

Cross-Cultural Differences in Preferences
For Visual Information in Technical Documentation

By

Patty-Jo Bellamy

A Dissertation submitted to the Faculty of Graduate Studies of
The University of Manitoba

In partial fulfillment of the requirements of the degree of

Doctor of Philosophy

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ABSTRACT

An important communication tool that impacts customers is the technological documentation that accompanies a purchased product. Whether in the form of an owner's manual, assembly instructions, operating instructions, or repair and maintenance information, this information may influence consumers' perceptions of the product. This technical information is often critical to the proper and safe use of the product. Technical documentation can make product usage easier and problem solving possible. Although cross-cultural research has examined differences in advertising communication, research examining cultural preferences in technical documentation is relatively unexplored. The little that has been conducted has focused on the written technical communication, or verbal content of such documentation. The visual elements that enhance and set the context for the written information have been relatively unexplored.

This research proposes using the cultural dimensions of Individualism and Uncertainty Avoidance to examine the impact of cultural differences on preferences for visual information in technical documentation. Two critical aspects of visual information in technical communications that will be explored include: 1) the amount of visual information; and 2) the way in which the visual information is organized. This research posits that cross-cultural differences in the amount and organization of visual information within the technical documentation are important factors in consumers' determining the quality and value of such documentation.

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Chapter 1

Introduction

In the increasingly multinational/global world of commerce, communicating with consumers in diverse cultures is an essential part of doing business. Businesses need to take into account all forms of communication between them and the consumer market place. This would include the technical documentation that accompanies the product. One area of product information that is little researched and understood is the impact of visual information in technical documentation. This research project will examine cultural differences in consumer's preferences for visual information in technical documentation.

OVERVIEW

With the “. . . globalization of markets and the changing role of business practitioners in a rapidly evolving international environment” (Catlin and White, 2001), businesses are under increasing pressures to attract and keep multinational/multicultural customers. “The comfort of doing just what we want to is gone. The world is

too small, communication is too rapid" (Catlin and White, 2001).

In this increasingly interconnected world, composed of competitive international markets, the concept of customer satisfaction has become a fundamental marketing concept (Keith 1960; Spreng, MacKenzie and Olshavshy, 1996). In order to understand customer wants and needs and to attract and keep customers, research has examined the concept of customer satisfaction (Yi 1990). While there is considerable interest and research examining the variable of customer satisfaction, two of the major concepts influencing customer satisfaction have been determined to be: (1) the experience with the product or service (Oliver 1980, Olshavsky and Spreng 1989; Spreng et al 1996; Westbrook and Reilly 1983; and Yi 1990); and (2) more recently, customer satisfaction with information from marketing communications (Spreng et al 1996).

Research has generally supported the notion that the consumer's experience with a purchased product will impact their overall evaluation of that product (Droge et al 1997; Olshavshy and Spreng 1989; Spreng et al 1996; Westbrook and Reilly 1983; Yi 1990). However, in their overall experience with the product, consumers frequently need to assemble all or part of the product, connect parts or components, or

learn how to operate the product properly in order to actually use the product. In such diverse products as computer desks, bookcases, garden sheds, lawn mowers, and children's toys, products need partial or complete assembly before they can be used. In products such as computers, home theater equipment, stereo equipment, VCRs and DVDs, the product components need to be connected to be used. For many products such as computer software, computers, VCRs, DVDs, lawn mowers, options on automobiles, cell phones, and kitchen equipment, consumers need to read instructions or owner's manuals in order to learn how to operate the products properly.

These written instructions, then, can be crucial to the consumer's overall experience with the product. "Virtually every model of the satisfaction process posits that feelings of satisfaction arise when consumers compare their perceptions of a product's performance to their expectations [of how the product will perform - their experience with the product]" (Spreng et al 1996, 18). Therefore, having the product assembled correctly or reading technical documentation in order to learn how to correctly operate the product would seem to have an impact on the customer's experience with the product and would, therefore, be an area of great interest to businesses.

Spreng et al (1996) proposed a model to better capture the determinants of customer satisfaction that included the notion of satisfaction with the marketing communication information. These researchers examined the relative impact of satisfaction with marketing communication on overall feelings of satisfaction with a product or service experience. Indeed, their research results identified satisfaction with information as a "key mediator of the impact of disconfirmation of expectations on overall satisfaction, [which] underscores how important it is for firms to accurately communicate with consumers . . ." (35).

Similarly, research by Gardial et al (1994) found marketing information to be of significant importance to satisfaction with product experience. Therefore, technical documentation would appear to be an important area for communications research.

Of further interest to businesses, instructions about the correct operation of a product can have a direct impact on the safety of the product. Legally adequate, understandable instructions are important to help safeguard consumers and help ensure that business do not end up in court. Easily understandable technical documentation will also help protect businesses if they find themselves in court (Helyar 1992; Kemnitz 1991; and McCord 1991)

Therefore, concern with well-prepared and easily understandable technical documentation should interest business to: (1) help promote the safety of consumers and protect businesses from court action; and (2) impact consumers' experience with products, which may have an impact on overall satisfaction with the product. Even with the importance of providing good technical documentation about the assembly of products, connection of components, and instructions for the safe and proper use of products, this area of research has been relatively ignored in the marketing research arena. In an increasingly competitive international market place, understanding how to effectively communicate with consumers to improve their experience with products would seem to be a field ripe for research.

RESEARCH PURPOSE

CROSS-CULTURAL COMMUNICATION

With the rapid growth in international business there is a corresponding increased emphasis on international marketing communications (Zhang and Neelankavil 1997).

If, as Spreng et al (1996) have indicated, information satisfaction has an impact on overall customer satisfaction, then understanding how to effectively

communicate product information with ethnically diverse consumers is important to customer satisfaction. Indeed, essentially no business can now contend they have a homogeneous consumer base. Businesses are increasingly faced with the need for cross-cultural business communication even in their own domestic workplace (Limaye and Victor 1991). There is the realization that all business communications today may be international or intercultural communication (Leininger 1997, 253). Therefore, it seems imperative that businesses come to understand cultural differences in the processing of technical documentation.

Friedmann (1986) contends that the meaning consumers derive from advertising and other marketing stimuli may be influenced by their culture. Since culture is the "lens" through which consumers assign meaning to their world (Hofstede 1984, McCracken 1986), research into understanding how culture would impact the decoding of technical documentation would be indicated.

VISUAL INFORMATION

When technical documentation is prepared to accompany products, these documents are designed using verbal as well as visual information. What little research that has been

conducted to investigate cross-cultural differences in technical documentation has examined the verbal elements of the communication (Ulijn 1995; Jansen and van Erkel 1996; Krone, Garrett and Chen 1992; Limaye and Victor 1991). The area of visual communication has been relatively ignored. Researchers have proposed that visual information communicates meaning through a culturally based visual vocabulary that, in turn, reinforces a corresponding, learned system of visual conventions (McCracken 1986, Scott 1994).

Scott (1994) proposed that visuals be viewed as information in a symbolic form, messages that must be processed cognitively by means of complex combinations of learned pictorial schema. In an examination of this possibility, Phillips (1996) conducted research that demonstrated this assertion, she found that visuals are indeed processed to form product message meaning. Therefore, not only are visuals important to the total marketing communication being processed for meaning, but also the processing of this meaning is through a learned "visual vocabulary" (Scott 1994, 253). Since culture is the shared "programming of the mind" (Hall 1976, 13) or the taught "lens" through which we assign meaning to all that we encounter (McCracken 1986), we would expect to find

cultural differences in the processing of visual information.

Some research in the advertising field supports this contention. When advertisements from the U.S. and France were compared, the American ads contained more verbal information cues than the French ads. The content analysis of these ads supported the proposed cultural differences in the amount of informational content in the U.S. and French print advertisements (Biswas, Olsen and Carlet 1992).

Similarly, other research supports cultural differences in the use of visual information. For example, Beniger and Westney (1981) found significant differences in the use of illustrations in the U.S. and Japan. Likewise, Culter and Javalgi (1992) examined visual components in advertising in the U.S. and the European Community. These two researchers found more country differences than similarities. Even within the European Community where there were many similarities, significant differences in visuals were found. Klein (1991) conducted an experiment with print advertising in Mexico and the U.S. He found significant cultural differences. Respondents in both countries significantly preferred total customization of language and pictures consistent with their cultures. The research in this paper proposes to examine possible cross-cultural

differences in preferences for visual information in the technical documentation that accompanies products.

CULTURAL FRAMEWORKS

Any research of cross-cultural differences has to consider the concept of culture and what aspects of culture are to be used to compare various cultures. One cultural model is now finding its way into marketing research. Hofstede's research elucidated cultural differences that the researcher denoted as four different cultural dimensions, namely: Individualism versus Collectivism; Uncertainty Avoidance; Masculinity versus Femininity; and Power Distance (1980 and 1984; Hofstede and Bond 1988). Hofstede's cultural dimensions have also been utilized in research examining marketing communications (Albers-Miller and Gelb 1996; Benedict, Steenkamp, ter Hofstede and Wedel 1999; Dawar and Parker 1994; Kale 1991; Lynn, Zinkham, and Harris 1993; Murphy 1999; Zhang and Gelb 1996).

Understanding cross-cultural communication differences is often difficult and the issues are complex. The amount of cross-cultural research is greatly increasing. Research has been conducted on cultural values as a basis for illuminating differences and similarities (Hofstede 1984; Hofstede and Bond 1988; Lowe 1998; Stroetzel 1983) non-

verbal differences and the impact of context on communication (Hall 1959, 1983, Hall & Hall 1990); behavioral patterns (Reisigner and Turner 1998; Sagie 1998); and differences in advertising communications (Albers-Miller and Gelb 1996; Zhang and Gelb 1996). Cross-cultural marketing communications research and research using this cultural framework suggests two areas of possible cultural differences to explore. These two variables are Amount of Information, and Organization of Information.

Amount of Visual Information

Hofstede's Uncertainty Avoidance represents the degree to which people within a culture are unwilling to accept and deal with uncertainty. This value is related to anxiety, need for security, and dependence on experts (Hofstede 1980, 1991). Thus, people in cultures that exhibit high Uncertainty Avoidance would rely on experts more and would be expected to prefer more explicit detailed information from the experts. Since they are risk adverse, people in high Uncertainty Avoidance cultures are more likely to desire more information (verbal information dominating) in order to operate, assemble, or maintain their equipment properly.

