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Cultural Variation in Situation Assessment: Influence of Source Credibility and Rank Status

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EXECUTIVE SUMMARY

This report presents the findings of an experiment that investigated the effects of cultural background, message information content, rank status, and source credibility on situation assessment. Although information content, rank status, and source credibility have received much attention by researchers in command and control decision-making, cultural variations in these factors have seldom been studied.

Study participants were junior military officers from the U.S. and five foreign countries: Greece, Malaysia, the Philippines, Singapore, and Turkey. Messages describing ongoing events in an imaginary geopolitical region provided the decision-making context. At the outset, each participant received instructions that either (1) favored an attack by one country on another country in that region, (2) favored the occurrence of war games in that country, or (3) that were neutral with regard to the likelihood of attack and war games. The 100 messages were organized into 10 blocks of 10 messages. Each message originated from one of three sources that differed in terms of their credibility. After reviewing each block of messages, participants estimated the likelihood of attack and rated their confidence in that estimate. To examine effects of rank status, simulated e-mail messages were interjected into the message stream at periodic intervals. These messages requested participants to assess a situation that was not directly related to the primary task. Responses provided from superior and subordinate sources either agreed or disagreed with the participant's original assessment, which could then be changed if the participant so desired.

All cultural groups increased their estimates of the likelihood of attack as more messages about the developing situation were reviewed. However, the groups differed significantly in the rates at which their estimates increased. Participants from Malaysia, the Philippines, and Singapore initially made lower estimates, but then increased to a level comparable with the other participants as the study progressed. Participants were most influenced by the messages they received in the first half of the experiment regardless of whether those messages came from a high- or low-credibility source. Participants had a strong tendency to assess the situation as soon as possible after encountering it, regardless of the quality of information used to make those assessments. The rank status manipulation found that, across cultural groups, the most common strategy was to change the initial assessment only when both superior and subordinate dissented.

Study findings contribute to understanding the effects of cultural variables on situation assessment. These findings can be used to enhance the development of a database that relates cultural characteristics to decision-making preferences and tendencies. Future research should build on these findings by investigating in detail the relationship between cultural attributes, organizational factors, decision biases, and situation assessment variables.

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INTRODUCTION

This report presents the findings of an experiment that investigated the effect of cultural background and selected decision variables on situation assessment. The decision variables included source credibility, rank status of information sources, and the degree of correspondence of one's own with other's judgments. Although researchers have closely studied these decision variables in Command and Control (C^2) decision-making, cultural differences in situation assessment have received little attention.

BACKGROUND

Understanding cultural differences is vital in a world where there is ever-increasing contact among people from diverse cultural groups. For example, the use of multi-national coalition forces in both war and peacetime operations emphasizes the importance of considering the cultural differences that exist among coalition forces. Failure to do so can hamper collaborative decision-making and seriously compromise operation outcomes. Research on decision heuristics and situation assessment will be summarized here to provide a context for the present study.

Cultural Values

Literature reviews completed earlier in the Cognitive Aspects of Decision-Making (CADM) project established that values play a central role in differentiating cultural groups. Five cultural values were identified that vary from culture to culture: individualism-collectivism, uncertainty avoidance, power distance, masculinity-femininity, and Confucian work dynamism. Research by Hofstede (1980, 1983, 1991), the Chinese Culture Connection (1987), and Schwartz (1994) converge to the view that these values influence decision-making processes and outcomes. The fact that independent researchers using different methods to measure culture obtained similar results indicates that these cultural values exert widespread influence on the lives of many people. In the experiment reported here, two of these values, Power Distance and Uncertainty Avoidance, were the basis for hypotheses for a situation assessment decision task.

> Uncertainty Avoidance is the extent to which planning and stability are used as strategies in response to uncertainty. In a high Uncertainty Avoidance culture, people who are considered experts are given the most authority, explicit role differentiation is preferred in group interaction, adherence to rules is valued, there is considerable resistance to change, and a conservative approach is taken when dealing with ambiguous situations. Low Uncertainty Avoidance is generally associated with the corollary conditions outlined above, including higher levels of risk-taking (Cummings and Worley, 1994).
>
> Power Distance is the amount of deference shown by those in subordinate positions towards those in superior positions in an organization. High Power Distance is associated with activities and attitudes such as autocratic decision-making, superiors considering subordinates as part of a different class, close supervision of subordinates, and subordinates not likely to disagree with superior's decisions. Low Power Distance is associated with egalitarian procedures (Cummings and Worley, 1994).

These two values were emphasized in this study because of their relationships with organizational factors and decision-making variables. This experiment investigated how these values could be used

to differentiate and describe the decision performance of people belonging to different cultural groups.

Decision Heuristics

Decision heuristics are information processing strategies that are often used to simplify real-world decision situations. Decision heuristics enable people to process information that is complex, uncertain, or ambiguous to reach an appropriate decision. On many occasions, they facilitate effective action that would otherwise require considerable additional time and effort. Sometimes,, however, decision heuristics do not produce an effective response. Instead, decision heuristics result in systematic judgmental biases that produce inappropriate actions and prevent decision-makers from achieving a desired goal.

Research on decision heuristics has been conducted mostly in North America and Western Europe. Because of this narrow cultural focus, information is limited about whether and in what manner cultural factors moderate decision heuristics. When interacting with people from different cultures, a thorough understanding of cultural factors, decision heuristics, and how they interact is prerequisite to achieving consistent and predictable outcomes.

The present experiment represents an important first step in defining the relationship between cultural factors and decision heuristics. It examines the anchoring and adjustment decision heuristic in the context of a situation assessment task. Anchoring and adjustment is a pervasive phenomenon wherein the starting point for some situation anchors later judgements. As more information becomes available about that situation, revised judgments fail to give enough weight to this later information. Consequently, judgments are biased toward the starting point.

The practical implications of the anchoring and adjustment bias for C^2 decision-making are numerous. Information provided during the earliest stages of a developing situation is a crucial determinant of responses to later information. Biases favoring a certain decision outcome can be established by controlling the content of the information that is presented early in a decision situation. Because adjustments from the initial anchor are typically overly conservative, predictions can be made regarding intermediate and final situation assessments when given knowledge of the information supplied after the initial information.

In addition to decision heuristics, many other factors influence the manner in which situation assessment occurs and the outcome of the assessment process. This experiment examined source credibility and organizational factors, such as rank status, in a cross-cultural context. These variables have been studied using U.S. participants, but few documented studies have been conducted using participants from other cultures.

Source Credibility

The credibility of information sources is often an important factor in determining whether information is believed and acted upon. Indeed, source credibility is more important than source expertise in determining the importance of information. Limited information from a source perceived as highly credible is given more weight than a predominance of contradictory information from less-credible sources (O'Reilly and Roberts, 1976).

Research on the representativeness decision heuristic has contributed knowledge that aids understanding the role of source credibility in situation assessment sources (Kahneman and Tversky, 1972). According to the representativeness heuristic, the likelihood of an event is estimated by the

extent to which it is similar to its parent population. If properly applied, this heuristic facilitates effective decision-making. However, people sometimes fail to consider factors that are representative of a population when forming likelihood estimates, instead relying on more salient, but less valid factors. For example, information sources that provide highly variable information tend to be less reliable than sources that provide information that is more consistent. However, this variability tends to make the source more salient to the observer, who then places undue weight on the information conveyed by that source. In this manner, lower credibility sources are relied on to a greater extent than higher credibility sources.

Predictions also tend to be consistent with the most recent evidence, and rare events are often overemphasized if they are typical of available evidence. Research indicates that reliance on extreme cases and available information (both of which can be non-representative) are used to justify decisions. Statistically, however, data extremity and availability are often inversely related to assessment accuracy. Consequently, people tend to be overly confident in poor judgments (Kahneman and Tversky, 1973).

The reliability of a source should be considered when assessing its credibility. However, in many situations, it is either not possible or decision-makers fail to consider source reliability. The present study investigated the role of source credibility in a situation assessment task. Each participant was given explicit instructions before starting the experiment about the reliability of each of three source classes. One major interest of this experiment was determining whether participants considered source reliability when assessing the situation.

Organizational Factors

The effect of the social position of a source within an organization is a reliable predictor for whether or not its communications are accepted. The present experiment examined rank status issues cross-culturally to determine the influence of cultural values such as power distance and uncertainty avoidance on responses to rank status during a decision task. In a study that investigated rank status influences among U.S. military personnel, Driskell and Salas (1991) found that subordinates were more likely to defer judgment to superiors, and across ranks, highly stressed team members were more deferential. As an example, consider Power Distance, the amount of deference between superiors and subordinates in an organization. We can be hypothesize that a decision-maker from a low Power Distance culture will be less likely to defer to a contradictory judgment originating from a superior than a decision-maker from a high Power Distance culture. Other relationships among rank status and message credibility will also be investigated. Certain cultures depend more on the rank status of individuals and groups involved in decision-making than do others (McMillan, Hickson, Hinings, and Schneck, 1973). The U.S. and Canada, for example, tend to have more specialized rank status relationships than does Great Britain. This increased specialization guides decision-making autonomy and establishes the range of authority that people in those roles can exercise. This experiment examined the role of rank status in certain Asian and European cultural groups in its influence on decision-making.

PURPOSE

This experiment examined the relationship between selected properties of information, cultural variables, and measures of situation assessment. Surprisingly little research on command and control decision-making has explored how cultural factors influence the way that information is perceived and used in dynamic decision-making situations.

SCOPE

This experiment investigated the influence of specific cultural variables, source credibility, critical message content, and rank status on decision-making in a laboratory simulation "micro-world" task. Interest centered on determining whether the decision variables were related to differences in situation assessment by people with different cultural backgrounds.

OBJECTIVES

The principal objectives of this experiment included the following:

- Describe how people from different cultural backgrounds respond to ambiguous and conflicting information in order to assess a developing situation
- Determine how selected cultural, cognitive, and organizational variables influence situation assessment

ORGANIZATION OF THIS REPORT

The Methods section describes the materials and procedures used to measure situation assessment and cultural background. The Findings section presents the results of the experiment as cultural factors, source credibility, critical message content, and rank status. The Conclusions and Recommendations section discusses the implications of the findings for future research in the CADM project.

METHODS

This section describes participant recruitment, the demographic and cultural questionnaire, the development of the experimental scenario, and the procedures used to conduct the experiment.

PARTICIPANTS

Participants were recruited from the student population at the Naval Postgraduate School in Monterey, California. Because a major aim of the CADM project is to examine cultural influences on decision-making, participants were drawn from several countries to obtain a culturally diverse sample. All but one participant was a military officer from the U.S. or one of five foreign countries: Greece, Malaysia, the Philippines, Singapore, and Turkey. The lone exception was a civilian employee of the Malaysian military. Three Hofstede cultural clusters were represented by the six countries included in this study: Cluster 4 (Greece and Turkey), Cluster 7 (Malaysia, Philippines, and Singapore), and Cluster 9 (U.S.). Approximately the same number of participants from each cultural group was recruited. All participants took part in the experiment as part of their daily work assignment and received no additional compensation for their participation.

DEMOGRAPHIC AND CULTURAL QUESTIONNAIRE

To characterize each participant as demographic and cultural factors, a two-part questionnaire was administered before the experiment. The first section of the questionnaire obtained demographic information including gender, age, education, occupation, citizenship, language typically spoken in various settings, style of food eaten, and religious background. We used responses to this section to summarize participant demographic characteristics and categorize participants into cultural groups based on markers of enculturation into a cultural group. The second section of the questionnaire assessed five cultural value dimensions that have been extensively used by researchers to investigate cross-cultural issues. Hofstede (1980, 1983) has identified four of these dimensions:

> Individualism–Collectivism: the degree to which one's identity is defined by personal choices and achievements or by the character of the collective groups to which one is more or less permanently attached.
>
> Uncertainty Avoidance: the extent to which one focuses on planning and stability as ways to respond to life's uncertainties.
>
> Power Distance: the amount of respect and deference between those in superior and subordinate positions in an organization or group.
>
> Masculinity–Femininity: the relative emphasis on achievement and interpersonal harmony that characterizes gender differences in some national cultures.

A fifth cultural value dimension, Confucian Work Dynamism, further differentiated variations in cultural background. This dimension assesses the extent to which a person adopts a long-term orientation toward life (Chinese Culture Connection, 1987). Scores on the four Hofstede dimensions were calculated using the methods described in Hofstede (1980). Confucian Work Dynamism scores were computed as specified by the Chinese Culture Connection (1987). Together, these five cultural dimensions characterize individuals as culturally based differences in values and behavior patterns that help explain decision-making based on uncertain and ambiguous information.

