing skills | 17 yes / 5 no |
| Game play | 15 yes (2.5 - 40 hr/wk,  M = 14.17, SD = 12.13) / 7 no |
| Chat use | 20 yes / 2 no |

## Indians

Two groups of Indian participants (15 participants) were recruited at Linköping University. Two other groups of Indian students (15 participants) were recruited at Skövde Högskola. Table IND summarizes the demographic information about the Indian participants.

The procedure used during the Swedish experiments was used for the experiments conducted in Linköping. For the two groups participating in Skövde, however, the experiment was conducted during one eight-hour session per group.

All questionnaires were backtranslated into English for the Indian participants. The demographic questionnaire was altered to fit the participants' background.

**Table IND:** Summary demographic characteristics of the 30 Indian participants.

| | |
|---|---|
| Gender | 30 men |
| Age | 22-29 years,  M = 24.72,  SD = 1.92 |
| Urban/Rural upbringing | 17 big city / 7 small city / 6 rural |
| Time spent in Sweden | 1-22 months,  M = 8.37,  SD = 6.63 |
| Religion | 21 Hindu / 5 Islam/ 4 Christian |
| How religious? (1=very religious, 5=not religious at all) | M = 2.38,  SD =1.18 |
| Mother tongue | 4 Urdu / 4 Tamil / 16 Telugu / 4 Malayalam / 1 Marathi /1 Kannada / |
| Language spoken at home | 3 Urdu / 1 Urdu-Hindi/ 4 Tamil / 13 Telugu / 3 Malayalam / 1 Malayalam-English /1 Marathi / 1 Kannada /1 Telugu-Hindi / 2 Telugu-Hindi-English |
| Work/profession | 30 students |
| Military experience | 0 yes / 30 no |
| Education level | 15 – 21 yrs, M = 16.96, SD = 1.52 |
| Computer at work | 30 yes / 0 no |
| Word processing skills | 27 yes / 3 no |
| Game play | 21 yes (5-20 hrs/wk, M = 8.57, SD = 5.51) / 9 no |
| Chat use | 30 yes / 0 no |

## Pakistanis

The Pakistani participants were recruited by a Pakistani Master's student at Linköping University. The experiment was conducted with three groups of eight participants, and one group of six participants. Table PAK summarizes the demographic information about the Pakistani participants.

The experiments with the Pakistani groups were conducted during one eight-hour session per group. The demographic questionnaire was altered to fit the participants' background.

**Table PAK:** Summary Demographic Characteristics of the Pakistani Participants.

| | |
|---|---|
| Gender | 30 men |
| Age | 22-31 years,  M = 25.9,  SD = 2.66 |
| Urban/Rural upbringing | 19 big city /7 small city / 4 rural area |
| Time spent in Sweden | 1-22 months,  M = 8.37 months,  SD = 6.63 |
| Religion | 30 Islam (24 Sunni / 5 Shia / 1 Other) |
| How religious? (1=very religious, 5=not religious at all) | M = 2.47,  SD = 0.78 |
| Mother tongue | Urdu 18 / Punjabi 7 / Pushto 2 / Balti 1 / Urdu & Punjabi 2 |
| Language spoken at home | Urdu 16 / Punjabi 6 / Pushto 1 / Urdu & Punjabi 6 / Urdu & Pushto 1 |
| Military experience | 2 yes / 28 no |
| Education level | 16-18 yrs, M = 16.48, SD = 0.92 |
| Computer at work | 30 yes / 0 no |
| Word processing skills | 30 yes / 0 no |
| Game play | 20 yes (5-20 hrs/wk, M = 10.30, SD = 7.55) / 10 no |
| Chat use | 29 yes / 1 no |

# Appendix 2:
# Instruktioner till deltagare

Var god läs med i texten medan vi läser dessa instruktioner högt. Om du har några frågor tveka inte att fråga när som helst.