On the other hand, cultures low in Uncertainty Avoidance are willing to take risks and are willing to process information more quickly, work independently (Hofstede 1980, 1984) Therefore, since information from visuals is processed rapidly (Paivio 1971), national cultures low in Uncertainty Avoidance would be expected to prefer less explicit information (visual information dominating).

Organization of Information

Hofstede's dimension of Individualism versus Collectivism is important in examining cultural differences in the organization of information. In the educational setting the Japanese, a collectivist society, uses a synthetic approach to determine meaning in communication. Members of this cultural group combined ideas to create a complex whole, storing types of information. On the other hand, in the U.S., an individualistic culture, respondents use an analytical approach to assign meaning to communication. Members of this cultural group break down information into pieces and store discrete pieces of information (Karjala 1993). Thus, cultures differing on the Individualism dimension may prefer differences in the way visual information is organized from the holistic view of

the product to discrete parts of the product.

Individualists may prefer separating out the visuals, only showing the parts of the product to be addressed in operating, assembling or maintaining the product.

Collectivists may prefer seeing how all of the differing parts of the product combine into the whole picture before operating, assembling, or maintaining the product.

Research

This research examined cultural preference for visual information in technical documentations. Specifically, the Dominance of Information, Visual or Verbal Dominance of the message, and Organization of Information, and Holistic versus Serialistic, were the foci of this research. The impact of these manipulations on Perceptions of Quality, Perceptions of Value, and Attitude toward the Technical communication were measured. The moderating effects of culture were assessed, in particular Uncertainty Avoidance on Amount of Information, and Individualism versus Collectivism on Organization of information.

Teas and Agarwal (2000) developed a model based on Zeithmal's (1988) means-end model. Teas and Agarwal's (2000) research was developed to test the extrinsic variables, specifically, those of price, store name and brand name, on perceived quality, perceived value and the

sacrifice component of perceived value as moderated by country name. The model for the research in this paper was developed by a modification and addition to Teas and Agarwal's model. In addition the work of Bezjian-Avery, Calder and Iacobucci (1998) was used and expanded. Bezjian et al examined differences in preferences for verbal dominance or visual dominance in advertising. The model for the research contained in this paper was developed by applying the differences in preferences for visual/verbal dominance to technical documentation.

The research in this paper examined these differences using an experiment developed with actual technical documentation for a bicycle. Questions to determine respondents' preferences for the technical documentation, Perceptions of Quality, Perceptions of Value and Attitudes along with individuating information were asked. A comparative sample of students from Japan, Hong Kong, Canada and the U.S. were used in the research.

DEPENDENT VARIABLES

The two critical aspects of visual information in technical communications include: 1) the amount of visual information; 2) the way in which the visual information is organized. This research posits that cross-cultural

differences in amount and organization of information within the technical documentation are important in determining the quality and value of the documentation. Understanding cultural differences is often considered a prerequisite for successful international marketing communications (Keegan 1989).

Consumers grow up in a particular culture and are trained in that culture's value system, beliefs, and perception process. Therefore, they respond to marketing communications that are congruent with their culture, developing favorable attitudes and rewarding businesses that understand their culture and tailor messages to reflect their values (Boddewyn, Soehl and Picard 1986; Buzzell 1968; Harris 1984; Hornik 1980; Zhang and Gelb 1996).

Communication that conforms to culturally based preferences is perceived as being of higher quality and, therefore, will be perceived as being of higher value (Gardner 1971, McConnell 1968), resulting in higher attitudes toward the technical documentation. Understanding cultural differences in preferences for visual information in technical documentation is important for developing communication tools which will be highly valued by a multi-national customer base.

ORGANIZATION

This research was designed to investigate the cultural differences in preferences for the Dominance of Verbal or Visual and Organization of Information in Technical Documentation. This research also explored the effects of these differences on Perceptions of Value and Quality and Attitudes toward the Technical Documentation.

Chapter two examines the relevant literature on Dominance of Information and Organization of Information. The cultural frameworks are elucidated and possible impact on preferences for the independent variables are then discussed. The outcome variables of Perceived Quality, Perceived Value, and attitudes toward the technical documentation are examined.

Chapter three lays out the model that was used for this project. The relationship between the variables is explored and the resulting hypotheses are stated.

In chapter 4 the methodology is discussed. Included are the design of the experiment instrument, the sampling processes, and an explanation of the sampling size.

Chapter five describes the analysis and results, while chapter 6 draws conclusions for theory and managerial applications.

CHAPTER 2

LITERATURE REVIEW

INTRODUCTION

Understanding how to effectively communicate with consumers has been an important impetus behind research in the psychological field as well as the marketing field (Bovee and Arens 1985; LaBarbera, Weingard and Yorkston 1998; Paivio 1971; Rossiter 1982) With ever increasing competition for consumers and the difficulties of increased communication clutter, researchers and practitioners are continuing to develop further understanding of how consumers process information (Duncan 2001). Certainly understanding how to effectively communicate with consumers involves trying to understand how consumers process information and developing communications based on their processing styles (Childers, Heckler and Houston 1985).

The next three sections will review the literature of interest for this current research. Firstly, since information processing is the way in which people assign meaning to communication stimuli (Paivio 1971), this important basis for communication will be examined. Secondly, culture is the "lens" through which people process information (Hofstede 1980; Kale 1991; McCracken

1986), therefore, theoretically, culture should have an impact on the processing of information. Culture and its possible impact on preferences for communication styles will be explored. Lastly, an understanding of how people respond to communications has been demonstrated to be important to their satisfaction with both the information and with the product (Spreng et al 1996). Outcome variables used in communication research to determine communication effectiveness are quality, value (Dean and Biswas 2001; Teas and Agarwal 2000; Zeithaml 1988), and attitude (Babin, Burns and Biswas 1992; Burns, Biswas and Babin 1993; Zhang and Gelb 1996). Therefore, how culture would be expected to moderate perceptions of quality, value and attitudes will be discussed.

INFORMATION PROCESSING

Dominance of Information

Two streams of research have emanated from the fields of psychology and consumer behavior to dominated the exploration of how information is processed (Gould 1990; Paivio 1971). These two areas of research are information processing and imagery. These are concerned with examining the processing of verbal information, and the other term of

imagery being a general term under which everything non-verbal is classified, respectively. While in the classical sense, information processing has typically referred to cognitive processing of verbal information, in this research the term information processing will refer to the more general definition of the cognitive processing of any information in any format.

In the seminal work conducted by Paivio (1971) to develop his dual-code theory (1986), he first explored the basis of information processing to establish and develop his theory. One of the primary bases for dual-code theory is that two independent and interconnected systems exist that make-up the way information is processed. The first system is the verbal system consistent with early cognitive psychology research. The second is a non-verbal or imagery system (Paivio 1971). Lord (1980), while labeling them schema and images, concurs that two separate modes of processing information exists. This development of the dual-processing model gave researchers a new view of information processing. Going against the predominate view at his time, Paivio's (1986) model proclaimed the superiority of information presented in a visual mode.

Paivio's (1986) dual-coding theory, while recognizing both systems, posits that not only do images or pictures

activate the visual coding process, but they also activate the verbal encoding process. The dual-coding theory sets forth the superiority of memory for recall of information presented through pictures or images because of the two retrieval paths (verbal and picture) that are activated at the time of retrieval (Paivio 1971, 1986).

With the two retrieval paths, both the verbal system and the image system within the brain are activated and involved. Information processing then takes place in more than one place. Therefore, the contention is that pictures have superiority over the verbal content when it comes to learning, or becoming part of a person's knowledge structure (Eysenck 1977; Paivio 1986; Rossiter 1982). When a person is presented with a stimuli in image form, the short-term, or working memory activates both the verbal and image processing systems. Information is then stored in long-term memory in both the verbal and image systems. The likelihood of remembering and the ability to retrieve information is related directly to the number of routes in memory (Anderson and Reder 1979; Paivio 1971, 1986; Unava and Burnkrant 1991). Therefore, because of this dual processing, learning is enhanced and recognition or recall is aided (McKelvie and Demers 1979; Paivio 1971, 1986). There is evidence that recall is a good predictor of

awareness (Research Systems Corporation 1983; Young and Robinson 1992). Since advertisers measure the effectiveness of communication with recall and awareness, getting messages into memory and increasing recall and awareness are important in the marketing communication field (Bovee and Arens 1989, Arens 2001). With this effect on recall and awareness, research in advertising has examined the use of visuals and their impact on communication effectiveness (Babin, Burns and Biswas 1992; Burns, Biswas and Babin 1993; LaBarbera and Weingard 1998; MacInnis 1987; McQuarrie and Mick 1999; Rossiter 1982; Smith 1991; Young and Robinson 1992). In addition, visual long-term memory appears to have virtually unlimited capacity and deteriorates very slowly unlike verbal long-term memory (Avons and Phillips 1980; Eysenck and Keane 1990; Rossiter 1982).

Based on the dual-coding theory, it would be expected that marketers would always want to communicate with consumers through visuals if it caused the message to be more memorable. Research was undertaken by McQuarrie and Mick (1999) in which they manipulated pictures in advertising while keeping the verbal content the same. They found that while visuals affect information processing, they do not necessarily increase persuasion. Similarly,

Young and Robinson (1992) conducted research in which they examined visual content of advertising and the impact on recall and persuasion. In their experiment, Young and Robinson used twenty-four 30-second television ads. They used a system that presents advertising in a laboratory environment and measures persuasiveness by means of a pre- and post-exposure brand choice technique. These researchers also used the picture sort technique to determine recall of all of the scenes in the advertisements. The results of Young and Robinson's research conclude: measures that were important for understanding persuasiveness were different from those that explain recall; ads that demonstrated high persuasiveness were neither less nor more visually complex than those ads that rated nonpersuasive; and viewers tended to view more of the visual information in the persuasive ads. Young and Robinson's research demonstrates that understanding what makes effective communication is complex. To determine that visuals aid recall is not enough. The measurement of recall alone is probably not sufficient to determine if a marketing communication has been effective in getting a message across to consumers.