SCENARIO DEVELOPMENT

A computer-based “micro-world” simulation describing a water rights conflict was developed by a subject matter expert familiar with military decision-making in situations involving incomplete, uncertain, and ambiguous information. The scenario described an imaginary geopolitical setting in which several neighboring countries had unequal access to limited water supplies. The possibility was raised that one of the countries might stage border incursions over disputed territory containing water resources. These countries differed in military capabilities, social and political circumstances, geographic features, and natural resources, among other factors.

The scenario permitted two mutually exclusive events: war games in one of the countries or an attack by that country on another country. The scenario was written to make either of these events viable. Participants were told that they were to monitor incoming message traffic and provide periodic situation assessments regarding the likelihood of an attack by one country on another country.

The scenario was implemented using a multimedia programming application, Macromedia Director, and run on Macintosh computers. A color monitor displayed the experiment to the participant and was the response interface. Figure 1 shows an example of the display as the participant viewed it during the experiment. A map occupying the upper part of the screen showed the countries of interest, military units of other countries (green squares), major transportation elements (railroad tracks, airports, bridges), geographic features (rivers, lakes, drainage areas), and country boundaries and names. A flashing yellow circle highlighted the area referenced by each message. A legend for the map symbols was located to the right of the map. Several items were displayed below the map, including each new message, its source, when it was sent, and the elapsed time since the prior message.

PROCEDURE

A set of 100 messages, organized into 10 blocks of 10 messages each, described events in an imaginary geopolitical region. Based on these messages, participants estimated the likelihood of an attack by one country on another country in that region. There were three types of messages in each block of 10 messages. Six of the messages were intended to be non-critical, with no direct relevance to estimating the likelihood of an attack. Of the remaining four messages, two were written to support the idea that an attack was likely to occur and two were written to support the idea that war games were more likely. Messages were presented singly and participants moved through each block of messages at their own pace.

Upon completing each block of messages, a screen like that in figure 2 was displayed. Participants entered a likelihood estimate for attack using a seven-point scale that ranged from “Very Low” to “Very High.” A confidence rating was also made for the likelihood estimate using a 10-point scale. The 10 messages from the preceding block were displayed on the screen along with their sources while participants entered their updated likelihood estimates and confidence ratings. Participants also indicated which of the 10 messages were most relevant in making their likelihood estimate and confidence rating. Clicking on the “DONE” button after making their responses moved the experiment to the next block of 10 messages.

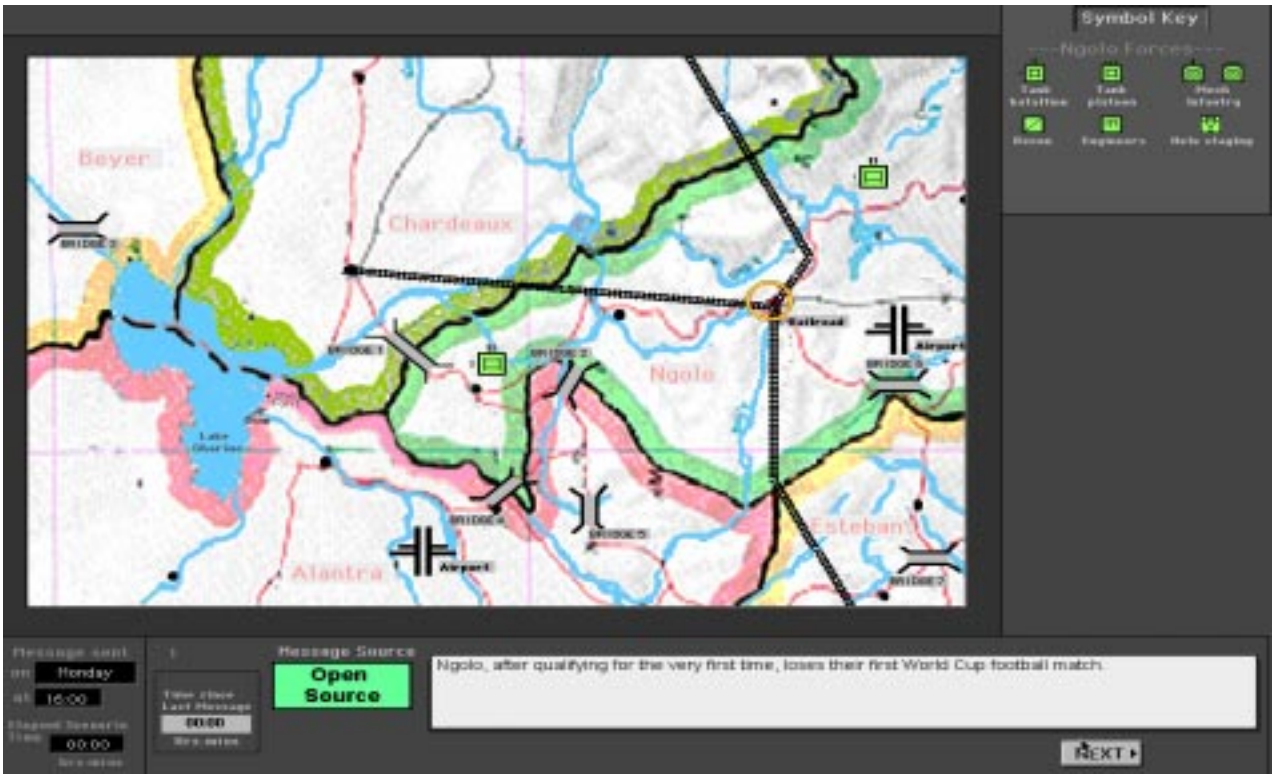

Figure 1. Sample screen showing information display and response interface.

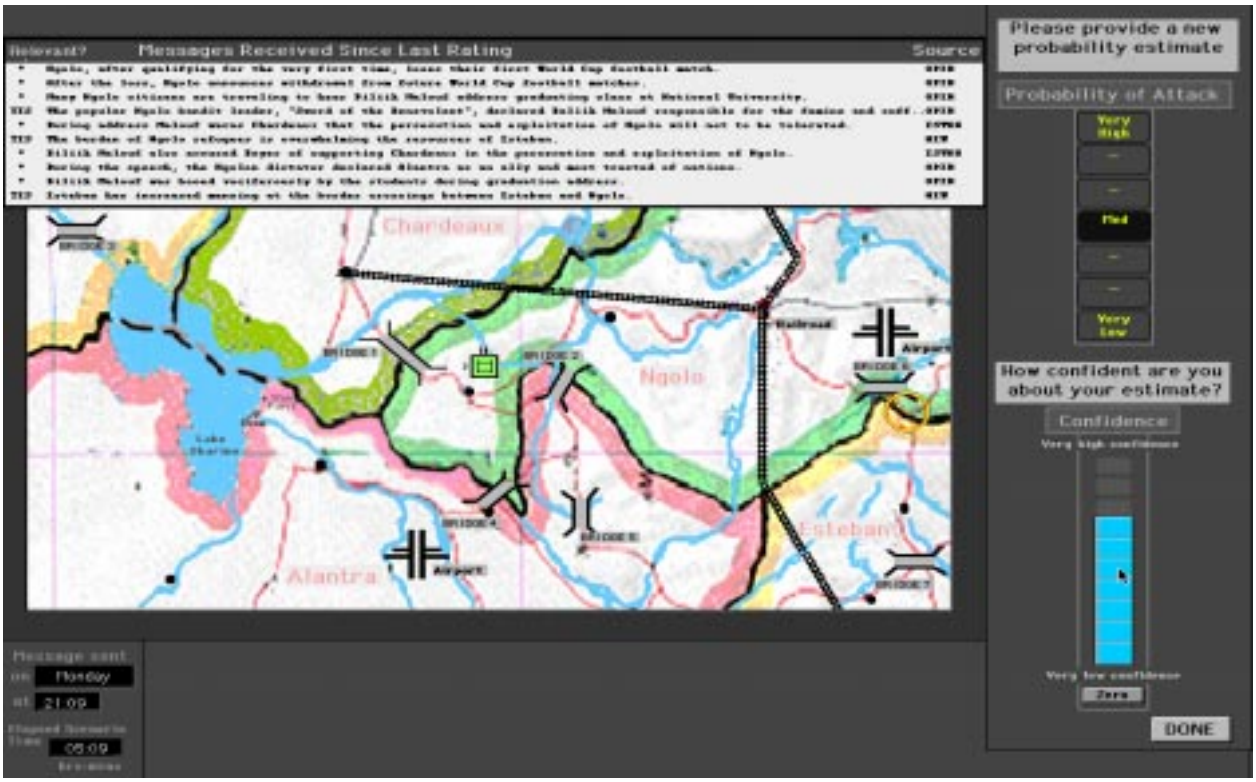

Figure 2. Sample screen during block assessment period.

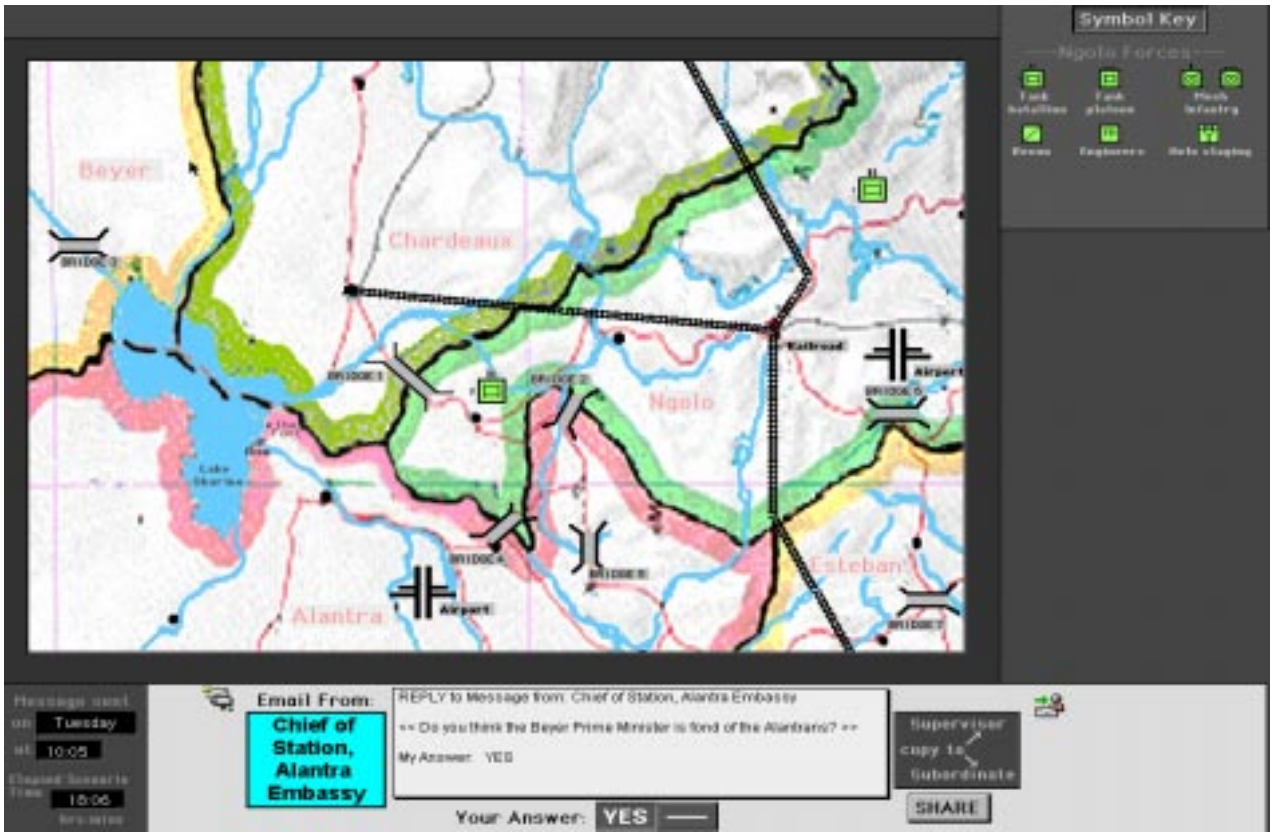

Figure 3. Sample screen showing simulated e-mail message and response options.

Source credibility was examined by assigning one of three levels of credibility to each message. The six non-critical messages in each block were always assigned to open sources that were described as newspapers, magazines, national/international television and radio, and international organizations. Participants were told that open source information could normally be accepted. The four critical messages in each block were assigned to either established covert sources or new covert sources. The instructions provided before beginning the experiment described each source in terms of its reliability, depicting the established covert source as more reliable and accurate than the new covert source.

The influence of rank status on decision-making was investigated by interjecting a simulated e-mail message at periodic intervals into a block of messages. The e-mail message requested that participants judge whether a certain event would occur. After making the initial assessment, participants forwarded the message along with their assessment to a superior and a subordinate for review and evaluation. After a short time, one of four reply combinations was displayed on the screen: (1) the superior and subordinate agreed with the participant's assessment, (2) the superior and subordinate disagreed with it, (3) the superior agreed, but the subordinate disagreed, and (4) the superior disagreed, but the subordinate agreed. Participants were allowed to revise their assessment according to this response before submitting their final recommendation. Figure 3 shows a sample screen for the rank status manipulation.