I denna studie kommer du att arbeta med tre andra deltagare. Ni fyra är ett lag. Ett lag består av fyra spelare med namnen A, B, C och D. Ni får organisera ert lag hur ni vill. Vi ber dig att INTE avslöja ditt namn under spelets gång, och att INTE avslöja vilket spelnamn du har, förrän vi säger att det är OK.

## Uppgift

Ditt lag kommer att spela ett datorgenererat spel i vilket en skogsbrand härjar. Som visas i Figur 1 nedan härjar den simulerade branden skogar, skolor och hus, och livet på barn i skolorna och på människor i husen.

Laget kommunicerar via email. Emailsystemet är det enda sättet som du kan kommunicera med dina lagmedlemmar under spelets gång.

Spelet börjar när en brand har setts någonstans på kartan. Ert lags mål är att släcka elden, att rädda så många skolor och hus som möjligt, att rädda så många människor som möjligt, och att rädda så mycket terräng som möjligt.
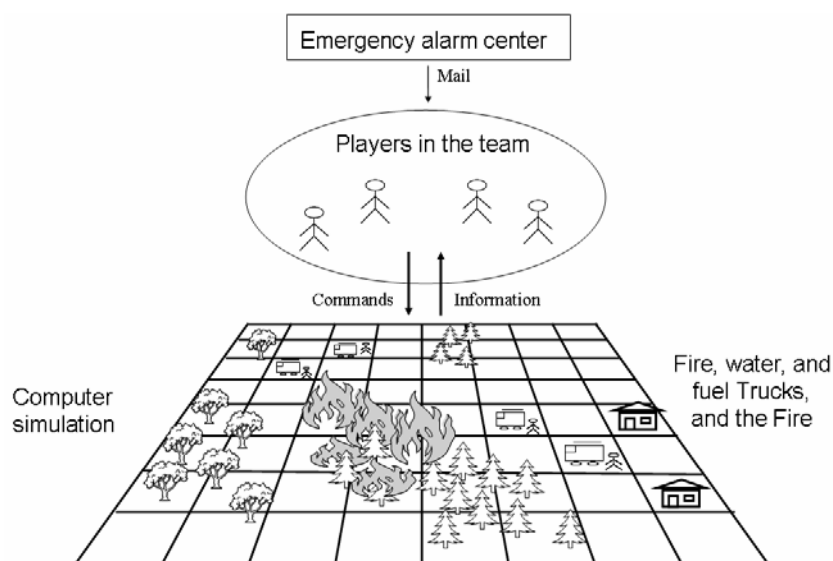


Figur 1. Konceptuellt upplägg av spelet.

### Den simulerade världen

Titta på din skärm. I mitten hittar du en karta över världen. Kartbeskrivningen finns längsmed den högra kanten. Det finns en klocka ovanför kartan. Email-verktyget och panelerna för lastbilsstatus upptar den vänstra sidan av displayen. Varje medlem i ert lag har tillgång till likadana gränssnitt. Allas gränssnitt har tillgång till samma information om den simulerade världen. Detta är de faktiska platserna för bränderna och lastbilarna i den simulerade världen.

### Karta

Kartan är en matris på 40 x 40 celler. Varje cell i matrisen blir unikt identifierad av en bokstav (vilken visar dess kolumn) och ett nummer (vilket visar dess rad). Bränderna kommer så småningom att bränna upp hela den simulerade världen om ert lag inte handlar på ett lämpligt sätt. Utbredningens hastighet och riktningen på brandens utbredning beror på två orsaker: vegetationssorten och aktiviteten hos de brandbilar som du styr över. Branden kommer inte att spridas utanför matrisen.

### Vegetation

Det finns fyra sorters vegetation i världen vilka brinner upp i olika hastigheter.

Normal vegetation.