Rossiter (1982), while discussing some of the advantages of using visuals to carry messages in marketing communications, also supports the contention that

communication effectiveness needs careful consideration of the verbal content of the message as well. Graber (1996) supports this contention that pictures, combined with words, enhance the transmission of information. Graber conducted research on television news. She had viewers watch news broadcasts in which specific stories were presented verbally or both verbally and visually. For the picture/verbal combination, Graber found significantly greater recall of scenes and details. So, while according to the dual processing model, visuals improve recall, the combination of visuals and verbals may be superior.

In accordance with the visual/verbal effectiveness in communication interest, research was undertaken to test two differing theories on complex learning (Gellevij, Van der Meij, De Jong, and Pieters 2002). Gellevij et al (2002) used multimodal versus unimodal instruction to examine their impact on learning. The multimodal method is based on the dual coding theory. With the multimodal method respondents would use the capacity of both the verbal and nonverbal system. Gellevij et al (2002) explain that according to the multimodal method, this would then lead to the processing of more information than using just the verbal or just the visual systems. The use of both systems leads to better learning because the connectivity of the

two systems contributes to the construction of a strong mental memory (Gellevij et al 2002; Mayer 1999 a, b; Mayer and Gallini 1990; Mayer and Sims 1994; Paivio 1990). On the other hand, cognitive load theory would support the use of unimodal instruction (Gellevij et al 2002; Chandler and Sweller 1991; Sweller 1994; Sweller and Chandler 1994). Cognitive load theory is based on the limitations of working memory. The cognitive load theory states that when people are faced with communications that may be difficult, more information may be a burden because of the limited amount of working memory. This theory further indicates that there are two potential risks with communications: redundancy and split attention effects (Chandler and Sweller 1991; Mayer et al 1999; Mayer and Bior 1998; Sweller 1994; and Sweller and Chandler 1994). Redundancy occurs when information is presented twice (verbally and visually for instance). This then takes up the limited working memory that could be used to process other information. Split attention occurs when respondents must attend to multiple sources of information at the same time and learning is hampered when these sources must be integrated.

The research conducted by Gellevij et al (2002) examining these two conflicting theories used instructional

material in a written text only, and a written text with visual illustrations. Gellevij et al (2002) designed instruction manuals for learning a complex computer program through self-instruction. One version of the manual contained only verbal information. The other version included screen captures (displays of the computer screen). The screen captures were designed to support three of the four key functions for such pictures (developing a mental model of the program; verifying screen states - that the respondent is on the right track; identifying and locating window elements and objects; the fourth that was not tested was switching attention - from manual to the screen of the computer). During the course of the experiment participants would reach screens where they were asked to fill in the current time and answer questions about cognitive load. After each chapter respondents were given a test. The training time was used as an indicator of the ease of use of the manual. The results indicated that the training time for the visual/verbal manual was significantly less than for the verbal only manual, indicating that the visual/verbal manual was easier to use. Users of the visual/verbal manuals also had significantly higher ratings on training tasks. The researchers concluded that the

combination, or multimodal method, had superior effects on learning.

Similarly, in the marketing field, Edell and Staelin (1983) found that the use of visual and verbal content was superior to the use of just verbal content or just visual content. Edell and Staelin (1983) conducted research in which they examined the processing of visuals versus verbals in print advertising and the resulting effects on memory by measuring recall. In their experiment Edell and Staelin used three manipulations: one version of the ad with only verbal content; one version of the ad with verbal and pictures; and the third version with just pictures. The results indicated superior recall of brand-relevant items and aspects of the advertisements for the messages with both verbal information and pictures. Respondents also exhibited higher attitudes toward the ad and the brand with the ads containing both visuals and verbal content.

In an experiment by Unnava and Burnkrant (1991), they examined more closely the relationship between the verbal content and the visuals. These researchers contended that verbal content that evoked images (the example they used to illustrate this point was a table) would make pictures redundant and in those cases the pictures would not increase recall of that attribute information. However, in

the case where the verbal content was not image-provoking (the example they used was freedom), the addition of pictures exemplifying an attribute would enhance recall of that attribute information. To test this contention, they designed a 2X2 experiment.

The first factor was imagery (high versus low) of the verbal content of the ad. The second factor was the presence or absence of pictures. These researchers then measured recall and delayed recall, but did not measure any other outcome variables. The results indicated that in cases where the verbal content was not particularly image-provoking, the use of pictures increased delayed recall scores. In the case where image-provoking verbal content was used, the addition of pictures did not significantly increase delayed recall measures. In the latter case, the verbal content is believed to initiate dual processing because the respondent develops the images in their mind. Unnava and Burnkrant conclude that their research results demonstrate the power of image processing and its impact in moderating the effects of pictures in print advertising. These results have been supported by similar research (Burns, Biswas and Babin 1993; Smith 1991; Childers and Houston 1984).

In summary the dual processing model previously discussed has demonstrated the importance of visuals in increasing the memory and recall of information (Paivio 1971, 1986), but not necessarily the persuasiveness of the communicated message (McQuarrie and Mick 1999). As effective as visuals are, research has also demonstrated the superiority of visuals with verbal content to impact learning and recall of both the communication details and product details (Gellevij et al 2002; Edell and Staelin 1983).

In a seminal work by Childers, Houston and Heckler (1985), they examined the possibility that people may prefer to process their information either visually or verbally. Childers et al examined research that had been conducted to try and test a respondent's propensity to process information either visually or verbally. Through this work, Childers et al developed their Style of Processing questionnaire that examines differences in preferences for verbal or visual information. These researchers examined the Visual/Verbalizer Questionnaire (VVQ) developed by Richardson (1977) and Gordon's (1949) Test of Visual Imagery Control (VIC). The VVQ is a 15 item scale developed to differentiate between people who typically engage in verbal or visual processing. The VIC

uses a twelve-item scale to assess a person's ability to control their imagery, or their ability to picture images when processing information.

Both of these scales have deficiencies. The VVQ has relatively low internal consistency and the test-retest reliability is also quite low. The VIC was found to have relatively low reliability coefficients, and Westcott and Rosenstock (1976) hypothesized that the scale may not be unidimensional. Therefore, to overcome the deficiencies in the available scales, Childers et al modified the Visual/Verbalizer Questionnaire to develop the Style of Processing Questionnaire.

In the development and testing of the new scale, these researchers found the internal consistency of the scale was an improvement over the Visual/Verbalizer Questionnaire. Furthermore, confirmatory factor analysis demonstrated that the visual and the verbal components were independent. Childers et al also found that the scale demonstrated discriminate validity. Important to this research Childers, Houston and Heckler found in the development and testing of the Style of Processing questionnaire, that respondents demonstrated differences in preference for visual versus verbal information. They found that some people prefer to

process information visually and others prefer information in verbal content.

Gould (1990) examined style of information processing and its relation to involvement with products, shopping behavior (visualizing the products while making a shopping list), and the trait of self-consciousness. Based on the respondents' answers on the Style of Processing Scale (SOP) (Childers, Houston and Heckler 1985), he sorted respondents into four categories: low processors; high verbals; high visuals; and high processors. Gould found that there were significant differences between the four categories of processors and their impact on the independent variables. Shopping visualization was clearly related to a visualization style with High Processors and High Visualizers more likely to visualize or plan a shopping trip. High Processors and High Visualizers also reported being more publicly and privately self-conscious. Individuals who are High Processors tended to be more involved in magazines. Gould concluded that people who are highly responsive to both verbal and visual cues may be more highly involved with magazines because of the dual verbal and visual nature of the medium. Gould also found that High Processors and High Verbalizers were more involved in books. He concluded that a person's preference

for either visual or verbal processing seems to influence their involvement with products that are more verbal or visual in nature.

LeBarbera, Weingard and Yorkston (1998) investigated differences in processing styles and the possible impact on consumer attitudes and purchase intentions. These researchers examined personality types on the basis of Jung's type theory (1923, 1971). Jung's type dimensions represent polar opposites: extroversion versus introversion; thinking versus feeling; and sensing versus intuiting. LeBarbera et al's (1998) research focused on the sensing versus intuiting dimension of Jung's types. Jung's theory (1923, 1971) contends that while everyone perceives information through both sensing and intuiting methods, people typically do not use each method with equal ease. Typically, people feel more comfortable with one method to interpret information. According to Jung's type theory, intuitives see the big picture; they possess information in "gestalt" manner.

On the other hand, sensors see the trees rather than the forest. Sensors demonstrate a need for hard facts, coupled with a strong attention to detail (Blaylock and Rees 1984; Jung 1923, 1971; Myers 1987; Schweiger 1985). From this LeBarbera et al (1998) hypothesized that

individuals would prefer images and advertisements that were consistent with their information processing styles, based on their personality type. They further hypothesized that these preferences would impact respondents' indications of purchase intentions. The experiment consisted of eight advertisements consisting of sensor and intuitive versions for four fictitious brand products. The respondents viewed the ads and were asked questions to determine their evaluation of the ads image appeal, overall evaluation, and purchase intention. The respondents were then asked questions used as a manipulation check.

After rating the ads, the respondents were then asked questions from the Myers-Briggs Type Indicator to determine their personality type (sensor or intuitive). The results strongly supported LeBarbera et al's hypothesis. When the researchers examined the results for each product category (LeBarbera et al used stereo equipment, retirement savings, orange juice, and mattresses in the advertisements in the experiment), these results held true regardless of the product category. LeBarbera et al conclude that the findings of their research supports the idea that understanding preferences for information processing is important in understanding and predicting how consumers may interpret and respond to marketing messages. Other research

has supported these results by demonstrating that advertising is more effective when it provides information in a manner that is congruent with the communication preferences of the audience (McBride 1988; Yorkston and LaBarbera 1997; LaBarbera, Weingard and Yorkston 1998).

