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A Qualitative Analysis of the Interaction among Culture, Technology and Groupwork

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Abstract
This paper examines the qualitative analysis used in a computer mediated groupwork study. The paper is concerned with the process of data collection and analysis and hence it does not report the findings of the original study. The research process can be seen to have comprised different activities such as preliminary interviews, design of the questionnaire, collection of quantitative data, using factor analysis to find the value groups to be used later for qualitative analysis, setting up the groupwork (both in supported and unsupported environments), transcription of the content of the unsupported groupworks, using the findings of the quantitative analysis (value groups and definitions) to code the content, using outside coders to review codes, using QSR software to categorize the findings based on the codes, review and writing up.

Keywords: content analysis, cultural studies, GSS

1. Introduction
The paper outlines the research process employed in a major study on group decision making with groups from different national groups in two different environments with computer support and without computer support. This study, unlike the majority of GSS studies, builds on decision-making research with two different characteristics. Firstly, the study focuses on one of the least studied areas of decision-making research, specifically, the impact of national culture on the decision-making process. Moreover, the study is not limited to technologically unsupported decision-making but extends to a comparison between the supported and unsupported decision-making process for the two participating nations in the study. Secondly, in contrast to most of the previous decision-making studies this study has focused solely on group decision-making with groups as units of study rather than using individuals as units of study as has been done in previous group decision support studies. The present decision-making research is descriptive in type. It aims to discover the values at work during the decision-making process.

The study is an exploratory study and is of a comparative nature. Two sets of groups acting as representatives for what could be called National Cultures (Australia and Malaysia) were involved in this study. The first part of the study is a questionnaire-based value survey to establish a basis for the measurement of some of the cultural dimensions. The second part is a set of experiments that compares unsupported group decision-making with supported group decision-making, first for each nation and then for the nations in comparison with each other. This part of the study consisted of laboratory quasi-experiments for which the comments were saved by the system for the supported group sessions, and the comments were tape-recorded for the unsupported sessions. Thus comments could later be coded and analysed in search of the cultural values addressed, and their allocated priorities. In these experiments, groups of each nationality completed a single decision-making task. The accomplishment of the objectives of this study required the completion of many tasks. First, it was necessary to develop an instrument to measure cultural dimensions or value groups. This instrument was a 64-item questionnaire, which was developed on the basis of
different instruments used in previous cultural studies (e.g., Hofstede [HERMES studies], 1980, 1983, 1984, 1991; Hui [INDCOL Scale], 1988). This questionnaire measured for different cultural value groups such as uncertainty avoidance and collectivism/individualism. The next step was to write groupwork tasks, which, although artificial, are still similar to the decisions that participants would make sometime in their future professional life. The tasks used in previous GSS studies did not seem relevant to this case, since some of their suggested concepts were not applicable to the Malaysian culture. A single task was used for the laboratory quasi-experiments. Each group took part in only one session and the duration of the sessions was close to two hours. The task was written in such a way as to encourage the participants to give their choice and their reasons for choosing that particular option.

This study examines in a laboratory setting the changes between supported and unsupported group work in the cultural values at work, specifically Individualism and Collectivism, for groups of Australia and Malaysia. It thereby addresses an aspect of social behavior. The research assumes that the decision-maker would assess different decision alternatives in congruence with a set of values (Boulding, 1975). This assumption guided the research to search out a set of cultural values as the basis on which the different decision-making alternatives could be assessed by the decision-maker and a final choice is made. No agreed upon set of values was found. The two most well known cross-cultural studies (Hofstede Hermes studies, 1980, 1988; Schwartz & Bilsky, 1987,1990) had each suggested a different set of cultural values. As well as producing different sets of cultural values these two studies used different methods of data collection and analysis. A collection of definitions and mechanism of classifying cultural values into value groups were borrowed from Schwartz (1992, 1994), Hofstede (1980) and Triandis (1988, 1992, 1994).

The technology used was GroupSystemsV, a type of Group Support Systems which are defined to be an integrated combination of computer, communication, and decision support technologies designed to support group work (Watson et al. 1994). The selected Group Systems technology for this study provided the participants with particular features such as anonymity and simultaneous entry of comments.