Tallar (brinner tre gånger snabbare än normal vegetation)

Björkar (brinner hälften så fort som normal vegetation)

Sumpmark brinner inte alls

### Lastbilar

Det finns tre sorters lastbilar: brandbilar, vattenbilar och tankbilar. Ert lag har ansvaret att styra lastbilarna i den simulerade världen. Alla lastbilar kommer att göra exakt det som ert lag befaller dem att göra om de har resurser att göra det. De kommer enbart att göra det som ert lag befaller dem att göra. Om ert lag inte säger till dem att, till exempel, åka och bekämpa branden kommer de inte att åka och bekämpa branden.

På kartan används nummer i olika färger för att identifiera lastbilarna, deras aktuella position och destinationen till vilken de är på väg.

Brandbil – används för att släcka branden. En brandbils aktuella läge visas av lastbilens röda nummer. Brandbilar använder vatten för att bekämpa branden och använder bränsle för att köra omkring. Brandbilar kan få slut på både vatten och bränsle.

En brandbil som kommer till och står still mitt i en brinnande cell kommer automatiskt att släcka branden så fort den kommer fram om den har vatten. Samma sak gäller om en brandbil står still i en icke-brinnande cell som börjar brinna.

Att placera två brandbilar i samma brinnande cell kommer inte att släcka branden snabbare.

Brandbilar kan tankas och vattenpåfyllas av tankbilar och vid tankstationerna.

Vattenlastbilar – används för att transportera vatten till brandbilarna. En vattenlastbils aktuella läge visas av lastbilens blå nummer. Vattenlastbilar kan inte bekämpa bränder men deras vatten kan ta slut. Deras stora vattentankar kan bara fyllas på vid tankstationer för vatten eller av andra vattenlastbilar. Vattenlastbilarna kan få slut på bränsle och kan tankas av tankbilar och vid tankstationer.

Tankbilar – används för att transportera bränsle till andra lastbilar. En tankbils aktuella läge visas av lastbilens gula nummer. Tankbilar kan inte bekämpa bränder.

De använder bränsle för att köra omkring och kan därmed få slut på bränsle. De kan tankas vid tankstationer och av andra tankbilar.

En brandbil som finns i en cell som ligger kant i kant med en cell som har en vattenlastbil eller tankbil (endast i fyra riktningar, N, Ö, S, V) kommer automatiskt att börja fylla på sig själv med vatten. Påfyllning eller tankning kan endast inträffa om vattenlastbilen eller tankbilen inte aktivt servar en annan lastbil. Lastbilar fylls på i den följd som de anländer. Påfyllning och tankning kommer inte att hända när två lastbilar står i samma cell! Tankning kan avbrytas om en av lastbilarna börjar flytta på sig till en annan position.

Du ger order till en lastbil genom att flytta dess röda/blå/gula nummer till den cell som du vill att lastbilen ska åka till. Drag-och-släpp det röda/blå/gula nummer till det ställe som du vill att lastbilen ska åka till och samma nummer kommer att visa sig i vitt i den cell du vill att den ska åka till. Om du vill ändra en lastbils destination (det vita numrets plats på kartan), är det bara att drag-och-släppa det vita numret till den nya destinationen dit du vill att lastbilen ska åka.

Med andra ord, en brandbil, vattenlastbil eller tankbil med ett specifikt nummer kommer att ha sitt nummer visat på kartan två gånger när den har fått tillsägelse att flytta på sig: de färgade (röda/blå/gula) numren, som visar dess aktuella position och samma vita nummer, vilket visar den position som den kör mot.

Om det vita numret försvinner direkt efter att du placerat det i en cell har lastbilen ingen bensin kvar.

Alla fordons hastigheter är oberoende av vegetationen eller byggnader i terrängen.

**Objekt**

Kartan innehåller fyra sorters objekt.

Hus. Viktigt att skydda. Kan innehålla människor att rädda. Hus brinner lika snabbt som normal vegetation.

Skola. Viktig att skydda. Kan innehålla barn att rädda. Skolor brinner lika snabbt som normal vegetation.