If research has indicated the superiority of a verbal/visual combination in communications, then how can the differences in preferences of communication processing styles be accounted for in developing effective communication? In research conducted in the U.S., larger pictures or illustrations produced better learning (Koslyn and Alper 1977; Koslyn 1980) The research conducted by these researchers supported the long held "square root law" in advertising, which basically states that the recognition of print ads increases with the square of the illustration size. For example these researchers found twice as much ad recognition with four times the picture size. In addition research conducted by Rossiter and Percy (1978, Percy and Rossiter 1980) and by Mitchell and Olson (1977, 1981) found that the size of the illustration not only had an impact on ad recognition, but also had a positive impact on attitude toward the ad and attitude toward the brand. Therefore, research in the U.S. has demonstrated that the size of the visual elements has a positive impact not just on memory

responses, but also on evaluate responses (Rossiter and Percy 1978, 1980; Mitchell and Olson 1977, 1981).

Bezjian-Avery, Calder, and Iacobucci (1998), examined the linear flow of traditional advertising versus the hierarchical tree method of interactive media: ads where the visual elements dominated the message versus ads where the verbal information dominated; and processing style preferences (visual preference versus verbal preference). They examined the impact of these variables on recall, attitude toward the ad, attitude toward the brand, and purchase intentions.

As expected, they found that verbally oriented consumers attuned to the verbal content of the ad and visually oriented people attuned to the visual content of the ad. The presentation of either predominately verbal information or predominately visual information had impact on the outcome variables of attitude toward the ad, attitude toward the brand, and purchase intentions. Where the information was presented in a manner consistent with their processing preference, either visually dominate information or verbally dominate information, then evaluation of attitude toward the ad and brand and purchase intentions were more positive.

The research by Edell and Stalelin (1983) and supported by others (Gellevij et al 2002; Rossiter 1982) has indicated the superiority of using communications with both verbal and visual elements. Furthermore, research indicates that people exhibit preferences for communication with either the visual elements dominating or the verbal information dominating (Childers et al 1985; Gould 1990). Research conducted by Bezjian-Avery, Calder and Iacobucci demonstrates that communication is most effective when sensitive to processing preferences.

All of this research in the marketing field examining visual and verbal information, processing styles, and the impact on outcome variables, has been conducted using advertising. Advertising's purpose primarily is to be persuasive in nature, thus the concern for and emphasis in the research to determine the verbal/visual impact on not only increase recall, but also on persuasion (Bovee and Arens 1989, Arens 2000).

Information Processing and Technical Documentation

Technical documentation differs from advertising in that consumers usually do not use or have access to the information on assembly and the owner's manual until after the purchase. Technical documentation instructs consumers

on how to assemble and operate the product and trouble shoot problems that may occur while using the product. Typically, then, technical documentation does not have the purpose of persuasion. Its purpose is to teach consumers how to assemble and use the product (Dorbin 1989; Miller 1989; Redish and Schell 1989). Therefore, ease of use of the technical information provided in the documentation is a prime consideration when developing the technical documentation that accompanies any product. Different purposes are important in designing communications (Bovee and Arens 1989, Arens 2001). The research of Gellevij et al (2002) did examine the impact of multimodal communications on learning, and found that a combination of both verbal and visual information was superior for ease of use and learning. However, their research did not examine the possible impact preferences for processing might have.

As previously indicated, Gellevij et al (2002) established the superiority of using both visual and verbal content in a learning environment. Research in the advertising field has demonstrated that in persuasive communications, consumers have demonstrated a preference for either verbal or visual information (Childers, Houston and Heckler 1985; Gould 1990). This research will expand on the work of Gellevij et al (2002) by also examining

communication with both visual and verbal elements used to inform/teach as well as examining preferences for either visual or verbal dominance. This research will attempt to add to the understanding in the learning field by adding preferences to the work by Gellevij et al (2002). This research will also expand understanding by examining preferences for information elucidated in the advertising field to determine if this will hold true in the learning field of technical documentation. Therefore, this research should also effectively expand our understanding of the use of visuals and verbal elements in developing effective marketing communications.

Organization of Information

The research just discussed was conducted by Bezjian-Avery and her associates (1998). It not only examined preference for type of information, but the research also supports the idea that differences in the organization of information may be important when designing communications. Part of these researchers' experiment was to examine differences when advertising information was presented linearly (as in a typical advertising format - for example television) or when it was presented in a hierarchical format (as in an internet interactive format). Their

research indicated differences in preferences for information presented in a linear fashion or a hierarchical fashion. Bezjian-Avery et al (1998) demonstrated that consumers exhibit different preferences for how the information was organized.

In the education field there is evidence of differences for preference in the organization of information. Gregorc (1982) developed the Transaction Ability Inventory to describe adults' method of interacting with their environment. Two of the categories are labeled sequential and random. When people have a preference for sequential, the preferred style is a step-by-step method of instructions. In what Gregorc calls random, people see the holistic view. They prefer instructions that demonstrate how the parts or pieces all fit into the whole picture.

Likewise, Pask (1976) classifies learning styles into holistic and serialistic. Holists are those who seek to personalize knowledge and to interrelate ideas into the whole. On the other hand, serialists prefer a narrow focus, concentrating cautiously on details and logical connections.

In research conducted with teachers, Fuller et al (2000) used four categories from Gregorc's Transaction Ability Inventory. In further development of these four

categories, Butler (1984) conducted extensive research to develop styles summaries for each of the categories. This included the sequential and random (holistic) styles. In the pilot research by Fuller et al (2000), they conducted surveys of teachers who were offering courses on-line. These teachers were asked a battery of personality questions from the Myers-Briggs survey, questions from the Transaction Ability Inventory, attitudes about teaching and learning on-line, their satisfaction with the learning environment, and their future intention to be involved in on-line learning. Fuller et al found that the respondent's learning style did impact comfort or preference with the learning environment.

In another research conducted in the education setting, only this time with students, the research once again found differences in learning styles (Karjala 1993). Karjala conducted research with Japanese and U.S. college students. This researcher contended that culture provides consistent guides for how people view and interpret their world. Karjala proposed that culture would guide how people select and organize information and, therefore, would process and store information differently. In his experiment, students were given information that included three different information types: color vs. shape vs.

location. The students were given the information and were given five minutes to process the information. Then the researcher gave the respondents arithmetic problems to clear short-term memory. The respondents were then allowed eight minutes to free recall. Next, the respondents were given the same information back again with target information missing and they were given six minutes to fill in the missing information. The results from the experiment demonstrated that the learning styles used by the respondents in this research were synthetic and analytical.

Karjala's research results indicated that the Japanese students exhibited the synthetic style, combining ideas to create a complex whole and storing information types more evenly than the U.S. students, or in other words these respondents exhibited holistic learning styles. The U.S. students exhibited an analytic style in that they broke down the information into discrete pieces of information, storing one type of information over another, similar to a serialistic learning style.

Technical documentation is designed with the purpose of teaching consumers how to assemble and/or use a product. Exploration of learning styles in this setting would seem appropriate. More specifically the learning styles categories of holistic, needing to see how the parts and

pieces are part of the whole, versus serialistic, needing to see the process step-by-step, would seem to be appropriate with technical documentation. This research proposes to apply the educational literature in the marketing setting and attempt to increase understanding of learning styles and the communications process.

Culture and Learning

Humans are programmed by their culture in how to assign meaning to what they see and hear (Hofstede 1984, McCracken 1986). Friedmann (1986) contends that the meaning consumers derive from advertising and other marketing stimuli may be influenced by their culture. This is supported by the experiment of Karjala (1993) just discussed, where he made the contention that culture provides the guide for viewing and interpreting information and that different groups process and store information differently based on their culturally provided guides. Many marketing researchers have similarly argued the importance of culture in analyzing consumer response to marketing communications (Clark 1990; Farley and Lehmann 1994; Takada and Jain 1991; Taylor, Miracle and Wilson 1997). The next section will cover culture, a culture framework for the

current research, and research supporting the use of culture in this research will be discussed.

Culture

When examining the concept of culture, many definitions of culture exist. Robock and Simmonds (1989) have referred to culture as the set of learned norms that condition a populations' behavior. Hofstede (1984) defines culture as:

"the interactive aggregate of common characteristics that influences a group's response to its environment . . . the collective programming of the mind which distinguishes the members of one human group from another" (21).

McCracken (1986) refers to culture as a "lens" that imbues the world with meaning. One of the most comprehensive definitions comes from a consensus of anthropological definitions as quoted by Kluckhohn (1951):

"Culture consists in patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values" (86, 5).

Similarly, Kale (1991) referred to culture as a series of learned responses that are a result of a "collective mental programming." Inherent in all of these definitions is the concept that through culture individuals learn to

assign meaning to what they see. According to Kale (1991), this collective programming then affects all aspects of a marketing transaction and this would encompass the technical communications included with the product. This concept makes culture and cultural differences important whenever the research of international communications is undertaken.

Cross-cultural research is increasing in the marketing communications field. Albers-Miller and Gelb (1996) noted that while there is a call for "multidisciplinary approaches" in researching marketing communications, historically few researchers have used a theory or model of culture to support their research. One framework, Hofstede's cultural dimensions (1980; 1984) is now being increasingly used in the research of cross-cultural differences (Alber-Miller and Gelb 1996; Cutler, Erdem, and Javalgi 1997; Frith and Sengupta 1991; and Kale and McIntyre 1991).

Prior to the 1980's the concept of culture was a rather "fuzzy" construct (Kim et al 1994). Culture had many definitions, but in the field of cross-cultural psychology researchers had experienced difficulty in operationalizing the concept of culture (Rohner 1984; Kim et al 1994). The research of culture had largely been defined by its

comparative methodologies rather than its coherence of content (Triandis 1980; Kim et al 1994).

While working for a large multi-national company, Geert Hofstede realized a need for businesses to be able to compare cultures and adapt to cultural differences. In 1980, Hofstede published the results of a large multi-national research conducted with more than 117,000 IBM employees in 66 countries. In this exploratory research, he used factor analysis and discovered four cultural dimensions. Hofstede labeled these cultural dimensions: Individualism versus Collectivism; Uncertainty Avoidance; Power Distance; and Masculinity versus Femininity. Since Hofstede's research, other researchers have attempted to explore one or more of these dimensions at greater depth. Referred to as the academic seed, this area of research has been "watered" by Harry Triandis and his colleagues (Kim et al 1994).