2. The Problem

The problem encountered in this research was complex. The main question was: ‘Is the impact of GSS on groups of one national culture, in terms of the values being referred to during the decision-making process, different from the impact of these technologies on the groups of another national culture?’ To answer this question it was necessary to first find the answers to the following questions:

- What is the set of cultural values, which might act as a reference during the decision-making process? What is the impact of national culture, in terms of the values at work during the decision-making process, on the technologically unsupported group decision-making processes of the groups from two national cultures who participated in this study?
- Would each set of national groups refer to a different set of values during their decision-making process? With the introduction of technology, would the groups of the same nationality refer to a different set of values in their supported decision-making process as compared to their unsupported decision-making?

3. Research Design

The research process was divided into two sections:

- In the first part the participants were asked to complete a self-administered questionnaire (the Value Survey).
The second part was a series of unsupported and supported group decision-making experiments with groups from the two national cultures which were participating in this study (Australian and Malaysian).

**Invitation of Students**
- Class invitation by instructor, or researcher
- Invitation letters in their pigeon holes
- Invitation on their orientation day

**Questionnaire Completion**
- Invitation to groupwork sessions provided with one information page and a time table with many choices

**Data into SPSS**

**Groupwork Sessions**
- Groupwork session texts
- Groupwork session tape

**Factor Analysis**
- Grouping of values into Dimensions

**Transcription of the tapes**
- Finding the constructs in the text
- Coding based on the detailed diagrams

**Analysis of the data based on content analysis established in previous stage**

**Figure 1: The Research Design**

In the value survey, participants were invited to complete a questionnaire and then to attend one group decision-making session. More than two thirds of the students who participated in the value survey also attended the group decision-making sessions. The participation was voluntary and no money or course credit was given as a reward for taking part in the research. The main reason for using voluntary participants was to eliminate any negative impact that a payment may have on their comments in a group decision-making session.

In the groupwork sessions, groups consisting of the two national cultures which were participating in this study would work with only one task. Half of these groups would work with the same task in the supported and the other half would work with this task in the unsupported mode. In each session, the participants were asked to read through the task,
select an option, and then give their initial decision with detailed reasons as to why they had decided to select this particular option. The requirement of giving enough reasons to make their selected alternative acceptable would encourage the participants to respond to each other’s comments. The data from the value survey were subjected to quantitative analysis, and specifically to factor analysis. A qualitative analysis was applied to the data from the groupwork sessions. Figure 1 shows the overall design and process of the research.

4. Measurement

Measurement in the context of this study has involved both quantitative and qualitative approaches for the different parts of the study. Jick (1979) has suggested that, by including a qualitative approach as well as a quantitative approach, the research is likely to sustain a profitable close correlation to the actual situation, thus allowing a greater sensitivity to the multiple data available. Lincoln and Guba (1985) proposed that the difference between the qualitative and quantitative approaches could be illustrated in the different ways of measuring human performance. The scientific or quantitative method includes feelings, personality and attitudes only to the extent that such factors directly influence performance. Thus researchers such as Sekaran (1984) and Emory (1985) advocate the measurement of performance, feelings, attitudes and personality, followed by tests for correlation. By contrast, qualitative researcher would be uninterested in measuring these variables but would rather observe the performance of people and draw conclusions.

As the two approaches seem to be complementary, it would appear to be wise to use both of them in understanding group research. Cultural researchers, such as Triandis (1994), advise using both qualitative and quantitative methods in any cross-cultural study, because each method can provide the researcher with one perspective of the subject. The present study uses both qualitative and quantitative approaches but to serve two different purposes.