Tankstation för vatten. Innehåller en obegränsad mängd vatten. Vattenlastbilarna och brandbilarna kan få vatten här.

och

En brandbil eller vattenlastbil som finns i en cell som ligger kant i kant med en cell som har en vattenpåfyllningsstation (dvs. i endast 4 riktningar, N, Ö, S, V) kommer automatiskt att börja fylla på sig själv med vatten. Påfyllning kommer inte att ske när lastbilen står i samma cell som vattenstationen eller i de diagonala cellerna!

Tankstation för bränsle. Innehåller en obegränsad mängd bränsle. Tankbilarna, vattenlastbilarna och brandbilarna kan få bränsle här.

En brandbil eller tankbil som finns i en cell som ligger kant i kant med en cell som har en tankstation (dvs. i endast 4 riktningar, N, Ö, S, V) kommer automatiskt att börja tanka sig själv med bränsle. Tankning kommer inte att ske när lastbilen står i samma cell som vattenstationen eller i de diagonala cellerna!

### Brand

Varje cell i den geografiska matrisen kan vara i ett av fyra tillstånd: normal, brinnande, släckt, eller utbränd.

| | |
|---|---|
| <span style="background:#d4f5c4">■</span> | Normal |
| <span style="background:red">■</span> | Brinnande |
| <span style="background:#804000">■</span> | Släckt brand |
| <span style="background:black">■</span> | Utbränd brand |

En brand i en ruta kan spridas till alla 8 rutor runt omkring. En normal cell kan fatta eld av en bredvidliggande brinnande cell. Sannolikheten att normal cell kommer att fatta eld ökar med antal bredvidliggande celler som brinner och hur länge de brunnit. Släckta och utbrända celler kan inte börja brinna igen.

<p align="center">***</p>

### Informationspanel för lastbilar

På informationspanelen för lastbilar kan du se statusen för alla lastbilar i världen. Du kan se många sorters information:

- o ID: lastbilssort och nummer: F betyder Brandbil (fire truck), W står för Vattenlastbil (water truck), G står för tank (motorbränsle) bil (gas truck). Numret är det nummer som lastbilen har på kartan. Så, F1 betyder Brandbil med nummer 1, W8 betyder Vattenlastbil med nummer 8, etc.
- o Pos: lastbilens aktuella position, en koordinat på kartan.
- o GoTo: destinationen mot vilken lastbilen åker, en koordinat på kartan.
- o Activity: lastbilens aktuella aktivitet.
- o Water: lastbilens aktuella vattennivå. (observera: tankbilar, t.ex. M10, fraktar inget vatten.)
- o Fuel: lastbilens aktuella bränslenivå.

Om du klickar på en rad med lastbilsinformation på panelen för lastbilsstatus kommer du att få detaljerad information om den lastbilen på panelen precis nedanför. På denna panel för lastbilsegenskaper kan du se information om den hastighet i vilken lastbilen arbetar inklusive tid för förflyttning, tankstorlek och påfyllningstid.

### Email

Med email-verktyget kan du läsa och skicka information till en eller flera av dina lagmedlemmar. Att skicka ett meddelande via email är det enda sättet du kan dela information med dina lagmedlemmar.

E-mailsystemet har två delar. I det övre fönstret kan meddelandena tas emot och läsas. I det undre fönstret kan du skriva och skicka meddelanden.

För att skriva ett e-mail måste du skriva i det undre fönstret. Om du vill skicka meddelandet till en specifik person, klicka då på knappen som motsvarar dess spelarnamn. Du kan också skicka ett meddelande till alla medlemmar i ditt lag genom att trycka på "All" knappen .