Hofstede's work has been recognized as providing structure for the concept of culture and also revitalizing cross-cultural psychology by providing a theoretical framework and a way of operationalizing culture to provide a method of cultural comparison (Kim et al 1994). This cultural framework has been acknowledged as a way of providing integration of knowledge within the disciplines

of psychology (such as cognition, development, social, organizational and clinical psychology) and across disciplines (such as anthropology, sociology, economics, and management) and suggesting convergence across different methodologies (Rohner 1984).

Not only has Hofstede's work sparked interest in his dimensions, spawning research to try and further refine or develop his model of culture, but also research to explore other possible cultural dimensions. Several models of culture have come forth that have developed or explored dimensions of culture.

Schwartz (1990) developed a model of culture that included cultural dimensions of self-direction, stimulation, hedonism, achievement, security, restricted conformity, traditionalism, universalism and power. Schwartz' dimensions of self-direction, stimulation, hedonism, and achievement correspond closely to the concept of individualism. Schwartz's dimensions of security, restricted conformity, traditionalism, and benevolence correspond to collectivism (Triandis 1994). Therefore, Triandis contends that while the labels have change, the model is very similar to Hofstede's.

Fiske (1990) developed a model of culture based on the way individuals relate to each other. In Fiske's model, the

cultural dimensions are referred to as: communal sharing; authority ranking; equality matching; and market pricing. Communal sharing is similar to collectivism. The dimension of authority ranking emphasizes power distance. Equality matching corresponds to individualism (Triandis 1994).

Thus, research into cultural differences has focused on the concept of finding and exploring various cultural dimensions. But, all of this research has converged on the same patterns of social behavior (Triandis 1994).

While Hofstede's initial work was conducted over 20 years ago, more recently Samli (1995) conducted an analysis of Hofstede's dimensions. The dimensions of Individualism versus Collectivism, Power Distances, and Uncertainty Avoidance were analyzed to determine the ways in which they might impact marketing. Samli found that these three dimensions should have an impact on the ways information is processed; values; consumption patterns; purchase behavior; affinity to new ideas. Particular to this research is the impact on the ways information is processed.

Therefore, many of the models of culture either spring from Hofstede's work or have developed dimensions similar to Hofstede's. Since Hofstede's work is seen as the "seed" from which the area of cultural research has developed; it is relatively easy to measure each of the dimensions; and

the precedence has been set for its use in researching cross-cultural differences in marketing communications (Albers-Miller and Gelb 1996; Benedict, Steenkamp, ter Hofstede and Wedel 1999; Chang and Lim 2002; Dawar and Parker 1994, Kale 1991; Lynn, Zinkhan, and Harris 1993; Moss and Vinten 2001; Murphy 1999; Samli 1995; Zhang and Gelb 1996) Hofstede's cultural model (1980, 1984, 1999, 2001; Hofstede and Bond 1988) will be examined for use in this research.

DEVELOPMENT OF CULTURAL DIMENSIONS

In Hofstede's (1980) development of cultural dimensions he proposes three levels of mental programming (see figure 2.1). The most basic level of mental programming is the universal level, which is that programming shared by almost all humans. The universal level includes the biological "operating systems" which includes behaviors such as laughing and weeping. The second level of mental programming is the collective level. This is programming that is shared with some people but not with others. This is the level that is common to people belonging to groups and is where cultural programming would take place. The third level of mental programming is the

Figure 2.1

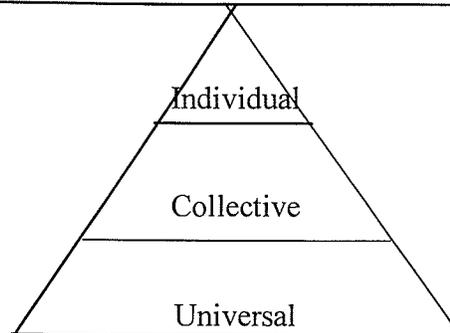


FIGURE 1 Three Levels of Uniqueness in Human Mental Programming
Source: Hofstede, Geert (1984) "Culture's Consequences, Vol 5, p. 16. Newbury Park, CA: Sage Publications

individual level that includes individual differences, those that are unique to the individual. While individual differences are of interest to marketers, when communicating with mass audiences, of major interest to marketers are the universal and collective levels of mental programming. Hofstede researched the collective level of mental programming to develop his cultural dimensions since this is where culture is programmed and cultural differences would be evident.

Previous to Geert Hofstede's cross-cultural research, some researchers had proposed cultural dimensions (Kluckhohn 1962, Rokeach 1973). Anthropologist Kluckhohn proposed that there exist universal categories of culture that need to be explored. Even though others had proposed cultural dimensions, Hofstede's research conducted from

1966-1978 constituted the largest and most extensive cross-cultural research of its time. Hofstede had undertaken this seminal work to find a way to understand and compare cultures by discovering other underlying cultural dimension proposed by Kluckhohn (1962). When Hofstede analyzed the data at the group level, he found four underlying cultural dimensions: Individualism versus Collectivism; Power Distance; Uncertainty Avoidance; and Masculinity versus Femininity.

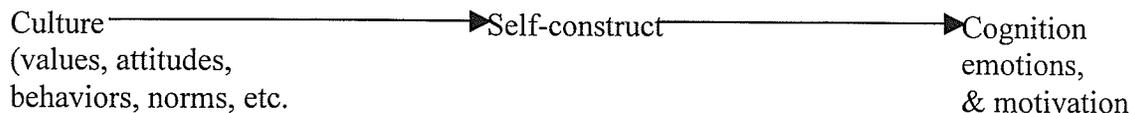
Individualism versus Collectivism

According to Hofstede (1980 and 1984) Individualism versus Collectivism (IDV) deals with the prevailing relationship between individuals and social groups within the culture. Hofstede states that this cultural dimension is not only a matter of "ways of living together," but is also linked to societal norms (1984, pg. 149). Therefore, IDV affects peoples' mental programming, or the way they assign meaning to the stimuli around them.

Hofstede (1980 and 1984) contends that cultures high individualism may focus on attaining individual goals, while cultures low in individualism may be tightly knit, focusing on the good of society. This is consistent with Hall's cultural model of high context versus low context.

Hall (1969) contends that in individualistic societies inhabitants have little involvement with each other. Therefore, the rich sharing of information does not take place. Low-context societies of Hall's model, then, are consistent with the societies high in Individualism in Hofstede's model.

Markus and Kitayama (1991) developed a cultural theory of independent and interdependent self-constructs that corresponds with the constructs of individualism and collectivism. They contend that these self-constructs affect the way individuals think, perceive themselves, feel emotions and act. Their model can be illustrated by the following:



Hofstede (1991) argues that the purpose of education is perceived differently between the poles of individualism and collectivism. In the individualistic society, there is a tendency towards learning to cope with new, unknown, unforeseen situations. Similarly, Hsu (1985), Pratt (1991), and Traindis (1989) provide evidence that Chinese and western concepts of "self" offer possible explanations for the impact of culture on cognitive styles. In an earlier

work, Triandis (1972) argued that culture results in the automatic processing of information, because culture specifies what is worth noticing, and how it is to be evaluated.

The research conducted by Karjala (1993) has demonstrated that people from collective cultures tend to interpret communications synthetically, whereas individualistic cultures tend to interpret communications in an analytical style. Thus, individualistic cultures would tend to break down information into pieces and collective cultures would tend to combine information to create a complex whole.

With researchers contending that the impact of individualism/collectivism's on cognition and patterns of social behavior, Triandis (1989) argued that the importance of the cross-cultural research of this particular cultural dimension could not be overstated.

Uncertainty Avoidance

Hofstede's (1980 and 1984) cultural dimension of Uncertainty Avoidance (UAI) is the degree to which a culture will tolerate ambiguity and change. Ways of coping with uncertainty belong to the cultural heritage of the societies and are passed on, or transferred and reinforced

through societies' basic institutions. Societies differ in their societal norms for tolerating ambiguity or uncertainty avoidance. According to Hofstede, cultures low in uncertainty avoidance are willing to take more risks and have a preference for broad guidelines, there should be as few rules as possible and if the rules that exist cannot be kept, those rules should be changed. In addition, in cultures low in UAI rules may be broken for pragmatic reasons. Whereas cultures high in uncertainty avoidance are risk adverse and exhibit a preference for clear requirements and guidelines. In cultures high in UAI rules should not be broken. There is a need for written rules and if rules cannot be kept the sentiment exists that the offenders need to change and start following the rules (Hofstede 1980, 1984, and 1990). Furthermore, this UAI dimension is also related to anxiety, need for security, dependence on experts, and the application of information (Albers-Miller and Gelb 1996).

Research Use Of Hofstede's Dimensions

Hofstede' cultural dimensions have been applied in diverse areas of marketing research such as purchasing (Mitchell and Vassos 1997), distribution channels arrangements (Kale and McIntyre 1991), customer

innovativeness (Steenkamp, ter Hofstede and Wedel 1999), and information processing (Steinwachs 1999). However, the area of marketing where the majority of research applying these cultural dimensions occurs is in the area of marketing communications. Research to determine effective use of promotional tools, such as advertising, promotions and sales, in a multicultural business arena has been the setting for research using Hofstede's model.

Frith and Sengupta (1991), in conducting advertising content analysis with ads from three different countries, were able to demonstrate how a country's score on the Individual dimension could explain cultural differences in advertising technique.

Zhang and Gelb (1996) conducted experiments to examine culturally different consumers' reactions to various ads. Zhang and Gelb developed ads with either an individualistic appeal or collectivistic appeal. These ads were then shown to both Chinese and U.S. respondents. The results showed that the U.S. subjects had a significant preference for the individualist ads while the Chinese showed a significant preference for the collectivistic ads.

In an examination of ads from 11 countries, Albers-Miller and Gelb (1996) tried to determine whether advertising content mirrored predictable differences in

cultures. The researchers coded the ads for appeal and correlated the advertising appeal with Hofstede's cultural dimensions indices. They found significant support for 18 of their 30 hypothesized relationships. They concluded that the method that they used for this particular research demonstrated that some countries simply had more advertising appeals of all kinds. Therefore, in comparing those countries that had more advertising appeals with countries that had fewer appeals, absolute differences may disappear, but proportional differences may not. Albers-Miller and Gelb concluded that their research results provided one more reason for hesitating when advised to standardize marketing communications.