Each participant was tested individually. The participant was seated in front of a desktop computer equipped with 17-inch color monitor. The experimenter explained the purpose of the study and the

participant was asked to sign an informed consent statement if agreeing to participate. The demographic and cultural background questionnaire (Appendix A) was then administered. Upon completing this questionnaire, the participant read a summary of the scenario background and an update of the current situation in the region of interest (Appendix B).

Next, the experimenter trained participants in using the computer to enter responses to each message. The instructions presented to the participants are contained in Appendix C. A practice session allowed participants to familiarize themselves with scenario features and response entry procedures. Participants were told to play the role of an analyst of one country, "Alantra." In this role, they would monitor and evaluate message traffic pertaining to actions by a country of interest in the region of concern. In this capacity, participants estimated the relevance of each message for predicting the occurrence of an attack upon Alantra by a neighboring country, Ngolo.

Participants were told that several blocks of messages would be presented and that after each block of messages they would be asked to estimate the likelihood of an attack, to rate their confidence for that estimate, and to indicate which of the 10 messages from the preceding block were the strongest determinants of their responses. The final instructions and information update were presented after the practice session, but before starting. The experimental trials are contained in Appendixes D and E, respectively. There were three versions of the final information update, depending on the anchor condition to which each participant was assigned: attack, war games, or neutral.

According to the anchoring and adjustment bias, information encountered early in a situation assessment is often more influential on decisions than later information. To examine the effects of this bias, three instruction sets were prepared that described different probable courses of actions by Ngolo. These instruction sets were presented to participants just before they began the actual experiment trials to gain the maximal anchoring effect. For the attack instruction set, statements were provided that supported the occurrence of an attack over some other alternative, including war games. An analogous approach was used in the war games instruction set. The neutral instruction set contained statements that showed attack and war games as equiprobable events.

FINDINGS

This experiment examined cultural variations in situation assessment as influenced by the initial information provided about a situation, credibility of message sources, rank status of people who provided feedback, and correspondence with other's judgments.

PARTICIPANT DEMOGRAPHIC AND CULTURAL CHARACTERISTICS

Participants were 39 male students attending the Naval Postgraduate School in Monterey, California (mean age = 31 years). All but one were military officers for their home country; the lone exception was a civilian employee of the Malaysian military. To aid in the categorization of participants into the appropriate cultural group, an enculturation index was computed for each participant. The enculturation index is composed of items measuring several demographic variables. It ranges from 0 to 6, with increasing values indicating greater commonality with the home country (the country with which the participant identified). A low enculturation score for an individual indicates that an individual may not provide responses that are reflective of the home country. The enculturation index for each participant was highest for the home country each initially listed, requiring no changes to self-identified home country. Table 1 shows the distribution of the 39 study participants according to the a priori Hofstede culture clusters, the enculturation index, and home country.

Table 1. Cultural characteristics of participants.

Hofstede Cluster	n	Mean Enculturation Index (Range)	Home Country (Number of Participants)
Cluster 4	14	5.67 (4.93–6.00)	Greece (2), Turkey (12)
Cluster 7	13	5.69 (4.94–6.00)	Malaysia (3), the Philippines (2), Singapore (8)
Cluster 9	12	5.93 (5.65–6.00)	U.S. (12)

For analysis, participants were grouped according to the cultural cluster profiles identified by Hofstede (Harzing and Hofstede, 1996). The profiles and cluster groupings in table 2 were identified from data of over 100,000 individuals in organizationally matched samples. These profiles provided a benchmark for comparing the participants in this experiment with their corresponding Hofstede culture cluster. These profile values are well-established in the literature and generally accepted by most cross-cultural researchers. Therefore, groupings of participants for analysis were based on the a priori placements of their home countries on these dimensions. Because of small sample size, groupings based on these a priori values are more valid for hypothesis evaluation.

Table 2. Hofstede cultural value profiles for clusters 4, 7, and 9.

Hofstede Cluster	Individualism–Collectivism	Uncertainty Avoidance	Power Distance	Masculinity–Femininity
Cluster 4	mid	high	high	mid
Cluster 7	low	low	high	mid
Cluster 9	high	low	low	high

Table 3 shows the four Hofstede dimension values for the participants in this experiment. Comparison of these values with the table 2 benchmarks reveals a relatively low level of correspondence for all three culture clusters. The reasons for this lack of correspondence are not immediately clear. Perhaps the restricted nature of the sample in this study was a contributing factor. All participants were students in an U.S. military postgraduate school. Therefore, they may not have been highly representative of their home culture. Note that the original Hofstede study upon which the cultural value profiles in table 2 are based was conducted more than 30 years ago. Certain aspects of these cultural values might have changed.

Table 3. Empirical cultural value profiles for clusters 4, 7, and 9.

	Individualism–Collectivism	Uncertainty Avoidance	Power Distance	Masculinity–Femininity
Cluster 4	mid	mid	high	low
Cluster 7	mid	mid	low	low
Cluster 9	mid	mid	mid	mid

CULTURAL VARIATIONS IN LIKELIHOOD ESTIMATES

Figure 4 shows the attack likelihood estimates for each culture cluster for all block assessments. The two-way interaction of culture by assessment period was significant ($F_{(7.464,\ 111.967)} = 2.15$, $p < .05$, $\eta^2 = .125$). All three cultural groups increased their estimate of the likelihood of attack as they were provided with more information about the developing situation. However, the groups differed in their rates of increase over time.

The initial assessment (Block 1) of Clusters 4 and 9 was the same, and Cluster 7 was lower, but by the final assessment (Block 11) Clusters 4 and 9 had the most disparate values, with Cluster 7 in the middle. The relative positions of the clusters changed several times over the 11 assessment blocks. These differences could be related to cultural differences in situation assessment, the details of which could be examined by future studies that focus on the interaction of cognitive and environmental variables in decision-making situations.

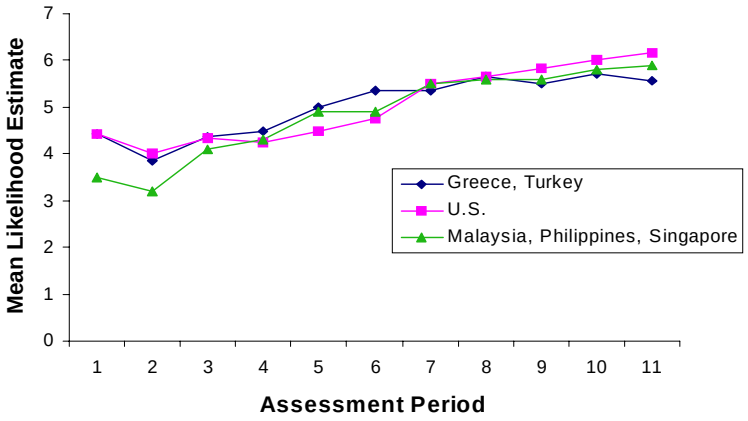

Figure 4. Attack likelihood estimates by culture cluster.

CULTURAL VARIATIONS IN CONFIDENCE

Figure 5 shows how the confidence ratings of each culture cluster varied as the experiment progressed. As with the likelihood ratings, there was evidence for a culture by assessment period interaction, although after adjusting for a violation of sphericity, it just failed to attain significance ($p = .059$) ($p < .05$ without the adjustment). Culture cluster 7 (Malaysia, the Philippines, Singapore) differed from the other two clusters, starting lower and following a less-predictable pattern as the study progressed. However, all three clusters became more confident in their likelihood estimates as more information was available.

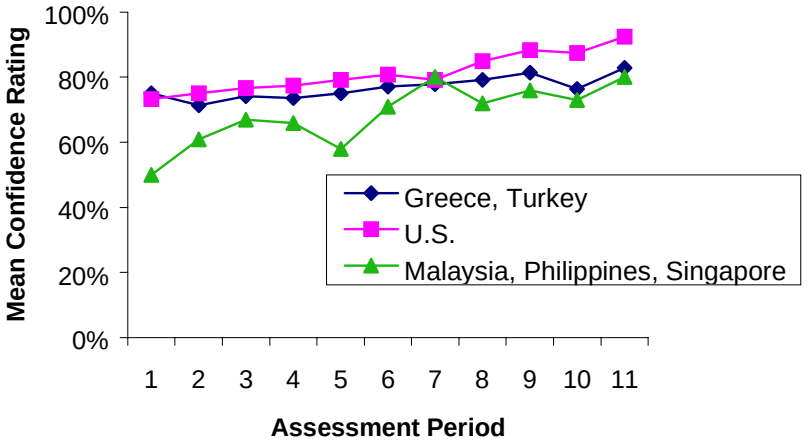

Figure 5. Confidence ratings by culture cluster.

ANCHORING

The anchor manipulation presented each participant with instructions, seemingly the report of a former watchstander. These instructions favored either an attack by one country on another country in that region (attack anchor) or the occurrence of war games in that country (war games anchor). Another condition in which instructions were neutral was concerning the likelihood of attack, and war games were designed as a control. We hypothesized that likelihood assessments for attack would be higher from participants presented with the attack anchor than from participants presented with the war games anchor. Figure 6 shows the mean likelihood estimates of participants in each anchor condition at initial assessment and final assessment. Although the pattern of means was in the expected direction, a statistically significant anchoring effect was not obtained. Because of the absence of an anchoring effect, investigation of sufficiency of adjustments from the initial anchor position was not attempted.

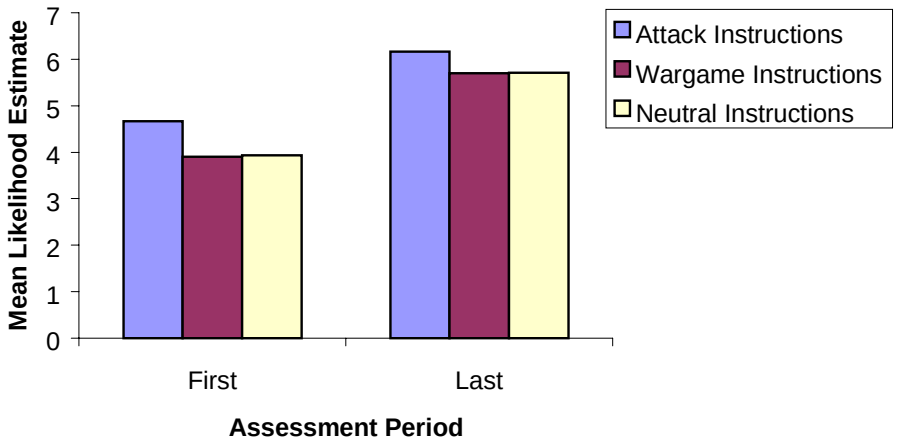

Figure 6. Mean likelihood estimate for attack by anchor condition.

IDENTIFICATION OF CRITICAL MESSAGES

For each block of 10 messages, participants identified up to five messages that they considered most important in making their likelihood estimate. The messages identified by the participant were compared with the set of critical messages to determine how well they matched. Figure 7 shows that the culture clusters varied significantly in the frequency with which critical messages were identified ($F(2, 36) = 3.667$, $p < .05$). Post-hoc tests (Tukey RSD, $p < .05$) found that participants from the U.S. identified more critical messages per block than the group from Greece and Turkey (72% versus 58% mean critical messages identified per block). Neither the U.S. nor the Greece/Turkey groups differed significantly from the group from Malaysia, the Philippines, and Singapore (65% of the critical messages identified per block). This pattern might be at least partially attributable to differences in fluency with the English language. The demographic data show that as a group, participants from Greece and Turkey (cluster 4) had the least experience, and the participants from Malaysia, the Philippines, and Singapore had considerably more experience, although less than the U.S. participants. These differences in English language experience might have influenced the ability of participants to read and properly interpret the critical messages.