När du tar emot ett e-mail händer två saker. (1) Bakgrundsfärgen i det övre fönstret blir ljust rosa och (2) numret i det högra övre hörnet av samma fönster ändras. Detta nummer indikerar hur många mail som du har tagit emot men ännu inte läst. Du kommer inte att få någon annan indikation på att du har fått mail så håll ett öga på det övre fönstret för att se om du har olästa meddelanden.

De meddelanden du får dyker inte upp av sig själva. Du måste klicka på "Next"-knappen en gång för att öppna och läsa de inkommande meddelandena.

Gamla meddelanden <u>kan inte läsas</u> igen. De försvinner när du öppnar nästa meddelande. Om du har flera olästa e-mail måste du klicka igenom dem alla för att komma till det senast inkomna mailet.

### **Sammanfattning av lastbilarnas egenskaper**

- o  alla lastbilar kör lika fort (5 sekunder per ruta),
- o  det tar 10 sekunder för alla brandbilar att släcka branden i en ruta,
- o  vattenlastbilar har en större vattentank än brandbilar,
- o  att fylla på en vattenlastbil med vatten tar längre tid än att fylla på en brandbil med vatten,
- o  brandbilarnas vattennivå räknas ner med en enhet per sekund under brandbekämpning.
- o  tankbilar har en större bränsletank än brandbilar och vattenlastbilar, och
- o  att tanka tar lika lång tid för alla lastbilar,
- o  alla lastbilar förbrukar 0,2 enheter av bränsle per sekund när de rör sig.

| ID | Sort | Tid för flyttning av lastbil | Tid för brand-släck-ning | Tid för vatten-påfyll-ning | Storlek på vatten-tank | Vatten-ned-räkning | Tid för bränsle-påfyll-ning | Storlek på bränsle-tank | Bränsle-ned-räkning |
|---|---|---|---|---|---|---|---|---|---|
| 1-6 | Brandbil | 5 | 10 | 5 | 40 | 1 | 5 | 20 | 0,2 |
| 7-9 | Vatten-lastbil | 5 | | 10 | 100 | | 5 | 20 | 0,2 |
| 10-12 | Tankbil | 5 | | | | | 5 | 100 | 0,2 |

Några frågor?

# Appendix 3 – Information about the Questionnaires

## Demographic inventory

The demographic inventory is a 16-item self-report questionnaire with both open-ended and forced-choice questions that assess the participants' (1) personal, academic and work related background, (2) international experiences, (3) estimated language skills, (4) experiences of military, emergency service or police work, and (5) experiences of using computers, especially word processing and chat programs.

## NEO Five Factor Inventory (NEO-FFI)

The NEO-FFI is designed to measure the 'Big Five', five domains of adult personality: extraversion, agreeableness, conscientiousness, emotional stability, and intellect/openness. It gives us valuable insights in the participants' personalities and facilitates differentiation between individual and cultural differences. It is one of our main tools for fending off objections that our data may be dominated by individual rather than cultural differences.

The NEO-FFI is a 60-item personality inventory (Costa & McCrae, 1992). We have obtained a license to administer the inventory and are paying its copyright holder a per-participant fee. The NEO-FFI has adequate internal consistency, construct, and discriminative validity across diverse samples (Ball, Rounsaville, Tennen, Kranzler, 2001; Costa & McCrae, 1992).

## Conflict Avoidance

We have created a conflict avoidance instrument consisting of 23 items that assesses a person's disposition to react to conflict. The scale is comprised of items from the ICAPS, the ROAD, and an additional conflict avoidance scale taken from Tjosvold (1985) and Barker, Tjosvold, and Andrews (1988). The index derived from these items allows us to if our participants find conflicts stressful or not.