4.1 The Cultural Survey

As was suggested by Rohner (1984) and later confirmed by Smith and Bond (1993), there is no possible definitive agreement as to how to distinguish one culture from another. However, the accepted practice among researchers is to use nations as representatives of cultures (Hofstede, 1980). The classic Hofstede’s Hermes study (1980) and the work of Schwartz (1992), as two of the most distinguished cross-cultural studies, have both used national cultures as units for their research. This same approach of using nations as units for cross-cultural studies has been adopted in this study. Although the only two Group Decision Support Systems studies which have addressed culture have used the findings of Hofstede’s Hermes study (1980, 1983, 1991), the findings of Hofstede’s study could not be used in the present study for the following two reasons:

The findings of Hofstede’s Hermes study reflect the cultural situation of two decades ago and the results, especially in relation to the nations of the Pacific Region, have been subject to change during the past 20 years. It has been suggested by Triandis (1994) that there may be some variable dimensions of culture, which could change over time. Although there is no overall agreement on the number and characteristics of the cross-cultural dimensions, there is still a suggestion that the nature of some of the dimensions is more variable than the nature of others (Smith & Bond, 1993). Thus, it seemed essential to study the cultural dimensions of the nations involved in the study before addressing the similarities and differences in their decision-making process due to the structure of their different value system.

Since the focus of the present study was the decision-making process of the student participants from these two national cultures, it was deemed necessary to first collect some basic information about the students’ value systems. The value systems of the students were
compared to those of the employers of one multi-national company which participated in Hofstede’s Hermes study. In order to relate the students’ value system to their reference value system in their decision-making process, it seemed useful to conduct a value survey before asking the students to participate in the groupwork sessions.

The purpose of this first part of study was to detect any differences between the two national groups who were participating in this study. The findings of Hofstede’s study highlight the following overall points:

While Malaysia had the highest Power Distance score among the 53 participating nations, Australia had one of the lowest Power Distance indices of them all.

Australia had the second highest index for the Individualism scale, while Malaysia had one of the lowest indices for this scale among the participating nations.

The two countries were close on the Uncertainty Avoidance scale, with Malaysia being slightly higher on the scale than Australia.

No Masculinity Index score was calculated for the Malaysians, but the index for Australians was 61. Japan had the highest score of 95 and Sweden had the lowest score of 5.

The findings of Schwartz (1994) did not point to any of Hofstede’s dimensions: Power Distance, Individualism/Collectivism, Uncertainty Avoidance, and Masculinity/Femininity. Schwartz has suggested seven scales of his own: Conservatism, Affective Autonomy, Intellectual Autonomy, Hierarchy, Mastery, Egalitarian Commitment, and Harmony. Based on his seven scales, he has differentiated between these two nations as follows:

Malaysians were more conservative than Australians. That is, they were more concerned with national security, family security, obedience, and preserving public image, which are only a few of the values he considered as relevant to this conservatism scale.

Australians seemed to be higher on what Schwartz called ‘Affective Autonomy’. That is, they appear to value an enjoyable life, an exciting life and a varied life more than would Malaysians.

The two countries seemed to be quite close to each other on the third scale, which Schwartz called Intellectual Autonomy. That is, the two countries gave almost the same weight to curiosity and creativity in their life.

Although Hofstede’s study noted a high power distance in the Malaysian culture in the 1970s, the Hierarchy index, used for the findings of Schwartz’s study, showed that the two countries are actually quite close on this scale.

The findings of Schwartz’s study showed that Malaysians would choose their own goal in life, and they are more ambitious and more independent than Australians. These values were classified as the Mastery dimension by Schwartz. The higher Mastery scores for the Malaysians are here in contrast with those of Hofstede’s study. Hofstede included all these independence and ambition related values as part of the Individualism dimension.

For Egalitarian Commitment, as suggested by Schwartz, which includes values such as loyalty, and accepting one’s portion, Australians scored higher than Malaysians. This is also in contrast to the findings of the 1970s Hermes studies. Hofstede would have automatically included the values relating to Egalitarian commitment in his Collectivism dimension.

In another set of values, called Harmony by Schwartz, which could be classified under what Hofstede would call Collectivism, Australians scored higher than Malaysians. The Harmony group of values includes unity, and the world of beauty.

In none of the above cases were any statistical tests conducted to ensure that the apparent differences on the different scales of Hofstede and Schwartz were statistically significant. Moreover Hofstede, in his analysis of the data from the Hermes studies, did not conduct an overall factor analysis to find the relevant factors and, as a result, the number of cultural factors to include was answered according to the personal judgement of Hofstede. The Schwartz study, which used an overall factor analysis, raised the following concerns:
The Schwartz study included a large number of parallel emic studies, with the collection and analysis of data being completed separately for each participating nation, which may have biased the findings to some extent.