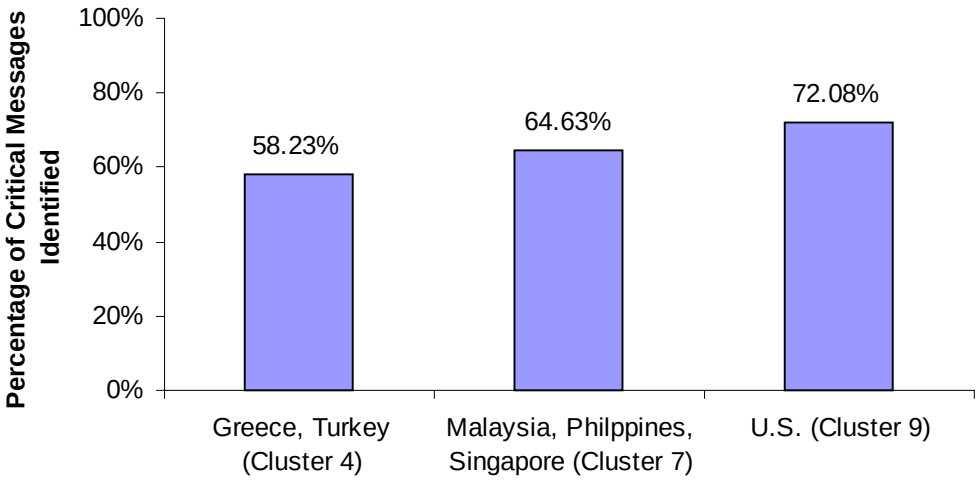

Figure 7. Mean percentage of critical message correctly identified per block.

Figure 8 further decomposes the results in figure 7 into the mean percentages of the attack-related and war games-related critical messages that each culture group correctly identified per block. Figure 8 includes only the participants who received either the attack or the war games anchor (whereas figure 7 includes all participants, including those who received the neutral anchor). All groups identified a higher percentage of the attack-related messages than the war games-related messages. Inspection of these two classes of messages revealed that the attack-related messages tended to appear more salient than the war games-related messages. The attack-related messages usually made a direct statement pertaining to an attack or made a strong implication that an attack was likely. The war games-related messages tended to be subtler, often requiring some interpretation before an appropriate implication could made.

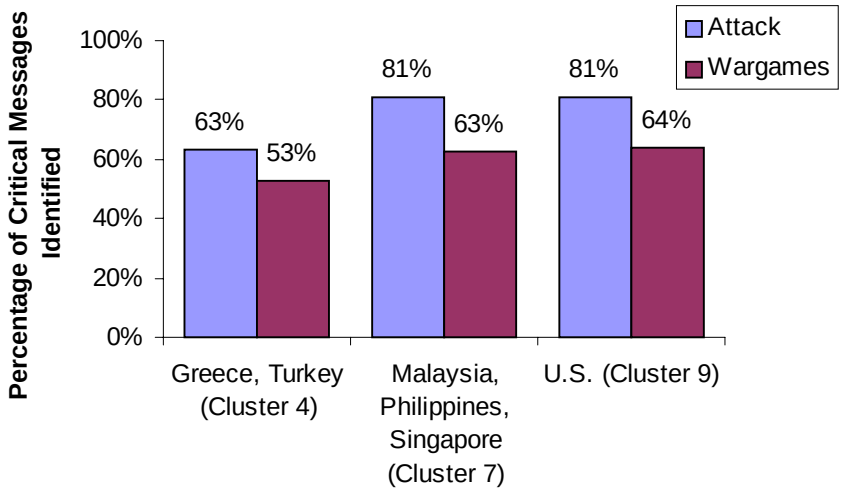

Figure 8. Mean percentage of attack-related and war games-related critical messages correctly identified per block.

SOURCE CREDIBILITY

Source credibility was examined by varying the type of source that delivered critical messages. In one condition, critical messages favoring an attack interpretation (pro-attack) were presented by a higher credibility source in the first half of the experiment and by a lower credibility source in the second half. In the other condition, the order was reversed. The source credibility manipulation enabled any differential influence of a higher versus a lower credibility source on likelihood estimates for attack to be examined. We hypothesized that source credibility would interact with the assessment periods such that attack messages from higher credibility sources would encourage higher likelihood estimates than attack messages from lower credibility sources.

Figure 9 shows a significant interaction of source credibility by block for the likelihood estimate for attack, $p < .05$. Likelihood estimates increased in both halves, but more so during the first half (when a high credibility source provided critical messages) than in the second half (when a low credibility source provided critical messages). Note, however, that the likelihood estimates in the second half were higher than those in the first half, indicating that a low-credibility source not only did not erode judgments, but further enhanced them, although at a slower rate of increase.

Figure 10 shows that the same general pattern emerged when lower credibility sources were initially used to present critical messages. In this case, there were two significant main effects for source credibility and block ($p < .05$), but no higher order interaction. Likelihood estimates in the first half increased at a greater rate than they did in the second half, and likelihood estimates in the second half were higher than in the first half. Evidently, higher rates of change occur in the early stages of assessment, regardless the level of source credibility. The fact that the critical messages in the first half were conveyed by low-credibility sources did not discourage using that information to assess the situation.

These findings are noteworthy because they show that participants were most influenced by information they received in the first half of the study, regardless of whether it came from a high or low credibility source. The early stages of situation assessment seem the most influential in generating an assessment, regardless the credibility of the source. This tendency to learn about situations as soon as possible after encountering them might also influence how much subsequent information is weighted.

Note that participant comments during the post-experiment debriefing regarding how they viewed source credibility did not match these findings. Most participants claimed that the message source was either moderately or decidedly important in determining their likelihood estimates for attack. These claims did not vary significantly by culture cluster. In addition, participants overwhelmingly chose the high-credibility source as the one they trusted the most. However, the findings reported in this section indicate that the need to learn about a situation took precedence over the credibility of the message source. Increases in likelihood estimates were greatest in the first half of the experiment regardless of whether the messages originated from a high or low credibility source. There seems to be a self-imposed need to assess a situation early even if that assessment is based on messages originating from a source that is not considered highly reliable or accurate.

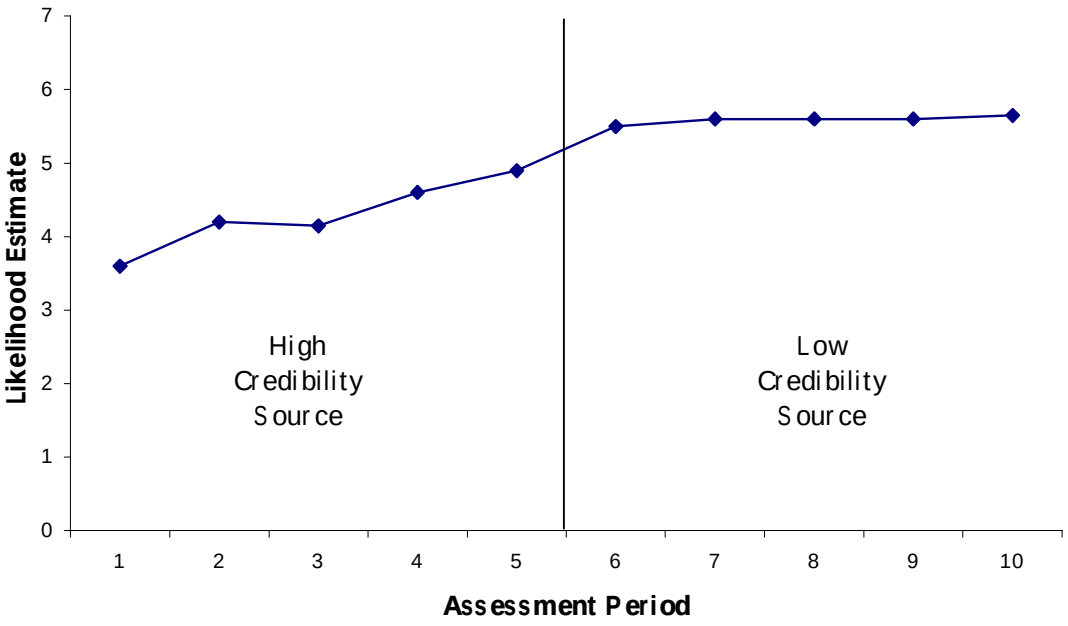

Figure 9. Likelihood estimates for attack when high-credibility sources presented pro-attack critical messages in first half of experiment.

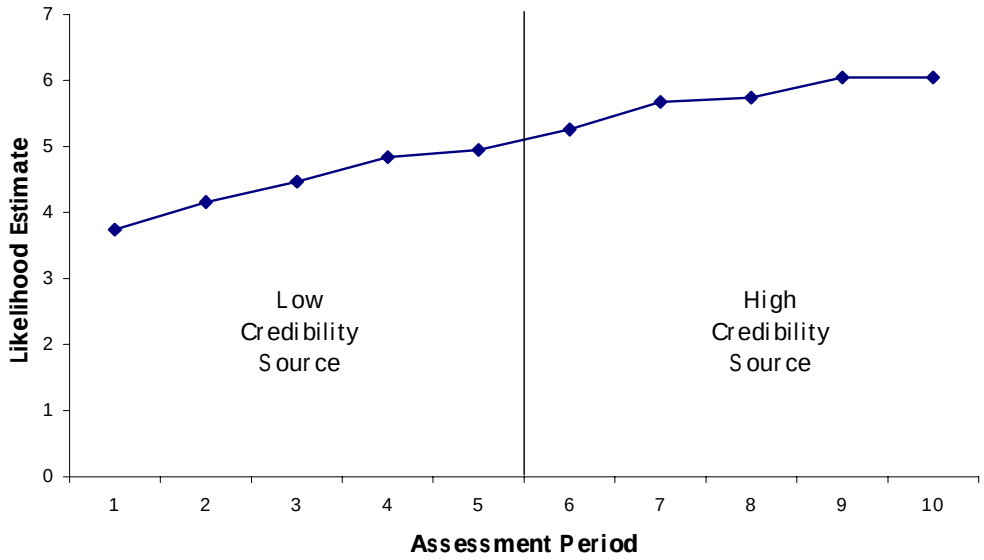

Figure 10. Likelihood estimates for attack when low-credibility sources presented pro-attack critical messages in first half of experiment.

RANK STATUS

The four e-mail messages interjected during the experiment enabled rank status issues to be addressed as Hofstede cultural values. Recall that after making the initial evaluation requested by an e-mail message, participants forwarded the message and their evaluation to a senior analyst (described to the participants as of superior rank status) and a junior analyst (described as of subordinate rank status). For each of the four e-mail messages, responses from these two sources varied in the extent to which the senior and junior analyst agreed with the participant and with each other: (1) both analysts agreed with each other and with the participant, (2) both analysts agreed with each other, but disagreed with the participant, (3) the senior analyst disagreed and the junior analyst agreed with the participant, and (4) the senior analyst agreed and the junior analyst disagreed with the participant.

A basic question was whether participants would change their evaluations in a predictable way with respect to the superior and subordinate rank status of the analysts who responded for their evaluations. Note that no additional information or rationale was provided as part of the response, so influence was isolated from other factors in the decision environment. An analysis conducted on the percentage of participants who changed their initial evaluations after receiving responses was statistically significant (Cochran's $Q(3) = 48.78$, $p < .05$). Figure 11 shows that, as expected, the fewest changes occurred when both the superior and subordinate agreed with the participant, and that the most changes occurred when both of them disagreed with the participant. These results were expected based on a simple "majority rule" model of decision-making. In addition, this "majority rule" strategy was expounded by a preponderance of participants who changed their initial assessments; this strategy did not vary significantly by culture cluster. The two mixed conditions (superior and subordinate disagree) generated results that more directly addressed rank status issues. Pairwise comparisons (McNemar Test) of each condition with the condition where both superior and subordinate disagreed showed that significantly fewer changes occurred in the former conditions. Although approximately three times more evaluations were changed when the superior rather than the subordinate disagreed with the participant, this difference was not statistically significant.

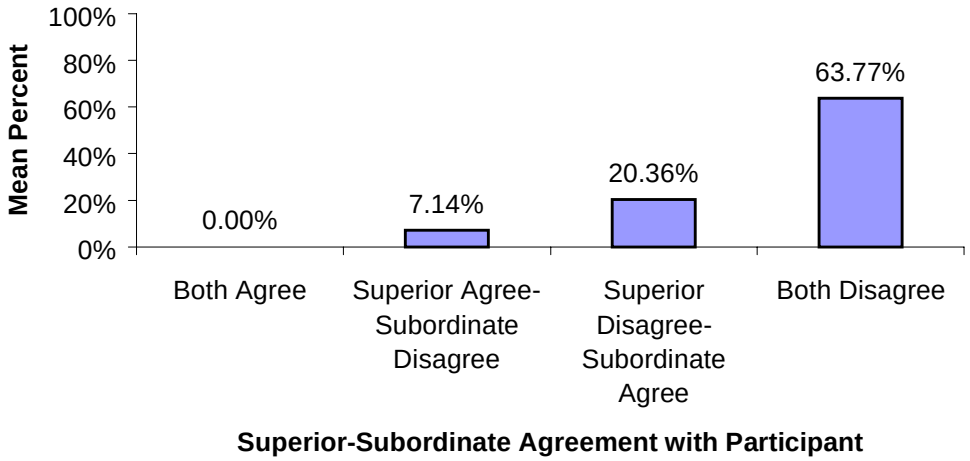

Figure 11. Percentage of participants who changed their evaluations by the four superior-subordinate agreement-disagreement combinations.