Hofstede's cultural dimensions have also been applied to research investigating ways to improve the effectiveness of the promotional function of sales in industrial marketing. Lackman, Conway, Hanson and Lansa (1997) compared cultures in the U.S., Japan, and Latin America. They found substantial differences between these cultures consistent with Hofstede's research. Murphy (1999) used these dimensions to examine sales practices in Australia and New Zealand. While results provided mixed support for Hofstede's dimensions, Murphy concluded that culture has an

impact on all aspects of sales force response to sales practices.

Roth (1995) related differences on Hofstede's dimensions to the need to customize brand image to improve brand performance. And lastly, in the area of marketing promotions, Kale (1991) used Hofstede's dimensions successfully as a framework to compare customer receptivity to marketing communications across cultures.

These researchers have demonstrated a precedence for the successful application of Hofstede's cultural dimensions to marketing research. Therefore, this research was conducted to examine cultural difference using two of these dimensions, Individualism and Uncertainty Avoidance.

Criticism and Support for Hofstede's Model

First of all, it must be acknowledged that there have been criticisms leveled at Hofstede's work. Specifically, the greatest criticism is that the data used by Hofstede to develop his model of cultural dimensions was collected from respondents all working for IBM. Since the respondents all worked for a corporation known for having a strong corporate culture, the critiques question whether the respondents are representative of their native culture

(Banai 1982; Kidd 1982; Merker 1982; Robinson 1983; Rose 1986; Sorge 1983; Triandis 1982).

In order to explicate this major criticism Mikael Sondergaard (1994) undertook the task of examining research, both published and unpublished, that used Hofstede's model. Two of Sondergaard's findings are important to the research at hand. Firstly, Sondergaard found empirical uses that either duplicated the framework or made adjustments to the framework. If, as the critiques claim, the respondents used in Hofstede's work are not representative of their native cultures, then the cultural dimensions developed from Hofstede's research would be suspect. On the other hand, if these dimensions are indeed part of an effective model of culture, then replications should discover the same dimensions.

Hoppe's (1992) research in nineteen different countries provided strong support for Hofstede's dimensions. Sondergaard found fifteen other replications: Lowe 1994; Chew and Putti 1995; Chow et al 1991; Westwood and Everett 1987; Fidalgo 1993; Pooyam 1984; Maldonado 1983; Yeh 1988; Punnett and Whitney 1988; Huo and Randall 1991; Forss 1989; Dunphy and Shi 1986; Ashkanini 1984; Seddon 1983; Redding 1982. Sondergaard (1994) concluded after examining sixty-one replications that while numerous

non-confirmations were expected due to the complex nature of cross-cultural studies, Hofstede's findings were confirmed.

In addition to these studies, Sondergaard (1994) found thirteen other studies asking questions different than from Hofstede survey that displayed results that supported one or more of Hofstede's cultural dimensions. Examples of research confirming one or more of Hofstede's cultural dimensions include research that studied twenty-two social relationships among respondents from Japan, Hong Kong, and Italy and found differences similar to Hofstede's Individualism-Collectivism (Argyle et al 1986). A research of respondents from Hong Kong and the U.S. found differences similar to the Individualism and the Power Distance dimensions (Bond et al 1985). Research conducted by Stroetzel (1983) conducted in nine European countries revealed a split identical to Hofstede's high and low power societies.

Secondly, Sondergaard (1994) also found research using Hofstede's dimensions as a paradigm in which the survey questions and the cultural dimensions were used as "taken-for-granted assumptions" (p.453). Of interest to this current research, Hofstede's cultural dimensions are now being used as a conceptual framework to explain the

influence of culture on research topics. Sondergaard's non-exhaustive search found 274 citations in which Hofstede's cultural dimensions were used as a paradigm. The use of Hofstede's dimensions is evident in the marketing field as well. Hofstede's cultural dimensions have been applied to sales practices in the sales management arena (Murphy 1999), and to brand image and performance (Roth 1995). The use of Hofstede's work in the field of cross-cultural advertising is more prevalent (Albers-Miller and Gelb 1996; Biswas, Olsen and Carle 1992; Cutler, Erdem and Javalgi 1997; Zhang and Gelb 1996). Research in the marketing field has demonstrated the applicability of Hofstede's cultural dimensions to cross-cultural research.

Summary

Developing effective communications to an often times multi-cultural audience has been driving a great deal of research in marketing communications. Two areas of interest in differences in multinational consumers' communication styles, namely amount of information (or Visual Dominance versus Verbal Dominance) and Organization of Information (either holistically or serialistically) are examined. Marketing researchers have made a call for a multidisciplinary approach to investigating cross-cultural

communications (Albers-Miller and Gelb 1996, Zinkhan 1994). Historically, few researchers have used a theory, framework or model to support their research (Albers-Miller and Gelb 1996). More recently the work of Hofstede has successfully been applied to cross-cultural research, and in particular, to cross-cultural marketing communications. Following this precedence, two of Hofstede's cultural dimensions (1980, 1984) are used in this current cross-cultural communications research. In the next chapter the model will be discussed with the relationship between the independent variables of amount of information and organization of information, the moderating impact of cultural antecedents, and the dependent variables.

CHAPTER 3

DEVELOPMENT OF MODEL AND HYPOTHESIS

The Conceptual Model

As discussed in the previous chapters, in this research of technical documentation the concepts of Dominance of Information and Organization of Information are explored. The impact of culture on respondents' evaluation of the technical documentation is also examined. When developing a conceptual model for this current research, a search of the literature to find an established model that explored communications and evaluative outcomes was undertaken. One model that was developed to examine extrinsic cues (such as price, brand name or marketing information) impact on perceptions of Perceived Quality and Perceived Value moderated by country name was developed by Teas and Agarwal (2000).

The Teas and Agarwal (2000) model is based on the relationship between the extrinsic cues of marketing communications and the outcome variables of Perceived Quality and Perceived Value. Since this relationship was established in the Means-End model of Zeithaml (1988), this portion of the Means-End are discussed first, then the development of the Teas and Agarwal (2000) model are

examined. The further development of the Teas and Agarwal model for use in this research are then examined.

In the seminal work of Zeithmal (1988), the Means-End chain approach to understanding the cognitive structure of information the consumer retains in memory has several levels of abstraction. Consumers' organized information ranging from simple attributes, such as the physical attributes (Myers and Shocker 1981), to complex attributes, such as personal values. Within these levels of abstraction, Zeithmal (1988) explored and developed the outcome concepts of Perceived Quality and Perceived Value.

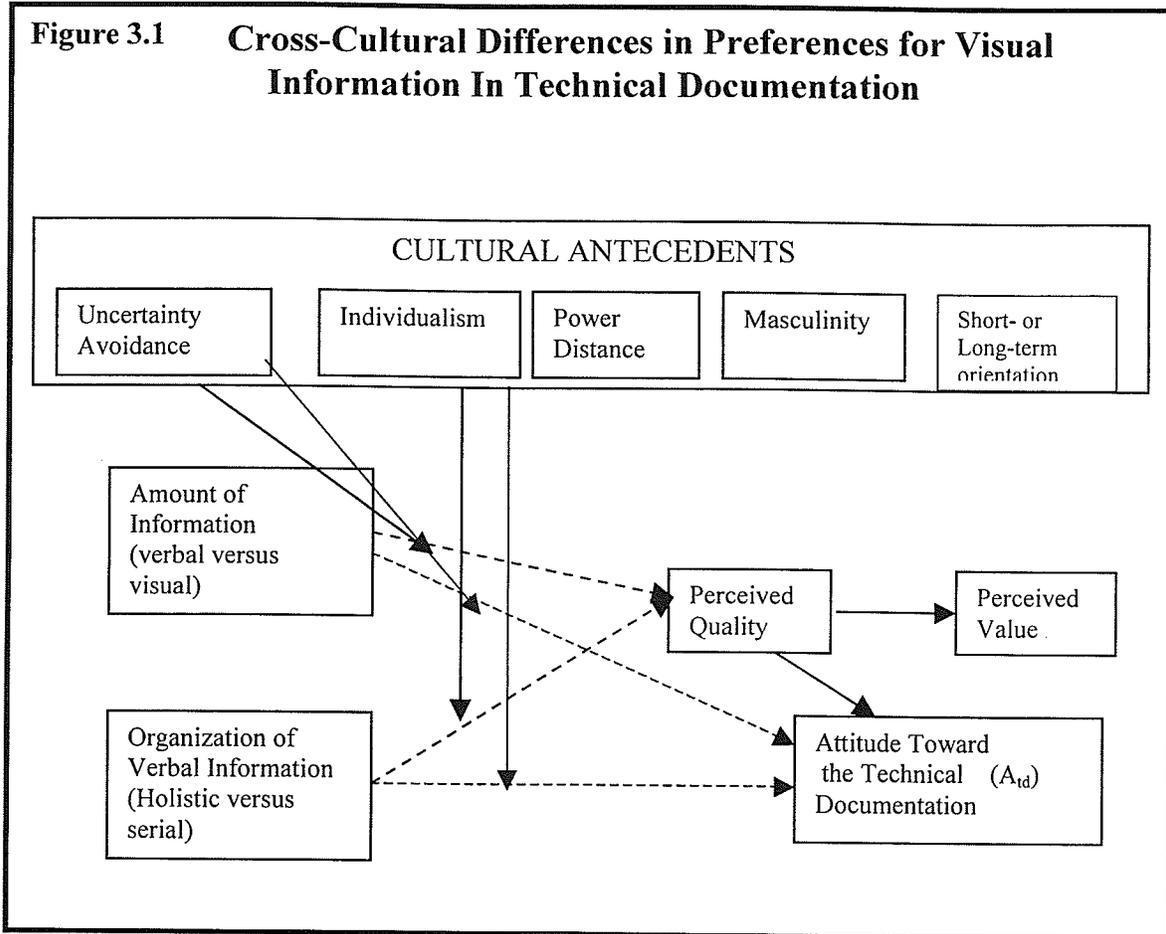
In the exploratory research to develop the Means-End model, Zeithaml (1988) found, consistent with the literature, that Perceived Quality is an overall evaluation (Olshavsky 1985), or a relatively global value judgment (Holbrook and Corfman 1985). Zeithmal (1988) found that Perceived Quality is a higher ordered cognitive attribute judgment. Furthermore, Zeithmal found that attributes that impact judgments of Perceived Quality are intrinsic and extrinsic cues (Olson 1977; Olson and Jacoby 1972). Extrinsic cues in this model are defined as the marketing communications such as price, brand name, and advertising. Zeithmal posits that extrinsic cues serve as generalized quality indicators across brands, products and categories.