## Tolerance for Uncertainty

People react differently to situations in which they feel unfamiliar or without complete information. We designed a 24-item instrument that assesses the degree of comfort in making decisions with incomplete information and in unfamiliar situations. The instrument is comprised of items adopted from the Need for Cognitive Structure scale (NCS; Bar-Tal, 1994), the Revised NEO Personality Inventory (NEO-PI-R, Costa & McCrae, 1992) and the Uncertainty Response Scale (URS; Greco & Roger, 2001). The URS is comprised of three factors, Emotional Uncertainty (EU), Desire for Change (DC), and Cognitive Uncertainty (CU). All three sources have satisfactory internal consistency and test-retest reliability across diverse samples (Ball et al., 2001; Bar-Tal, 1993, 1994; Greco & Roger, 2001).

## Time Horizon

We designed an 18-item instrument that assesses how far people plan in advance, the time frame of their goals, and how far ahead they look to justify their actions.

The scale is comprised of items from the Uncertainty Response Scale (URS; Greco & Roger, 2001), the PFI, the 'Time Orientation' dimension of the Value Orientation Method Survey (VOM; Kluckhohn & Strodtbeck, 1961; Kluckhohn Center, 1995), and the Ability to Achieve Cognitive Structure Scale (AACS; Bar-Tal, 1994). The AACS has both satisfactory internal consistency and test-retest reliability (Bar-Tal, 1993, 1994).

## Schwartz Value Survey

The Schwartz Value Survey is a 57 item questionnaire, aimed at testing Schwartz's claims (presented in the Culture section). The survey asks respondents to rate 57 values "As a guiding principle in my life," using a nine-point scale. The values are presented in two lists: the first contains nouns (e.g., equality, freedom, excitement in life); the second contains adjectives (e.g., humble, helpful, curious). This splits the survey into two manageable parts. Prior to rating the values on each list, respondents are instructed to read the whole list, and to chose and rate the value most important to them, and then to chose and rate the value they most oppose. This procedure serves to anchor the 9-point scale and to encourage introspection when rating the values.

The Schwartz Value Survey provides us with a measure of what values our participants find important and gives us the opportunity to test if these values are considered unequally important across our national groups.

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# List of publications discussing SRSA-funded research

## 2007

Lindgren, I. (2007). *Towards the mitigation of cultural barriers to communication and cooperation.* Licentiate thesis, Linköpings universitet, Linköping, Sweden.

Lindgren, I., Smith, K., & Granlund, R. (2007a). *Identifying cross-cultural group faultlines.* Manuscript submitted for publication.

Lindgren, I., Smith, K., & Granlund, R. (2007b). *Predicting group faultlines in multicultural C2 operations.* Accepted for presentation at the 12th International Command and Control Research and Technology Symposium (ICCRTS). Newport, RI.

Lindgren, I., & Smith, K. (2007). *A naturalistic study of a multinational coordination team training for humanitarian response operations.* Submitted for presentation at the 8th International Conference on Naturalistic Decision Making. Monterey, CA.

Smith, K., & Lindgren, I. (2007a). *Guidelines for the design of multicultural teams.* Submitted for presentation at the 51st Annual Meeting of the Human Factors and Ergonomics Society (HFES). Baltimore, MD.

Smith, K., & Lindgren, I. (2007b). *Cultural diversity and group faultlines.* Manuscript in preparation.

## 2006

Lindgren, I., & Smith, K. (2006a). *National patterns of teamwork during an emergency management simulation.* Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting. San Francisco, CA, 354 - 357.

Lindgren, I., & Smith, K. (2006b). *Using microworlds to understand cultural influences on distributed collaborative decision making in C2 settings.* Proceedings of the 11th The International Command and Control Research and Technology Symposium (ICCRTS), Cambridge, UK. Awarded the Willard S. Vaughan, Jr. Best Student Paper Award.

Lindgren, I., Granlund, R. & Smith, K. (2006). *Studying cultural aspects of emergency management using the C3Fire microworld.* SIMsafe2006, Karlskoga.

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Woltjer, R., & Smith, K. (2005). *Development of automation to recognize changes in constraint in microworld simulations of distributed collaborative command and control*. Proceedings of the 7th International Conference on Naturalistic Decision Making. Amsterdam.