Power Distance

We hypothesized that when the dissenter was a superior, participants from high Power Distance cultures (clusters 4 and 7) would change their evaluations more frequently than participants from a low Power Distance culture (cluster 9). The rationale for this prediction was that people in high Power Distance cultures have been trained as more deferential toward those in superior positions in an organization than people in low Power Distance cultures. Figure 12 shows that the predicted pattern of results was obtained, although the difference between the two groups was not statistically significant. More than 26% of participants from high Power Distance cultures (clusters 4 and 7) changed their initial evaluations when the superior disagreed with it, compared to just 8% of the participants from the low Power Distance culture (cluster 9).

Figure 13 shows the percentage of changed evaluations when the subordinate rather than the superior disagreed. We hypothesized that participants from a low Power Distance would change their evaluations more frequently than participants from a high Power Distance culture. The rationale for this prediction was that people from low Power Distance cultures, having a more egalitarian perspective, would tend to accept advice from subordinates more readily than people from high Power Distance cultures. However, participants from high Power Distance cultures changed their evaluations more often than participants from the low Power Distance culture, although this difference was not statistically significant. The percentages were much lower in both cases. No participants from the low Power Distance culture, and only 10% of those from the high Power Distance cultures, changed their evaluations when the subordinate disagreed with them.

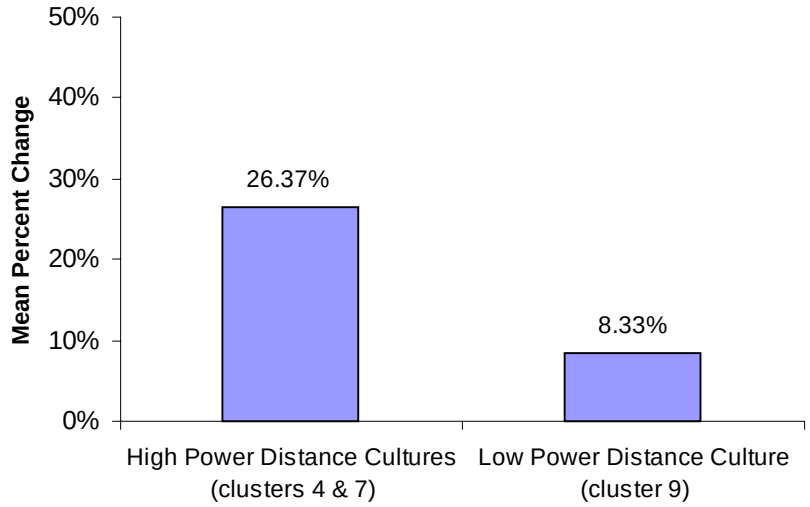

Figure 12. Percentage of changed evaluations by high and low Power Distance cultures when only the superior disagreed.

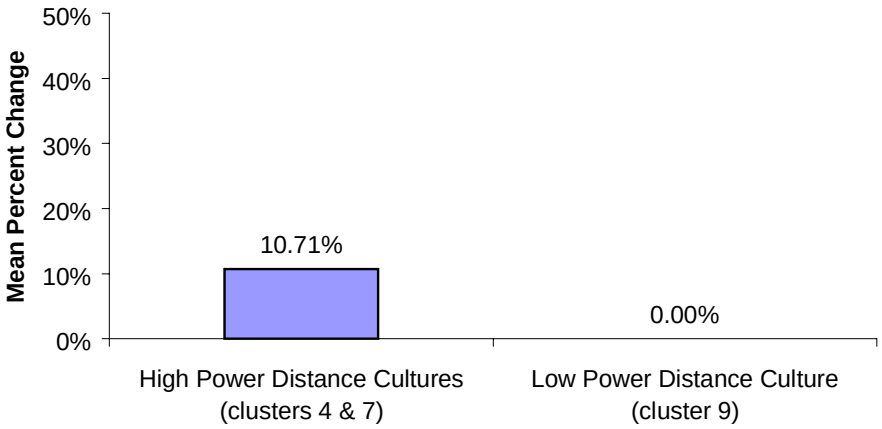

Figure 13. Percentage of changed evaluations by high and low Power Distance cultures when only the subordinate disagreed.

Uncertainty Avoidance

Uncertainty Avoidance was another Hofstede cultural value that was discussed in the context of rank status. Participants from a high Uncertainty Avoidance culture (cluster 4) were hypothesized to change their evaluations more often than participants from low uncertainty avoidance cultures (clusters 7 and 9). The rationale for this prediction was that uncertainty instilled by disagreement of a co-worker would be reduced by changing one's decision to be consistent with the other. Figure 14 shows the findings which, while not statistically significant, exhibited the hypothesized trend.

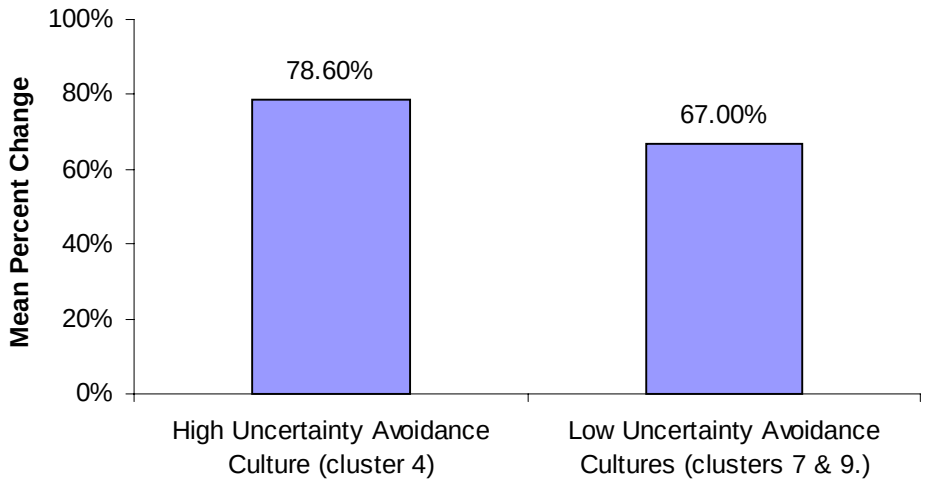

Figure 14. Percentage of changed evaluations by high and low Uncertainty Avoidance cultures.

CONCLUSIONS

CULTURAL CHARACTERISTICS

Only a modest correspondence was found between our sample's cultural dimension profiles and those of Hofstede and the Chinese Cultural Connection. Our sample was a different and very restricted one in organizational membership. All were employees of their respective countries' militaries, and not, therefore, necessarily representative of their countrymen. Compounding this and representing a major challenge is the fact that all foreign participants are currently residing in the U.S. and using a language that is not their native tongue. Finally, the sample size is limited. In prior research with a larger sample (Heacox, Gwynne, Sander, and Fleming, 1998), a higher level of correspondence was obtained. Hofstede and the Chinese Culture Connection have cautioned that the validity of these dimensions relies on large samples. Therefore, the a priori profiles of these researchers were used for analysis of hypotheses related to culture cluster.

LIKELIHOOD ESTIMATES

Although all three culture groups increased their likelihood assessments as the study progressed, they did so at different rates. Participants from Malaysia, the Philippines, and Singapore (cluster 7) tended to vary from the other two groups who differ less from each other. The largest differences occurred at the outset of the assessment task when the cluster 7 participants made more conservative (lower likelihood) estimates. By the third period, however, they had increased to approximately the same level as clusters 7 and 9.

ANCHORING AND ADJUSTMENT

The failure to obtain a statistically significant anchoring effect made the interpretation of that portion of the experiment problematic. Despite the lack of statistical evidence for an anchor, the anticipated pattern of anchoring effects was obtained. Participants who received the attack anchor made the highest initial likelihood estimates for attack, and those who received the war games anchor made the next highest estimates, followed by those who received the neutral anchor. This trend suggests that the anchor manipulation had its intended effect, although it failed to attain a sufficient magnitude to reach statistical significance. The power analysis conducted during the design of the experiment assumed that the anchor manipulation would produce a moderate effect size. Evidently, the effect size was smaller, with the result that too few participants were included to provide the power needed for statistical significance.

An additional issue should be discussed concerning anchoring and adjustment. Given the context of this experiment, what constituted a sufficient adjustment or an insufficient adjustment from the anchor? Anchoring and adjustment experiments typically use a quantitative anchor to facilitate its measurement and gauging movement from it. This experiment did not incorporate an explicit metric for measuring an anchor and movement from it. Because of this, subsequent movement from the initial anchor was difficult to evaluate in terms of sufficiency of adjustment. However, if a significant anchoring effect were obtained, the adjusted likelihood estimates that are made following a neutral anchor could be considered as "sufficient." Adjustments made in other anchor conditions could then be compared to the control (neutral) anchor condition. The fact that all three conditions increased as the experiment progressed indicates that there was a general tendency to perceive an attack as becoming more likely regardless of anchor.

CRITICAL MESSAGE IDENTIFICATION

The unintended differential saliency of the attack and war games critical messages complicates interpretation of the attack likelihood estimates. Recall that in each block of 10 messages there were four critical messages and six "background" messages. The critical messages were evenly divided into two attack messages and two war games messages. The rationale for this design was that participants who received the attack anchor would make higher estimates for attack than participants who received either the war games anchor or the neutral anchor, because even though balanced amounts of information was presented, those who had received an attack anchor would find those messages more salient. However, participants with both attack and war-game anchors found the attack messages more salient. Analysis of the messages that participants identified as most relevant for making the attack likelihood estimates revealed that attack messages were identified most of the time. (A different story for the war games critical messages, however; they were missed considerably more often).

SOURCE CREDIBILITY

The major source credibility finding was that likelihood estimates increased more in the first half of the experiment than in the second half, regardless of whether higher or lower credibility sources were supplying the critical messages. A straightforward interpretation of this finding is that participants' need to generate a situation assessment outweighed consideration of the accuracy and reliability of the information upon which that assessment was based. A very interesting observation, noted earlier, is the discrepancy between these findings and participants' verbal reports of the importance of the source. The finding that information from acknowledged low credibility sources has implications for information operations. Information from questionable sources may have more influence power than previously assumed, especially if this information occurs early in a situation assessment task.

RANK STATUS

The major rank status finding was that all cultural groups employed a "majority rules" decision rule. The sheer number of dissenting opinions was the major determinant in whether a participant changed his initial assessment. Recall that no further information was provided by the dissenters-they merely disagreed. Several participants, when debriefed, said, "when both disagreed I figured they knew something that I didn't know."

Driskell and Salas (1991) placed U.S. military participants in a situation in which they reviewed several two-pattern checkerboard slides and made an initial choice of which of the two patterns contained more white space (in reality there was no difference). When participants received a dissenting opinion from a "team member" lower in status, they changed their initial estimate 34% of the time. When the dissenting opinion came from one higher in status, participants changed 51% of the time. Our results cannot be directly compared in part because there were two other members providing input, therefore adding a majority–minority within-group dynamic. In addition, the rank status condition Driskell and Salas studied was between-subjects rather than within-subjects. However, in general, a pattern consistent with their findings was observed; there were fewer changes when only subordinates disagreed, and more when only superiors disagreed.

Our findings show the power to influence decisions that exists within a group, especially in ambiguous situations. A stated majority position might result in a change of decision by a minority, a change that is not necessarily warranted. The hypotheses related to cultural dimensions were not

supported, although two of the three findings were consistent with the hypotheses. The predictive power of these broad cultural dimensions appears to be compromised with small sample sizes.

The hypothesized cross-cultural differences in Power Distance and Uncertainty Avoidance in terms of the influence of rank status on changing evaluations were not obtained. Military membership might exert a stronger influence than broader cultural values on task performance, especially when those tasks are highly specific to military organizations.

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APPENDIX A
DEMOGRAPHIC AND CULTURAL BACKGROUND QUESTIONNAIRE

You are being asked to participate in a scientific study of decision-making. As joint international military and business ventures are occurring more frequently, it is important to understand how people with diverse backgrounds can work together to make good decisions. Toward this end, the current study is being conducted by the Research, Development, Test and Evaluation Division of the Space and Naval Warfare (SPAWAR) Systems Center San Diego (SSC San Diego).

Your participation is voluntary. If you agree to participate, please fill out the attached survey. If you prefer not to participate, simply return this form to your professor or research assistant.

This survey is anonymous. Do not write your name on the survey.

If you have questions regarding the study, or if you would like to receive a summary report of survey findings, please contact one of the researchers: Dr. Steve Sander, SSC San Diego, San Diego CA 92152-5001, or Dr. Nancy Heacox, Pacific Science and Engineering Group, Inc., 6310 Greenwich Drive, Suite 200, San Diego CA 92122-5918.