The type of the analysis used by Schwartz was the Smallest Space Analysis (SSA), as suggested by Guttman (1968, 1982). In this method, the researcher’s hypotheses specify the number of dimensions and the configuration that should be formed by the stimulus points on the two-dimensional projections used. The axes are not assumed to have any substantive meaning because they are, in fact, quite arbitrary. In the SSA type analysis, the researcher interprets the regions formed by the groupings of points and the ordering of these regions, thus shaping the results to a large extent.

The Schwartz study used different groups of participants. That is, while the participants in one nation were all primary school teachers, the participants of another nation were college students. This makes for difficulties in comparison between the two sets of national participants. There was no statistical testing involved, and as a result, the observed small differences on the different factors may not be statistically significant.

Due to the above problems associated with both the previous main cross-cultural studies, it was decided that, for this present study, a cultural survey of the participants in the groupworks would be conducted in order to identify their values. The instrument was designed based on the data from previous cultural studies.

4.2 Group Support Systems, Group Decision-making and National Culture

The model of group decision-making suggested by Gallupe (1985) was based on the earlier model suggested by Huber (in Gallupe, 1985). This model described an input-process-output oriented model involving the important variables of group decision-making. These variables were: task characteristics, decision process variables, group size, group structure, member characteristics, leadership behaviour, and the physical environment. The model suggested by Gallupe (1985) is actually a shortened version of the model suggested by Huber (1984). The following is the representation of the model suggested by Huber:

\[
\text{decision-making effectiveness} = \text{the potential decision-making effectiveness} - \text{the process losses} + \text{the process gains.}
\]

This model have been developed on the basis of an integrated input-process-output model of small group interaction as a result of an extensive review of the group behaviour literature. The inputs to group behaviour are assumed to be: group structure, group strategies, leadership, and reward allocation.

There was no mention of national culture as a variable in the group decision-making process in any of the above mentioned models. It seems that it has been generally assumed that there is a universally applicable impact of technology on the group decision-making process. In order to investigate whether this is so, it seems necessary to include the cultural variable and to examine the interaction between the decision-making process, technology and culture.

The main research method used in different GSS research involves: counting the number of comments, the time it has taken the group to reach a decision, and the satisfaction with the decision-making process. This method has also been used in the few studies addressing the impact of technology on culture (e.g. Watson et al., 1994; Maznevski & Chadoba, 1995). The quantitative method of counting the number of comments and the time taken to reach consensus is useful for showing that the members of some cultures reach consensus much faster than those of other cultures (as has been found by Watson et al., 1994). However, by merely counting the number of the comments and the time taken to reach consensus, the reference value system of the participants would not necessarily be revealed. The reference value system was addressed in this study because it seemed necessary to examine the
similarities and differences between the types of values referred to in unsupported meetings as compared to the type of values being referred to in supported meetings. The inability of the methods used in previous GSS studies to address the impact of culture on group interactions in decision-making groups, in either a supported or an unsupported environment, was the reason for the selection of a qualitative type analysis to address the issues of interest to the present study. As a result, instead of the previously discussed methods, the participants’ comments were used in a qualitative content analysis to find the main values being referenced in the decision-making process by the participants. This method is widely used in the social sciences, group behaviour analysis and, more recently, in cross-cultural studies (Fiske, 1992) and has proved to give the desired type of result.

5. The Design

This section examined the comparison between the value systems at work in the unsupported and the computer-supported groupwork for the two participating national groups. The values systems in use are compared for the unsupported and supported groupwork for each nation, and are then compared between the nations for the supported and the unsupported groupwork combined. The task set for the groups from the two nationalities was to express their views on a number of questions about higher education.