In Zeithmal's Means-End model (1988), Perceived Quality has a direct impact on Perceived Value. In this model Perceived Value is proposed to be a higher-level abstraction. Perceived Value differs from Perceived Quality in two ways. Firstly, it is more personal than quality and may be similar to an emotional payoff (Young and Feigen 1975; Zeithmal 1988). Secondly, unlike quality, value involves a tradeoff of give and get components. Zeithmal (1988) found that most respondents in her research depended on extrinsic cues in forming impressions of value.

In a further exploration of the impact of communication cues on perceptions of quality and value, Teas and Agarwal (2000) expanded this part of the Means-End model. In the Teas and Agarwal model (2000), extrinsic cues of brand name, store name, and price are linked to Perceived Quality and Perceived Value. This part of their model is the same as the Means-End model of Zeithmal (1988). Teas and Agarwal added to the Means-End model by examining country-of-origin on the relationship between the extrinsic cues and the outcome variables of Perceived Quality and Perceived Value. In addition, Teas and Agarwal (2000) added the outcome variable of perceived sacrifice.

In the model for this research (see figure 3.1), consistent with the work of Zeithmal (1988) and Teas and

Agarwal (2000), the extrinsic cues are linked with Perceived Quality and Perceived Value. In this case, the



communication cues are the Dominance of Verbal and Visual of Information and Organization of Information. The moderating impact of cultural antecedents on the relationship between the communication cues (Dominance of Information and Organization of Information) and Perceived Quality value are the focus of this research. In addition,

consistent with advertising research, attitude toward the marketing communications, in this case technical documentation is added to the model. Each of these relationships, with the moderating impact of cultural antecedents, will now be discussed.

MODERATING VARIABLES

UNCERTAINTY AVOIDANCE

Hofstede's cultural dimension of Uncertainty Avoidance suggests cultural differences in the preference for information. The Uncertainty Avoidance factor relates to anxiety levels, need for security, and dependence upon experts (1980, 1984). Specifically, people from countries high in Uncertainty Avoidance have a fear of failure, take less risks, prefer specialists, and exhibit a "preference for clear requirements and instructions" (Hofstede 1984, 132). Persons from cultures with low Uncertainty Avoidance are willing to take more risks and move at a faster pace (Hofstede 1980, 1984). Thus, persons from countries high in Uncertainty Avoidance would seem to want more detailed information in order to operate, assemble, or maintain their equipment properly and, thereby, lower the risk of failure by relying on information from experts. Therefore,

they would be expected to want more explicit verbal information. Research by Albers-Miller and Gelb (1996) found differences in advertising content to correlate with the Uncertainty Avoidance dimension. Mitchell and Vassos (1997) conducted a research to determine if a traveler's own willingness to take risks would impact purchases of holidays perceived to have varying levels of risk. Mitchell and Vassos found differences in perceived risk and holiday purchases in the whole respondent set in keeping with Hofstede's dimension.

INDIVIDUALISM VERSUS COLLECTIVISM

Hofstede's dimension of individualism versus Collectivism is important in determining cultural difference in the Organization of Information, in fact Triandis calls it the most important cultural dimension (1994). Hofstede (1984) contends that, the relationship between the individual and the collective in human society is not only a matter of ways of living together, but it is intimately linked with societal norms and, therefore, affects both people's mental programming, structure, and the functioning of many other types of institutions beside the family. People are taught by their culture to examine the individual or individuating information in cultures

high in individualism. On the other hand, people from collectivist cultures are taught to examine relationships, how each individual relates to the whole, or how each piece relates to the whole. This is consistent with Markus and Kitayama's (1991) concept of interdependent and independent views of self. In their definition of interdependent (collective), people in this society are holistic and relational in their view. Independents (Individualists) have a separatist view.

Connor, Davis and DeRycker (1995) conducted a content analysis of job application letters from two different cultures. They found differences in information content, how the letters were written and structured. Results of a research examining Flemish and U.S. students' job application letters suggest writing styles need to be adapted to fit different culture's writing conventions in order to be easily processed (Connor, Davis, and DeRycker 1995). Since culture is the "lens" by which meaning is assigned to both visual and written information, it would seem to follow that communication styles, including visual information, would need to be adapted to fit different cultures' visual contentions as suggested by Connor, Davis, and DeRycker (1995) and Scott (1994).

In a research of accounting students from Australia, Hong Kong, and Taiwan, Auyeng and Sands (1996) demonstrated how the Individualism dimension is reflected in the learning styles of the respondents. The students from the collectivistic cultures demonstrated a more abstract, reflective, less concrete and active learning style. On the other hand, the Australian students demonstrated a more concrete, active, less abstract and reflective learning style. Therefore, the students from the collectivistic cultures used an assimilation learning style, while students from the individualistic culture used an accommodation learning style.

In the research by Karjala (1993) discussed earlier, this research was conducted within the educational setting in which Japanese students, a collectivist society, were compared with the U.S. students, an individualistic society. The respondents were given information on color, shape, and location. The research demonstrated that the Japanese use a synthetic or holistic approach to determine meaning in communication. Members of this cultural group combined ideas to create a complex whole, storing types of information. The U.S. respondents were found to use an analytical, serial, or linear approach to assign meaning to communication. The U.S. subjects broke down information

into pieces and stored the discrete pieces of information (Karjala 1993).

Thus, cultures differing on the individualism dimension would be expected to exhibit differences in the way visual information is organized. Individualists may prefer separating out the visuals, only showing the parts of the product to be addressed in operating, assembling or maintaining the product. Collectivists may prefer seeing how all of the differing parts of the product combine into the whole picture before operating, assembling, or maintaining the product.

OUTCOME VARIABLES

Even though more effective communication does not always guarantee better performance results (Burke et al 1999), communication in which the informational content and context corresponds to respondent's characteristics may results in improved outcomes (Trevino et al 1987). Consistent with Zeithaml (1988) and Teas and Agarwal (2000), in examining communications and the respondents' overall evaluations, the outcome variables selected for this research project are Perceived Quality and Perceived Value. Consistent with the advertising field and the examination of effective communications, the outcome

variable of Attitude toward the Technical Documentation is included. The selection of these outcome variables is discussed next.

PERCEIVED QUALITY

In the Means-End model (Zeithmal 1988) and Teas and Agarwal's (2000) model, extrinsic cues or marketing communications has a direct link to Perceived Quality. Quality is broadly defined as superiority or excellence, and by extension quality can be defined as the consumer's judgment of a document's overall excellence or superiority (Zeithmal 1988). Perceived Quality is a global assessment of the documentation. Holbrook and Corfman (1985) agree that quality is a relatively global value judgment.

Research conducted by Gelfand, Spurlick, Sneizek and Shoa (2000) examined the role of information and culture. In their research, they presented scenarios where they would interact with a new co-worker, a possible new romantic partner, a respected colleague, and a new neighbor. The respondents from the U.S. and China were then randomly given either relational information or individuating information to correspond with the cultural dimensions of individualism and collectivism. The respondents were then asked to estimate their confidence in

making social predictions. The respondents found culturally sensitive communications less confusing and easier to understand. The results indicated that communication that was consistent with a person's culture (culturally sensitive communications) was perceived to have higher usefulness and was perceived to have higher quality.

From the models of Zeithaml (1988) and Teas and Agarwal (2000), as well as the model for this research, Perceived Quality is an appropriate outcome variable to include in the research. Culture has been demonstrated to moderate the relationship between communications and the respondent's perceptions of quality.

PERCEIVED VALUE

While there are many ways in which the term "value" is used by consumers, the definition used in this research is consistent with the concept of value put forth by Sawyer and Dickson (1984). Their concept of value is a ratio of attributes weighted by their evaluations divided by their costs weighted by its evaluation. Consumer use of information has costs (Nelson 1970), the time and effort costs of processing information. Consumers will process information only to the point that the marginal costs of processing information equals or does not exceed the

marginal return (Nelson 1974, Dean and Biswas 2001). While consumers differ in their perceptions of costs and benefits of information processing, many consumers exhibit minimum effort (Claxton, Fry and Portis 1974). Therefore, consumers are seeking communication that provides them the information that they seek in an easily understandable format. In this way it may be similar to the "emotional payoff" of Young and Feigen(1975) and to "instrumental values" of Olson and Reynolds (1983). In the research by Gelfand et al (2000) previously discussed, communications that are culturally sensitive are less confusing and easier to understand. This would mean that culturally sensitive information would take less effort, and would therefore be of greater value. This is consistent with the Means-Ends model (Zeithaml 1988) and Teas and Agarwal's (2000) model. In both cases there is a direct link between Perceived Quality and Perceived Value.

Dean and Biswas (2001) conducted research in which they manipulated advertising to determine perceptions of quality and information value. They found that the manipulation of visuals used in the ads had a significant impact on respondents' evaluation of quality and information value.

ATTITUDE TOWARD THE TECHNICAL DOCUMENTATION

Results of research have indicated more favorable attitudes are developed for communications that are congruent with their culture. Further, consumers reward marketers who tailor their messages to cultural differences (Zhang and Gelb 1996). Therefore, in this research a direct link from the independent variable, moderated by culture, to Attitudes toward the Technical Documentation is expected. Further, attitude toward the ad is defined as a "predisposition to respond in a favorable or unfavorable manner to a particular advertising stimulus during a particular exposure" (MacKenzie, Lutz and Belch 1986, 130). Although the definition specifically names advertising, it is appropriate for attitudes formed about any marketing communications.