Your participation is appreciated. Please return completed surveys as directed to your professor or research assistant.

BACKGROUND SURVEY **SECTION A**

Are you active military? ___ Yes ___ No **Are you** ___ Male ___ Female

What is your age? _____ **What is your religion?** _____

What is your current job or work assignment? _____

What is your citizenship? _____

What is the country with which you identify yourself? _____

Note: In the following items, this country is referred to as your "home country."

How long have you lived in your home country? ____ years

How long have you lived in another country? ____ years **Country:** _____

(Please list additional years and countries on the back of this paper.)

How often do you eat food prepared in the style of your home country?

___ Less than monthly ___ 1 or 2 times a month ___ Weekly ___ Everyday

Language:

What language did you usually speak at home as a child? _____

What language do you usually speak at home now? _____

What language do you usually speak at school or work? _____

What language do you usually speak with your friends? _____

Please list the countries where you were educated:

- Ages 6 – 12: _____
- Ages 13 – 18: _____
- College / University / Advanced Training _____

If you are currently a student, what is your academic program of study?

___ Arts / Literature ___ Business ___ Education
___ Engineering ___ Life Sciences ___ Physical Sciences
___ Social Sciences Other (list) _____

SECTION B: PLEASE ANSWER THE QUESTIONS IN SECTION B RELATIVE TO YOUR CURRENT OR MOST RECENT EMPLOYER IN YOUR HOME COUNTRY. IF YOU HAVE NEVER BEEN EMPLOYED IN YOUR HOME COUNTRY, PLEASE SKIP TO SECTION C.

THE DESCRIPTIONS BELOW APPLY TO FOUR DIFFERENT TYPES OF MANAGERS. READ THROUGH THESE DESCRIPTIONS, THEN COMPLETE ITEMS #1 AND #2:

Manager 1: Usually makes decisions promptly and communicates them to subordinates clearly and firmly. Expects them to carry out the decision loyally and without raising difficulties.

Manager 2: Usually makes decisions promptly but before going ahead, tries to explain them fully to subordinates. Gives them the reason for the decision and answers whatever questions they may have.

Manager 3: Usually consults with subordinates before reaching decisions. Listens to their advice, considers it, and then announces his/her decision. He/she then expects all to work loyally to implement it whether or not it is in accordance with the advice they gave.

Manager 4: Usually calls a meeting of subordinates when there is an important decision to be made. Puts the problem before the group and tries to obtain consensus. If consensus is reached, the manager accepts this as the decision. If consensus is impossible, the manager usually makes the decision him/herself.

	Mgr. 1	Mgr. 2	Mgr. 3	Mgr. 4	
#1. Regarding the above types of managers, please circle the one which you would prefer to work under.	1	2	3	4	
#2. Which one of the above types of managers is most like your own manager?	1	2	3	4	

SECTION B CONTINUES ON THE FOLLOWING PAGE

COMPLETE ITEMS #3 – #6 BASED ON YOUR EXPERIENCES AT YOUR CURRENT OR MOST RECENT EMPLOYER IN YOUR HOME COUNTRY:

#3. Company rules should not be broken—even if the employee thinks it is in the company's best interest.	strongly disagree 1	disagree 2	neutral 3	agree 4	strongly agree 5
#4. How frequently in your experience does / did the following occur: Employees being afraid to express disagreement with their managers.	very seldom 1	seldom 2	sometimes 3	frequently 4	very frequently 5
#5. If currently employed: How long do you think you will continue working for this company ?	2 years at most 1	from 2 to 5 years 2	more than 5 years 3	until I retire(d) 4	
If not currently employed: How long did you work for your most recent employer?					
#6. How often do / did you feel nervous or tense at work?	very seldom 1	seldom 2	sometimes 3	frequently 4	very frequently 5

SECTION C: PLEASE COMPLETE THE ITEMS IN SECTION C BASED ON YOUR PERSONAL PREFERENCES AND PRIORITIES.

How important is each of the following to you personally:

		very unimportant	unimportant	neutral	important	very important
#1.	Observation of rites and social rituals.	1	2	3	4	5
#2.	Reciprocation (exchange) of greetings, favors and gifts.	1	2	3	4	5
#3.	Ordering relationships by status and observing this order.	1	2	3	4	5
#4.	Personal steadiness and stability.	1	2	3	4	5
#5.	Thrift.	1	2	3	4	5
#6.	Persistence (perseverance).	1	2	3	4	5
#7.	Having a sense of shame.	1	2	3	4	5
#8.	Protecting your “face” (i.e., maintaining your public image).	1	2	3	4	5

Section C (continued)

How important is it to you to:

	very unimportant	unimportant	neutral	important	very important
#9. Have challenging work to do—work from which you can get a personal sense of accomplishment?	1	2	3	4	5
#10. Live in an area that's desirable to you and your family?	1	2	3	4	5
#11. Have an opportunity for higher earnings?	1	2	3	4	5
#12. Work with people who cooperate well with one another?	1	2	3	4	5
#13. Have training opportunities (to improve your skills and to learn new skills)?	1	2	3	4	5
#14. Have good fringe benefits (paid vacation time, health insurance)?	1	2	3	4	5
#15. Get the recognition you deserve when you do a good job?	1	2	3	4	5
#16. Have good physical working conditions (good ventilation and lighting, adequate work space)?	1	2	3	4	5
#17. Have considerable freedom to adopt your own approach to a job?	1	2	3	4	5
#18. Have the security that you will be able to work for your company as long as you want to?	1	2	3	4	5
#19. Have an opportunity for advancement to higher level positions?	1	2	3	4	5
#20. Have a good working relationship with your manager?	1	2	3	4	5
#21. Fully use your skills and abilities on the job?	1	2	3	4	5
#22. Have a job which leaves you sufficient time for your personal and family life?	1	2	3	4	5

THANK YOU FOR COMPLETING THIS SURVEY

APPENDIX B
SCENARIO BACKGROUND AND CURRENT SITUATION

Background and Current Situation

Setting and Task:

You have recently been assigned as a senior analyst for Ngolon affairs within the intelligence directorate. You are supporting the Alantra political leadership and various Alantra embassy officers throughout the region. You are being supported by other, more junior, analysts within the directorate. Your reports and analyses will normally be provided to your supervisor, the Chief of the Intelligence Directorate.

As part of your initial familiarization, you will be reviewing information about the background of the area, the current situation, and an analysis and situation assessment prepared by your immediate predecessor. This information is contained in the following pages.

Background:

The countries Alantra, Beyer, and Chardeaux have a long history as distinct nations. The historical separations, now borders among these nations, are based on ethnicity, tribal affiliation and religion; plus the geographic features of the area. Beyer and Chardeaux share a common religion and heritage; their common border has changed from time to time, but rarely due to conflict. Rather the border changes have been to accommodate ancient tribal and familial affiliations. Alantra, on the other hand, is culturally unique. Its ethnicity and religion are quite different from the rest of the region. They have always been the most powerful nation in the region and look upon themselves as quite tolerant and benevolent. In the past they did exploit and at times persecute their neighbors. This era seems to have passed but the other nations in the region always critically examine Alantra's motives as to alliances, negotiations, trade pacts, and other socio-economic initiatives. All three countries have developed a sophisticated political process that provides for direct representation. The nations each have a well-established election process.

The nearby countries Ngolo and Esteban are relatively new nations and came into being during the post-colonial era by decree and the partition process. There are no natural or geographic features that define the boundary between Ngolo and Esteban and in the past only one country and people existed where there are now two. The political process of both countries is relatively unsophisticated, with little or no representation of the people. Presently a military dictator, Biliik Maloof, rules Ngolo and in Esteban the chief of the minority tribe is in power. In the past the ancestors of the people of Ngolo and Esteban continually warred with the ancestors of Alantra. These wars, although fought as religious wars, were in fact over water rights, water transportation, and access to seasonal hunting areas in the marshlands around Lake Sharino. This area of Lake Sharino, known as "The Font" has been in dispute for over 2000 years. "The Font" is now a rich agricultural plain and also contains the northern dam, that controls the water flow from Lake Sharino. No natural boundary or separation exists between Alantra and Ngolo nor between Alantra and Esteban.

In the past, Alantra, Beyer, and Chardeaux were dependent upon fishing, husbandry and agriculture for prosperity. Today, all three of the nations are prosperous and have light industry, a well-

developed agricultural capability, and a limited fishing industry. The three nations have long shared the major water resource, Lake Sharino. Two years ago they signed the second 100 year co-prosperity treaty that addresses the lake, mutual trading, and identifies other favored trading partners.

Ngolo and Esteban historically have been hunters and gatherers. Today, Esteban is barely above the poverty level, has no industry, and only a limited agricultural base. Ngolo, on the other hand, has a fledgling light industry base, only a limited agricultural base, and all property is state owned and controlled. All power and wealth are tightly held by the ruling and military class. Ngolo could increase its prosperity if agrarian and land reform policies were enacted. However, to date the ruling dictator has not made any attempt at reform.

Alantra, Beyer, and Chardeaux have self-defense forces that operate under control of the civil government. Alantra forces are fairly modern and include: a) land forces, consisting of one motorized rifle division, two reconnaissance battalions, and one tank brigade; b) air forces, consisting of one helicopter transport squadron, local air defense sites (located along the adjacent borders with the countries of Ngolo and Esteban and around the two dams on Lake Sharino, and 3 medium lift fixed-wing transports; c) water-borne forces, consisting of two special purpose (reconnaissance) platoons, two coastal water craft squadrons, and the lake-district surveillance helicopters. Beyer and Chardeaux have similar capabilities, although less modern forces.

Very little is known about the disposition of military forces in Ngolo and Esteban. Recently Ngolo has attempted to modernize and strengthen their military forces. It is thought that some mechanized capability has been developed. Ngolo has one under-strength motorized rifle division, possibly one mechanized rifle brigade and two tank battalions. The elite force is the Royal Guard, a brigade size force with modern arms and assault vehicles. They have recently added point air defense capabilities and it is believed they have added a limited attack helicopter capability. In addition, some older light transport helicopters are available and the only fixed-wing assets are civil air; however, these could be co-opted by the military. Esteban's forces are likely less modern than Ngolo's. Both countries have large "bandit" forces that are organized around local leaders and are at times very active. These bandit forces are well armed, with individual weapons, and well organized.

Recent History:

<u>1 year ago</u>

A three-year long drought continues. Alantra, Beyer, and Chardeaux are managing to remain reasonably self-sufficient. This is due to the enlightened management of the water resources of Lake Sharino, and the economic and trade alliances among themselves and other nations outside the region. Conversely, Ngolo and Esteban are fast approaching poverty and mass hunger. The rivers in the region depend upon the seasonal rains, which have been absent for three years. They are totally dependent upon the good will of Alantra and Chardeaux for water for the crops necessary to feed the people. For the last two years, Alantra, Beyer, and Chardeaux also provided approximately 50% of the required foodstuffs to Ngolo and Esteban.

6 months ago

Alantra, Beyer, and Chardeaux amended the 100 year co-prosperity treaty to remove Ngolo and Esteban as favored trading partners. Further, they reduced the amount of water that could be taken from the lake by 20% for each of the three countries. As a result of these new restrictions, Alantra reduced the flow of water to Ngolo and Esteban by 80%. Chardeaux soon followed and completely shut-off water sources for Ngolo and Esteban. Beyer discontinued all aid and trade with Ngolo and Esteban. Alantra soon followed.

Currently:

Alantra, Beyer, and Chardeaux are now suffering the effects of the drought and resultant famine, although not to the same extent as Ngolo and Esteban. Alantra, Beyer, and Chardeaux have ended all trade and aid to Ngolo and Esteban. Additionally Alantra announced that they would deny all water resources soon. Esteban has turned to their neighbor to the South for relief. This neighbor has provided some water and some foodstuffs, but can only do this for a short time. Ngolo has found itself completely cut-off from all water sources. The drought, lack of water sources, poor agrarian policies, and a history of social injustice have isolated Ngolo from its neighbors. Only Esteban has any semblance of normal relations with Ngolo. Starvation, bandit activity, popular uprisings, military coup, or attack on neighboring nations are all possibilities for Ngolo.

Outlook:

Although the situation is dire in Ngolo and the political and military situation is tense, currently the citizens appear to be conducting business as normal. That is, they continue to barter and trade with Esteban and petition the other nations in the area for increased support and aid.

Additionally, there are some indications that Ngolo dictator Malouf was advised by his brother, the ambassador to Chardeaux, to conduct war games in order to bolster national pride and to show its military power and will to neighboring nations and the minority and dissident factions within the country.

As the situation continues to worsen, the only rallying point left for Malouf may be the ancient battle cry of “The Font, the Font, on to the Font”. If he chooses this option, it is anticipated that Ngolo will invade Alantra to seize control of the southern dam in Alantra and the rich agricultural fields in the area, thereby making water and foodstuffs available to Ngolo.