The process of this part of the study is represented in the following diagram:

![Diagram showing the process of comparison between supported and unsupported groupwork for groups from the two national cultures](image)

**Figure 2: The process of the comparison between supported and unsupported groupwork for groups from the two national cultures**

6. Pilot Study

For each part of the pilot study, illustrated in Table 1, one group was invited to participate. The students were invited to participate in the pilot sessions by their lecturers in the Schools of Management and Information Systems.

Four different groups of students participated in this pilot study. The purpose of the pilot study was to provide the researcher with feedback as to the appropriateness of the task for achieving the purpose of this section of the study, which was an examination of the impact of the technology on the value system being referenced in the groupwork process. Some modifications were made to the task which was then used in the main research. The process of content analysis from the pilot study was completed manually, both for finding the original themes and for the coding of the data. For the main research, although the process of finding
the original themes was to be completed manually, the coding of the data was completed using QSR Nudist.

<table>
<thead>
<tr>
<th>Environment</th>
<th>Nationality</th>
<th>Australian</th>
<th>Malaysian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsupported</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Supported</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: The design of the pilot study

7. Laboratory Quasi-Experiments

The study has an exploratory focus in a comparatively new field. As yet, little knowledge is available in relation to the impact of technology on decision-making, and even less on the impact of culture as a new variable in the decision-making process. As a result, the method selected for this part of the study was an adaptation of a controlled laboratory experiment, which is called a laboratory quasi-experiment. Cooper and Emory (1995) suggest the following as the three most important advantages of laboratory experiments as a method of collecting data:

1. The major advantage is the researcher’s ability to manipulate the independent variable.
2. The second advantage of the experiment is that contamination from extraneous variables can be controlled more effectively than with other designs. This helps the researcher to isolate experimental variables and to evaluate their impact.
3. Replication, or repeating an experiment, with different subject groups and conditions leads to the discovery of an average effect of the independent variable across people, situations and times.

Triandis (1994) mentions the difficulty of ensuring that the same degree of manipulation of the independent variables has been used in each setting which involves a cultural study. As a result, it was decided to conduct the study using the same setting, that is, to complete the different parts of the study, which involved the two sets of national cultures, in Australia, instead of conducting the study in the two different countries involved. A major difficulty for the research was to attract sufficient Malaysian student volunteers when no overt reward system was offered.

7.1 Participants

The same students who completed the cultural value questionnaires discussed in Chapter 6 were invited to participate in groupwork sessions. The invitation to participate was given in lectures at the beginning of the academic year in student orientation sessions. Students were told about the major characteristics of computer supported group systems and it was pointed out that this was an opportunity to learn about a new technology not generally available. For those who expressed interest by giving their name and contact details a mail follow up gave more information about the time and place of the experimental session and the student’s role. Each student would take part in one session only.

Ninety-nine students participated in sessions for this part of the study. These 99 comprised 50 Malaysian (12 groups) students and 49 Australian students (12 groups). Half of the groups of students for each of the participating national groups worked in supported groups and the other half worked in unsupported groups. There were three to five members in each group.
7.2 Task

The belief that the most important variable affecting group decision outcomes is the decision-making task involved, as suggested by Gallupe et al. (1988), was later supported by Menneck and Wheeler (1993). They suggested that most of the previous Group Support Systems research was conducted without any particular attention given to the type of task used for the study. Although previous GSS research has used many different kinds of tasks in the study of decision-making, the research did not involve any study of the impact of cultural values. Most previous research focused on structured decisions where the responses revealed little about the personal value systems of the respondents or whether the researchers used tasks which were inappropriate for the students in this study or the particular cultures studied here. The different parts of the single task used in this section of the research were specifically chosen as open-ended questions in order to encourage the participants to discuss both positive and negative issues about higher education and their personal reasons for going to university. The task included asking students to discuss the advantages and disadvantages of going to university and then subsequently, as a group, to write a letter to final year school students persuading them for or against the opinion the group had formed.

7.3 Preparation of Data

The resulting data from the supported and unsupported groups was, for the former, a computer print out of all comments keyed into the computer and, for the latter, a transcribed text of the tape recordings of the discussions from the unsupported group sessions. Comments from both the unsupported and supported groups were initially identified by a key, which recognised groupwork type, nationality of the group members, and the date of the session. The comments from all the sessions were then combined in a pool to be used for the content analysis.

7.4 Developing the Structure for the Main Themes

The method of content analysis followed an approach suggested by Morse and Field (1995). The researcher reads the entire document and identifies 'topics'. These topics became the main categories or category labels. At first the categories were required to be very broad so as to allow a large number of comments to be grouped into each category. Later, these categories were divided into sub-categories as the need arose. A tree diagram then represented these categories and sub-categories and, on the basis of this, it was possible to write a descriptive analysis of the categories and investigate the relationships between the categories.

Wilson (1989) suggested that there are two different types of content analysis:

- Semantic or deterministic content analysis, which is content analysis done at the obvious or manifest level. An example of this type of content analysis is simply coding and counting responses in a transcription.
- Feeling tone, inferred, or judgemental content analysis, which is content analysis at the implication, or latent, level. In this type of content analysis the researcher goes beyond what was said directly to infer the meaning of something.

The present study combined the two types of content analysis. Some of the topics or categories (deterministic) were present in the group discussions and the others (judgemental), which were implied in the discussions, had the same meaning, although using slightly different wordings. For example, the categories which were related to the sources of motivation were mostly based on the exact words of the participants, but the ‘responsibility’ categories were mostly based on judgements about the implied meaning of the words used.
This assisted the analyst to save the full richness of the data, which in turn provided the study with a more comprehensive list of the values referred to in the process of groupwork sessions.

7.5 Coding process

The steps followed in the content analysis of the groupwork discussion in this study can be summarised in the following three steps suggested by Wilson (1989) and Berg (1995):

1. Deciding on the unit of the analysis. In this stage, a decision needed to be made as to what would be considered as the text units. A text unit is an entity recognised by Q.S.R. Nudist. The text units were selected on the basis of their meaning and could only be a part of a sentence, a complete sentence or even a paragraph, which would then be allocated a code. The code would guide the software to the location of that special theme rather than the rest of the tree. That means that, in some cases, a part of sentence would refer to the same practical concept, as does a whole paragraph in another case, at least with respect to the values embodied therein.

2. Borrowing or developing the set of categories. Wilson (1989) suggested that if the study is concerned with concepts imported from an existing theory, then the researcher could set up classifications in advance and merely read through the data. For this research study, it was decided to devise a set of categories based on the themes appearing in the data (Wilson, 1989) instead of referring to the categories suggested in previous cross-cultural studies. This method helped the researcher to use the findings of the value survey as a basis for recognising cultural factors and, at the same time, to save the richness of the task-specific values.

3. Developing the rationale and illustrations to guide coding of the data into categories. The categories were defined in as much detail as possible in order to assist the coding process. These definitions were the result of a close examination of the data for the purpose of assigning the categories. Two other coders went through the same group discussions to ensure that the coding could be considered valid. In some cases, differences in coding practice were discussed and agreement was then achieved in 75 per cent of the cases.

After the content analysis, the next step was to develop the tree (the classification of comments) into Q.S.R. Nudist by entering the data file and allocating the codes. The Q.S.R. Nudist software simplifies the process of analysis by indicating the number of comments in a class of comments and providing the researcher with reports of the different categories and all the comments in that class.

7.6 Data Reduction

The task set for the group provided an opportunity to examine the motivations of the decision-makers from their comments and the encouragement they had received for their decisions to continue their studies.

The classification of the main themes was based on the pool of the comments submitted by the participants of the four different modes: Australian supported, Australian unsupported, Malaysian supported, and Malaysian unsupported. This means that for some of the classes of comments there have not been any comments issued. The summary of classification of the themes are represented in Figure 3.

Conclusion Drawing and Verification

Huberman and Miles (1994) suggested that the conclusion drawing and verification stage involves the researcher in interpretation, or drawing meaning from the displayed data. The
researchers suggested different tactics for the interpretation of the data, including the noting of patterns and themes within each general conclusion about the data. An investigation of the patterns and existing themes in the data is the method followed in the qualitative analysis of the data in this part of the study.

Figure 3: The main themes and the codes for the fourth task

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