Information Sources:

Analysts within the intelligence directorate rely on three source groups:

- **Source Group A: Open Sources**

The sources in this group are "open" sources. That is newspapers, magazines, national/international television and radio, and international organizations. The information from these sources can normally be taken at face value. These sources normally report activities and only rarely add a biased interpretation.

- **Source Group B: Established Covert Sources**

The information sources within this group are highly placed within various agencies and organizations of the countries of interest. The information provided is normally very accurate.

- **Source Group C: New Covert Sources**

The information sources within this group have been more recently recruited than those in Group B. At times, the information provided is not accurate. There is no concern of compromise and the inaccuracies are probably as a result of inexperience.

APPENDIX C
PARTICIPANT INSTRUCTIONS

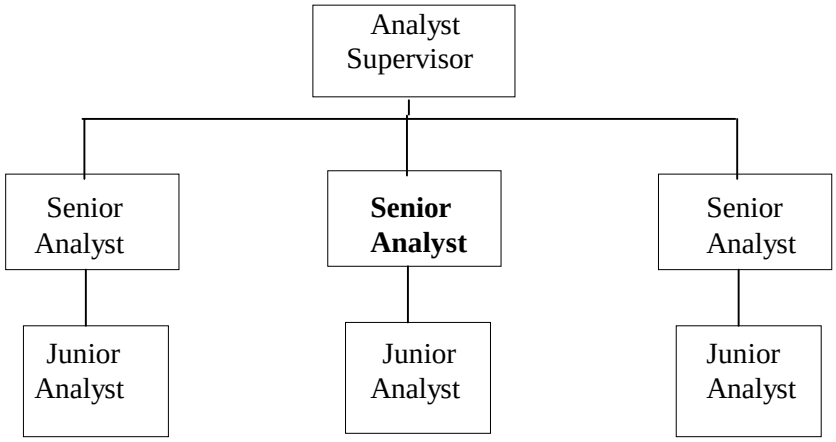
VERBAL INSTRUCTIONS FOR EXPERIMENT (A/A)

Welcome and Purpose of Study.

Thank you for coming to participate in our study. The purpose of this study is to investigate if the way in which information is presented affects how people use that information to make decisions. In this study, you will be acting as an analyst in a government command center in the imaginary country of Alantra. You have recently been assigned as a senior analyst within the intelligence directorate. You are supporting the Alantra political leadership and various Alantra embassy officers throughout the region. You are being supported by another, more junior, analyst within the directorate. Your reports and analyses will be provided to your supervisor, the Analyst Supervisor.

⇒ SHOW THE ORGANIZATION CHART (BLUE PAPER)
NOTE: THE PARTICIPANT WILL RECEIVE A HARD COPY OF THE ORG CHART WITH THE "BACKGROUND" HANDOUT

Alantra Intelligence Directorate
Organization Chart



You will monitor a series of incoming messages pertaining to a particular fictional geographic region in order to estimate the likelihood of a future event in the country of Ngolo. In addition, from time to time during the scenario you may receive requests for various types of assessments from Alantra embassy staff in the surrounding countries and from the Chief of the Alantra Intelligence Directorate. Your position acts as the liaison for these requests with the other members of your analyst unit, which includes the analyst supervisor and the junior analyst in addition to yourself. When requests of this type are received, all members of the unit are invited to provide input. This helps to ensure that all staff with relevant knowledge regarding an issue are included.
The study will be conducted on a computer and will ask you to make assessments regarding messages pertaining to an imaginary situation. I will explain how to make these assessments and respond to the requests from embassy staffs and the Chief of the Intelligence Directorate. I will also walk you through a practice session so that you can become more comfortable with the simulation.

Your responses will be used by SPAWAR Systems Center for research purposes only. Your individual responses will be kept anonymous and will only be released when combined with those of other participants. Please feel free to ask questions at any time. Your participation is voluntary and you may terminate the study at any time with no adverse consequences. In addition to evaluating messages, we also ask you to complete a short background survey.

Consent Form and Demographics/Cultural Values Survey.

⇒ HAND OUT THE SURVEY AND INFORMED CONSENT SHEET. COLLECT THEM WHEN THE PARTICIPANT IS FINISHED.

At this point, I would like you to read and fill out a consent form if you agree to participate, and then to fill out a background survey.

Political Background and Current Situation Handout.

⇒ HAND OUT "SETTING & TASKS, BACKGROUND, RECENT HISTORY, CURRENT SITUATION & OUTLOOK" AND A COPY OF THE MAP.

Please read this operational scenario carefully. It provides information about the political background and current situation in the imaginary countries of Alantra, Ngolo, Esteban, Beyer, and Chardeux. Do not try to memorize this information; you can refer to these papers throughout the scenario. Your task, as a government command analyst of Alantra, will be to monitor and evaluate message traffic pertaining to possible actions by Ngolo.

⇒ WHILE PARTICIPANT IS READING OVER THE SCENARIO, THE EXPERIMENTER WILL REVIEW THE PARTICIPANT'S BACKGROUND SURVEY AND CONSENT FORM TO INSURE THAT THEY ARE COMPLETE. THE EXPERIMENTER WILL ALSO USE THIS TIME TO CONFIGURE THE COMPUTER FOR THE TEST CONDITIONS.

Training.

⇒ NOTE: THE EXPERIMENTER ADVANCES THROUGH THE SCREENS AND DEMONSTRATES HOW TO MAKE THE ASSESSMENTS DURING THE FIRST SIX (6) MESSAGES OF THE PRACTICE SET. THE INITIAL SCREEN CONTAINS INSTRUCTIONS FOR THE PARTICIPANT.

Please read the screen entitled "What To Do." This screen describes your tasks and the event you will be considering. Please let me know if you have any questions.

⇒ AREAS FOR THE EXPERIMENTER TO EMPHASIZE:

1. **The event category of interest — a possible attack on Alantra.**
2. **The periodic assessments (and confidence ratings) after a block of messages.**
3. **Marking of 1–5 messages most important in making the assessment.**
4. **The fact that, during practice, the participant will evaluate messages pertaining a possible attack by Beyer. Stress that, during practice and the "real" scenario, the participant is acting as an analyst of Alantra. (The participant is always an analyst of Alantra—during practice he/she evaluates messages pertaining to likelihood of attack by Beyer, and during the "real" scenario," he/she evaluates messages pertaining to the likelihood of attack by Ngolo.)**

⇒ THE EXPERIMENTER WILL ADVANCE THE SCREEN TO THE PRACTICE SESSION, AND WILL DESCRIBE THE SCREEN DISPLAY TO THE PARTICIPANT:

The first screen requests an initial assessment of what likelihood you would assign to the probability of Attack based on your reading of the background information. Following each assessment of this type, you will be asked to provide a confidence rating for your assessment.

⇒ THE EXPERIMENTER WILL ADVANCE THE SCREEN TO THE FIRST PRACTICE MESSAGE.

The next computer screen contains a map of Ngolo, Esteban, Alantra, Beyer, and Chardeux, as well as the locations of the avenues of transportation (railroads, bridges, and airports), troop deployments, and message sources. The sources for messages include

- **"Open" sources (green background). These are newspapers, magazines, national/international television and radio, and international organizations. The information from these sources can normally be taken at face value. These sources normally report activities and only rarely add a biased interpretation.**
- **Established covert sources (blue background). The information sources within this group are highly placed within various agencies and organizations of the countries of interest. The information provided is normally very accurate.**
- **New covert sources (yellow background). The information sources within this group have been more recently recruited than those in the Established Covert Sources group. At times the information provided is not accurate. There is no concern of compromise and the inaccuracies are probably as a result of inexperience.**

The screen also shows the day and time the message was sent, the elapsed time during the scenario (faster than real time), and the time since the last message.

For each message, there will be a flashing circle on the screen that will correspond to the area that the message describes. Some messages pertain to Ngolo's mechanized infantry, engineers, reconnaissance, and helicopter landing areas—the location of these sites is also included on the map and their meaning is listed on a key to the right of the screen.

⇒ THE EXPERIMENTER WILL ADVANCE THE SCREEN THROUGH 6 MESSAGES TO AN ASSESSMENT BLOCK, AND WILL DEMONSTRATE MAKING AN ASSSESSMENT, A CONFIDENCE RATING, AND MARKING IMPORTANT MESSAGES.

During the practice session, you will be making assessments of the likelihood of attack by Beyer, and you will be rating your confidence in your assessments. When you are asked for this information, the upper left screen will list the previous messages since the last assessment. This is like the initial assessment and confidence ratings except there were no previous messages. You will also be asked to mark the messages (up to 5) that were most important in making your assessment. To mark a message, just click anywhere on the line of the message.

Practice Session.

⇒ THE PARTICIPANTS "TAKES OVER THE CONTROLS." WHEN THE FIRST E-MAIL MESSAGE IS RECEIVED, THE EXPERIMENTER WILL TALK THE PARTICIPANT THROUGH IT.

This screen shows a request from an embassy for an evaluation of some situation. (Read through the request.) Remember that you are the liaison for these requests with the other members of your analyst unit, which includes the analyst supervisor and the junior analyst in addition to yourself. All members of the unit are invited to provide input. Again, this helps to ensure that all staff with relevant knowledge regarding an issue are included. The procedure for replying to these requests is as follows:

1. **Read the request and make your initial evaluation.**
2. **Forward the request and initial evaluation to the group (your supervisor and the junior analyst) for their review and input.**
3. **When the responses from your supervisor and the technician are received, prepare a final evaluation.**
   Note: Although all staff in the analyst unit are invited to provide input, the final evaluation is your choice.
4. **Send the final evaluation directly to the requestor.**

⇒ THE PARTICIPANTS PROCEEDS THROUGH THE FINAL SIX (6) MESSAGES IN THE PRACTICE SET, ENDING AT A TRANSITION SCREEN.

Instructions Summary.

⇒ THE EXPERIMENTER ASCERTAINS THAT, FOLLOWING PRACTICE, THE SCREEN IS ADVANCED TO THE "FINAL INSTRUCTIONS."

Please review the instructions and let me know if you have any questions.

⇒ AREAS FOR THE EXPERIMENTER TO EMPHASIZE:

1. **The event of interest.**
2. **The periodic assessments (and confidence ratings) after a block of messages.**
3. **The need to mark 1–5 messages most important to each assessment period.**
4. **The procedure for responding to embassy and Chief of Intelligence Directorate requests.**
5. **The fact that the participant will now evaluate messages pertaining to the possibility of an attack by Ngolo. Stress that, as during practice, the participant is acting as an analyst of Alantra.**
6. **The fact that the experiment is self-paced.**

(On-screen versions of scenario information:
"NEXT" button sends to update on screen,
"BACKGROUND" button sends to full background; suggested only if participant is confused or wants to review information—however, they have hard copies of all.)

Update to Current Situation: "Ngolo Update"

⇒ ADVANCE THE SCREEN. ON THE FINAL SCREEN BEFORE BEGINNING THE SCENARIO, THE EXPERIMENTER SHOULD EMPHASIZE THE NGOLO UPDATE: PREVIOUS WATCHSTANDER'S REPORT:

Before beginning the study, please review the update on the situation in Ngolo. This is previous watchstander's analysis of the situation, and is the most up-to-date information available regarding the situation.

Allow participant to review the previous watchstander's assessment.

Study Scenario (Part I).

Please work at your own pace and respond as you did during practice to the assessment blocks and requests. Expect to take about a half-hour to complete the first 50 messages. The study will start by asking you for an assessment based on the current situation in Ngolo. Following this, there will be 50 messages divided into blocks of 10 — after each block you will be asked by the Alantra government headquarters for your assessment and for a rating of the confidence of your assessment (remember that during the assessment,

the screen will list the previous 10 messages to assist in your decision). Please also mark those messages most important in making your assessments, 1–5 per block of 10. In addition, you may receive e-mail requests for various types of evaluations from embassy staffs and the Chief of the Intelligence Directorate for After completing the first 50 messages you may take a 5-10 minute break before starting the last 50 messages.

⇒ THE EXPERIMENTER ADVANCES THE SCREEN TO THE INITIAL "REAL" ASSESSMENT.

(**"BACK"** button sends back to final instructions screen,
"START" button sends initial assessment.)

⇒ THE EXPERIMENTER OBSERVES THE PARTICIPANT(S) AND ASSISTS WITH PROBLEMS. THE EXPERIMENTER SHOULD ONLY REITERATE AND CLARIFY PREVIOUS INSTRUCTIONS; THE EXPERIMENTER SHOULD NOT ATTEMPT TO ASSIST THE PARTICIPANT WITH INTERPRETATION OF MESSAGES.

Break
You may take a 5 – 10 minute break if you wish, before starting the remaining 50 messages.

Study Scenario (Part II).

Please follow the same format that was utilized for the first 50 messages. Are there any questions? Please begin.

Structured Interview.

For the last part of this study I would like to ask you some questions about the scenario:

1) **How important to your assessments of the likelihood of attack was the source of the messages?**

   Follow-up probes:
   What did you consider with regard to the source?

   Which source did you trust the most? The least?

   How consistent were the sources as to whether or not attack seemed likely?

2) **How did you choose the messages that were most important to your assessments?**

3) **What had the biggest impact on your confidence ratings?**

4) **With regard to requests from embassy staffs and Chief of Intelligence Directorate: How often did you change your initial evaluations after receiving feedback from your team?**

   What was your strategy?

5) **Was there some point in the scenario when you reached a final opinion regarding the likelihood of attack?**

6) **Was there any information not provided that you would liked to have had to help you evaluate the scenario?**

7) **Please give us any other comments you have about the study.**

<u>Conclusion.</u>

Thank you for your participation. Do you have any questions about this study?

⇒ AFTER THE PARTICIPANT HAS DEPARTED, THE EXPERIMENTER WILL COPY THE APPROPRIATE EXPERIMENT LOG FILE ONTO A FLOPPY DISK FOR DATA ANALYSIS.

STEP-BY-STEP PROCEDURES

1) Welcome and Purpose of Study - Thank subject for participation; present overview of study and **show Organization Chart** (blue paper); offer to answer any questions; discuss confidentiality.

2) Consent Form and Demographic/Cultural Values Survey - **Hand out a Consent Form and the Demographic/Cultural Values survey** for each participant to fill out.

3) Political Background and Current Situation Handout - **Hand out a "Setting & Tasks, Background Current Situation, & Outlook" sheet and a copy of the map** to each participant. (While participant is reading over the material, the experimenter looks over the Consent Form and the Background Survey to make sure that they were answered thoroughly and correctly).

4) Training and Practice Scenarios - Familiarize participant with map (location of countries, sources of messages, transportation sites, troop deployments, and meaning of flashing circles); familiarize participant with protocol for responding at assessment blocks and to requests.

   Monitor messages and assess likelihood of an attack by Beyer with participant to help insure that participant feels comfortable with exercise. In Practice Set 1 (1st 6 messages), the experimenter guides the participant. In Practice Set 2 (2nd 6 messages), the participant manipulates the display on his/her own.

   Assist participant in responding to requests of embassy staffs and Chief of Intelligence Directorate.

(Transition to beginning of experimental scenario)

6) Instructions Summary - Briefly review with participant the instructions for progressing through the scenario.

7) Ngolo Update: Previous Watchstander's Assessment - On the next screen, direct the participant to the Ngolo Update. Emphasize that this is previous watchstander's analysis of the situation, and is the most up-to-date information available regarding the situation. Allow participant to review the previous watchstander's assessment.

8) Study Scenario (Part I) - Participant makes initial assessment of events probability, responds to first set of 50 messages and provides assessments of event probability and ratings of confidence of the assessments (in blocks of 10 messages).

9) Break - 5 – 10 minute break.

10) Study Scenario (Part II) - Participant responds to second set of 50 messages and provides assessments of event probability and ratings of confidence of the assessments (in blocks of 10 messages)

11) Structured Interview - Ask participant structured interview questions regarding the scenario and their hypotheses.

12) Conclusion - Thank the participant and answer questions he/she may have.

APPENDIX D
FINAL INSTRUCTIONS

FINAL INSTRUCTIONS

Your task is to monitor and evaluate message traffic pertaining to **Ngolo**.

As you saw during the practice, you will see each message in the order it was received (but not in real time). Each message includes:
(1) the message text,
(2) the message source,
(3) when the message arrived (e.g. Monday at 16:24),
(4) the time (hrs:mins) that has passed since the first message, and
(5) the time (hrs:mins) that has passed since the previous message.

You must read each message to determine whether it contains evidence for or against one possible event:

- ATTACK - NGOLO is going to attack Alantra

After you have finished evaluating the contents of a message, click the "NEXT" button to show the next message.

Periodically, headquarters will ask you to estimate the likelihood of an attack and your confidence in your estimate. As in the practice session, all the messages you have received since your last assessment will be displayed to help you decide how the situation may have changed. Please mark the messages (up to 5) that were most important in making your assessment.

You may also receive e-mail requests for information about specific issues. The requests will come from Alantra embassy officials in the surrounding countries or from the Chief of the Alantra Intelligence Directorate. You are the liaison for this type of request for your analysis unit which includes your analyst supervisor and one junior analyst.

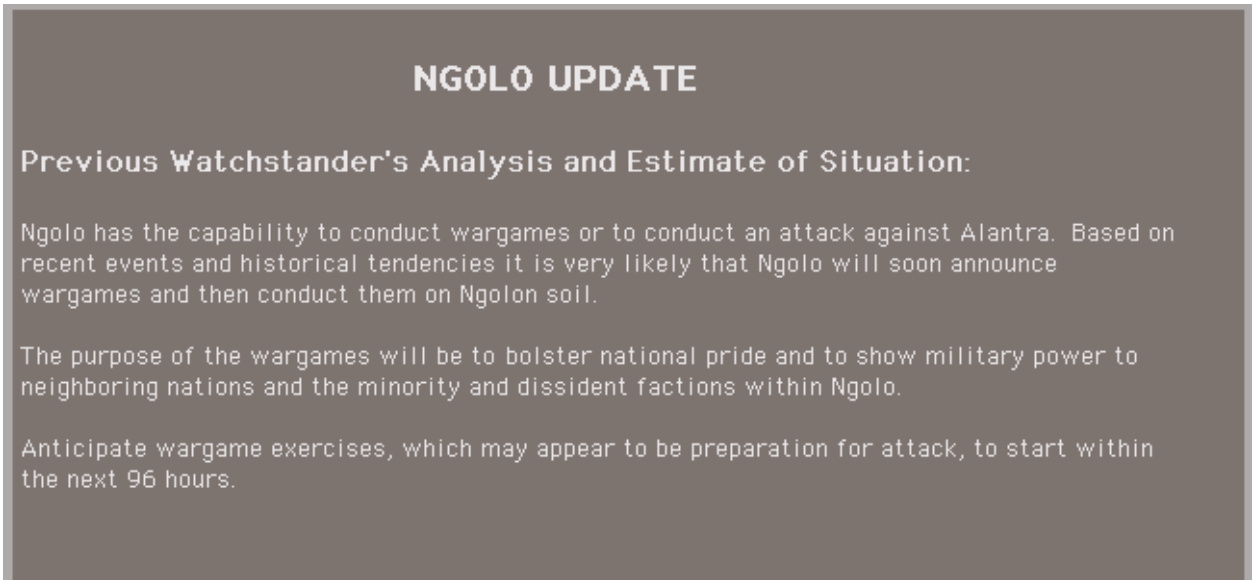
When you receive one of these requests, select your initial best answer and press "Share" to forward the request and your answer to your supervisor and your subordinate for their review. After they reply, consider their comments, retain or modify your initial answer, and then press "Send Answer" to return it to the embassy or intelligence chief. (NOTE: although the other staff are invited to provide input, the final answer is your choice.)

Background NEXT

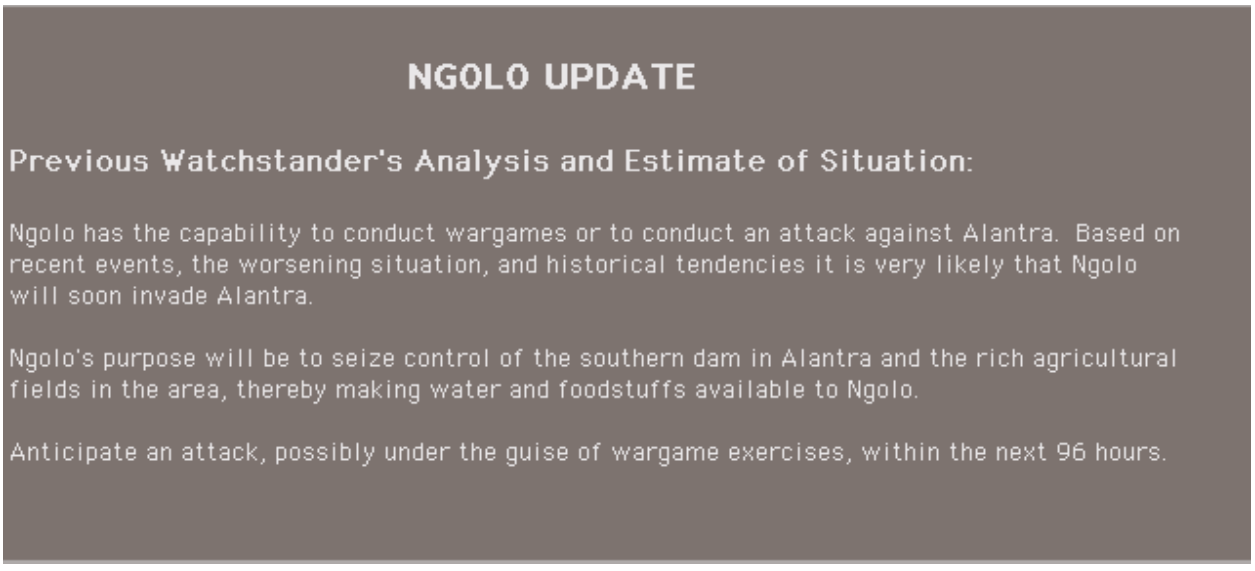
APPENDIX E
FINAL INFORMATION UPDATES

The following three passages were shown to participants just before they started the actual experiment in order to establish an anchor for the initial set of messages. Each participant viewed only one of these passages, depending on the anchor condition to which he had been assigned. They were presented in the context of being the latest analysis and estimate of situation of the previous analyst.

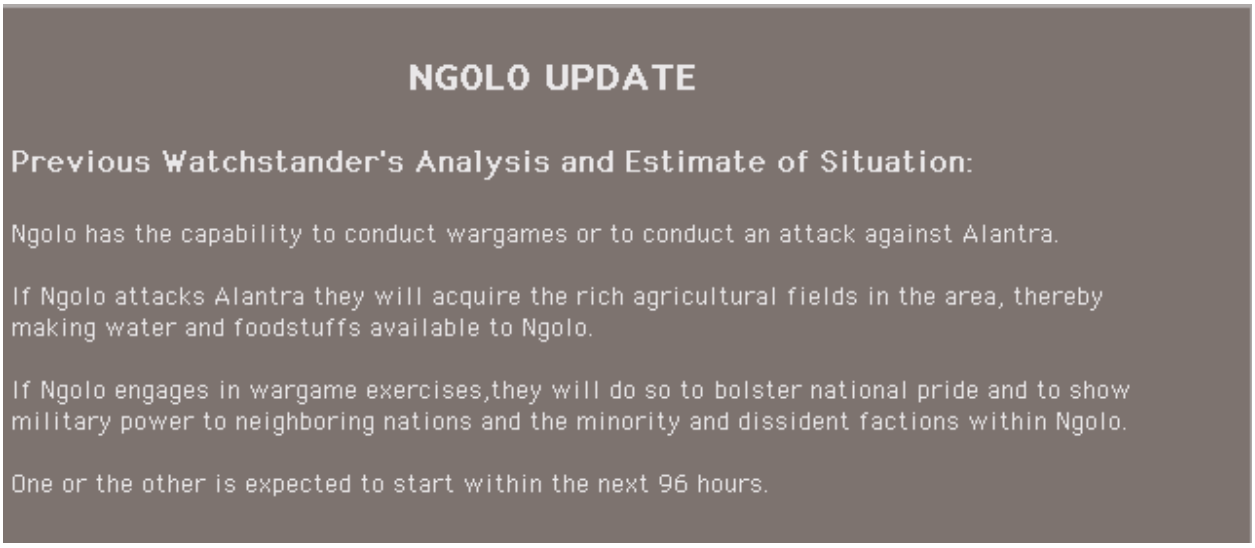
War Games Anchor:



Attack Anchor:



Neutral Statement:



REPORT DOCUMENTATION PAGE

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14. ABSTRACT

This report presents the findings of an experiment that investigated the effects of cultural background, message information content, rank status, and source credibility on situation assessment. Although information content, rank status, and source credibility have received much attention by researchers in command and control decision-making, cultural variations in these factors have seldom been studied. Findings in this report contribute to understanding the effects of cultural variables on situation assessment. These findings can be used to enhance the development of a database that relates cultural characteristics to decision-making preferences and tendencies. Future research should build on these findings by investigating in detail the relationship between cultural attributes, organization factors, decision biases, and situation assessment variables.

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Mission Area: Command, Control, and Communications
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decision aids
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decision heuristics
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database development

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