For the purpose of this research Attitude Toward the Technical Documentation (A_{td}) is defined as the predisposition to respond in a favorable or unfavorable manner to a particular technical documentation stimulus during a particular exposure. Studies in the advertising field have all indicated that images or pictures all contribute to forming attitudes towards marketing communications (Biehal, Stephens and Curlo 1992). Research has demonstrated that marketing communication's message

quality and content directly impacts attitudes toward the documentation (Hastak and Olson 1989; Burton and Lichtenstein 1988). Therefore, a direct path between quality and attitudes is expected.

DEVELOPMENT OF HYPOTHESIS

This research extends the research of Bezjian-Avery, Calder and Iacobucci (1998) discussed earlier in which they examined Visual Dominance versus Verbal Dominance in advertising. Their research results demonstrated that differences in preferences for information in either a predominately visual or predominately verbal presentation do exist. This difference has been demonstrated in the advertising field, where communications main purpose is to persuade. In the technical documentation field, where the consumer has already purchased the product and the main purpose of the information is to assemble and use the product correctly, the preferences for visual/verbal dominance have not been investigated. Therefore, this research will extend the research of Bezjian-Avery et al (1998) to the field of technical documentation.

Furthermore, this research will also extend the work of Teas and Agarwal (2000) by examining different extrinsic variables, those of Amount of Information and Organization

of Information. The outcome variable of Attitudes toward the Technical Documentation (extrinsic cues) is also added to their model.

AMOUNT OF INFORMATION

While visual information is remembered better than verbal information, a combination of visual and verbal information is superior for memory and learning (Pavio 1971, 1986; Gellevij et al 2002). People demonstrate a propensity to prefer information either in a verbal format or a visual format. People who are from cultures that are high in uncertainty avoidance would prefer information that is explicit. People from these cultures would want to rely on experts to lessen their uncertainty. Communication that is culturally sensitive is seen to be more useful and of higher quality. Therefore, the cultural dimension of Uncertainty Avoidance will moderate the relationship between Amount of Information (in the form of verbal versus visual dominance) and Perceived Quality.

H1_a: Uncertainty Avoidance will moderate the relationship between Amount of Information and Perceived Quality in such a way that when Uncertainty Avoidance is high (low) a stronger relationship with high information content - Verbal Dominance (high visual content - Visual Dominance) will be demonstrated.

ORGANIZATION OF INFORMATION

The learning styles of holistic versus serialistic have been successfully documented in the educational setting. These two styles of learning have consistently been associated with the cultural dimensions of Individualism and Collectivism. Cultures high in individualism have a tendency to examine the parts in a step-by-step basis. Cultures high in collectivism have a relational view. They tend to want to see how all the parts fit together into the whole. Communication that is culturally sensitive is easier to use and is seen to be of higher quality. Therefore:

H1_b: Individualism versus Collectivism will moderate the relationship between Organization of Information and Perceived Quality in such a way that high Individualism (Collectivism) will demonstrate a stronger relationship between Serial (Holistic) visuals and Perceived Quality.

In the marketing information field, one of the prime outcome variables of interest is attitude toward the communication. In the advertising field attitude toward the ad is almost always measured because of its known impact on attitude toward the brand and purchase behavior. In this case attitude toward the technical documentation is of interest. Respondents are known to reward marketers with

more positive Attitudes when marketers tailor their messages to cultural differences (Zhang and Gelb 1996). The following is expected.

H2_a: Uncertainty Avoidance will moderate the relationship between Amount of Information and Attitude Toward the Technical Documentation (A_{td}) with high Uncertainty Avoidance (low Uncertainty Avoidance) having a positive impact on the relationship between high (low) Amounts of Information.

H2_b: Individualism versus Collectivism will moderate the relationship between Organization of Information and Attitude Toward the Technical Documentation (A_{td}) with high Individualism (High Collectivism) having a positive impact on the relationship between serial (holistic) visuals and A_{td}.

QUALITY AND VALUE

Value includes the concept of what the respondent gives up for what they get back. The trade off in what is given up includes time and effort. Therefore, information that takes less time and effort would be of more value. High quality documentation is seen as less confusing and easier to use. If the documentation is easier to use, then it would take less time and effort and would, therefore, be of higher value.

H3: There will be a positive relationship between Perceived Quality and Perceived Value.

QUALITY AND ATTITUDE TOWARD THE TECHNICAL DOCUMENTATION

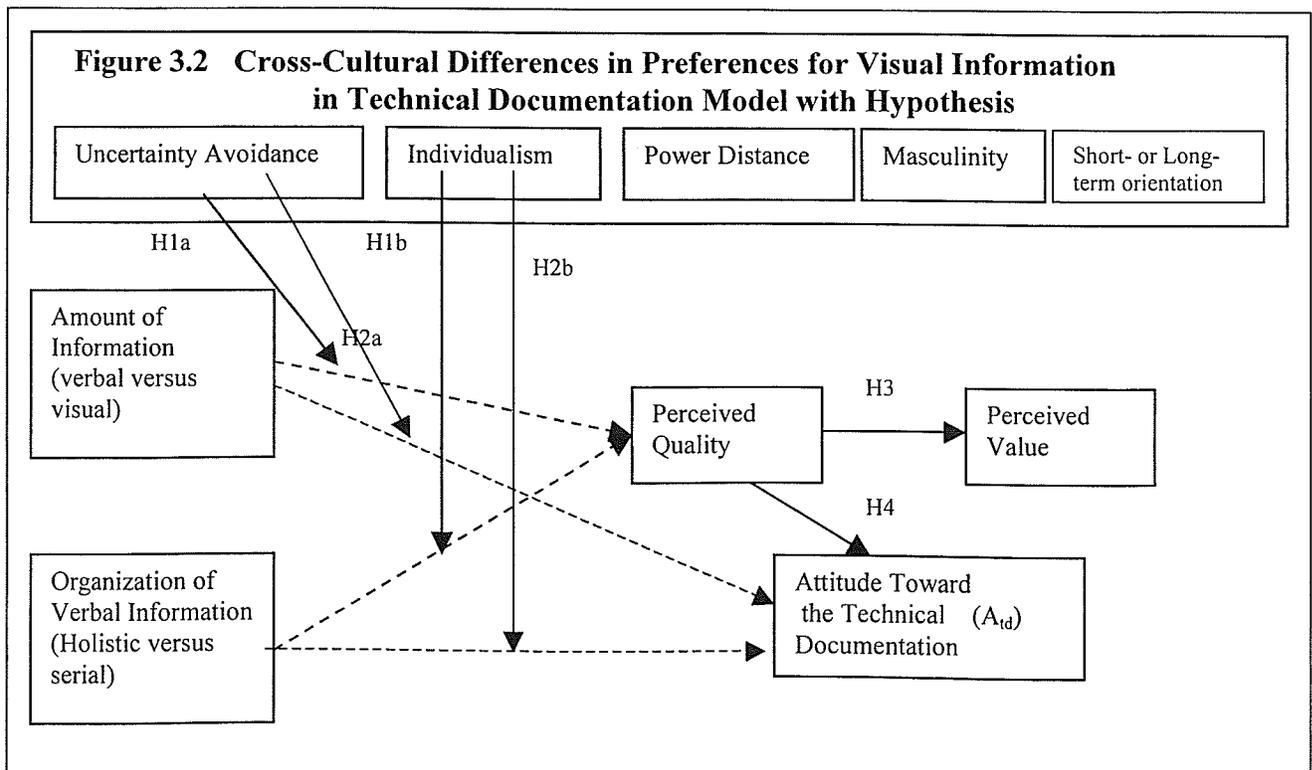
(A_{td})

Research has also demonstrated a relationship between the quality and content of the message with attitudes (Hastak and Olson 1989; Burton and Lichtenstein 1988).

Items to be of higher Perceived Value and are associated with more positive attitudinal measures. Items perceived to be of lower quality are associated with less favorable attitudes. Therefore, the following is expected:

H4: There will be a positive relationship between Perceived Quality and Attitude Toward the Technical Documentation (A_{td}).

(see figure 3.2 for the model with hypothesis)



In the next chapter the methodology to test these hypotheses will be examined. Specifically, the experimental instrument that will be used will be examined; the sample will be defined; and the statistical procedures will be discussed.

CHAPTER 4

RESEARCH METHODOLOGY

This chapter presents the methodology that was used to test the hypotheses developed in the previous chapter. This chapter is organized into two sections. The key conceptual ideas and the hypothesized relationships that were tested will be summarized and will be outlined to show how the hypotheses were tested. The second section outlines what methodology was used to analyze the data.

HYPOTHESES

The hypotheses presented in Chapter 3 are operationally stated in the following sections. The first section pertains to the examination of the Dominance of Visual Information. The second section will pertain to the hypotheses examining the Organization of Visual Information.

DOMINANCE OF VERBAL VERSUS VISUAL INFORMATION

If a culture is high in Uncertainty Avoidance, then:

- a. respondents would demonstrate a higher preference for documentation with explicit verbal information presented in context with visuals.

- b. respondents would determine that documentation with explicit verbal information presented in visual context would be of higher quality
- c. respondents would demonstrate more positive attitudes toward the technical documentations.

If a culture is low in Uncertainty Avoidance, then:

- a. respondents would demonstrate a higher preference for documentation with the information presented in visuals with less explicit verbal information.
- b. respondents would determine that documentation presented with less explicit verbal information and more visually presented information to be of higher quality.
- c. respondents would demonstrate more positive attitude toward the technical documentation.

ORGANIZATION OF VISUAL INFORMATION

In cultures high in Collectivism rather than

Individualism, then:

- a. respondents would show a preference for technical documentation designed holistically (visuals designed to show how the different parts of the product fit together for the whole product).
- b. respondents would perceive that the above documentation was of higher quality than documentation designed serialistically.
- c. respondents would demonstrate more positive attitudes toward the technical documentation.

In culture high in Individualism rather than Collectivism,
then:

- a. respondents would demonstrate a preference for documentation that presented the visuals in a serial manner (would break the product down into its discrete parts showing the visuals in a step-by-step process).
- b. respondents of the above documentation would perceive it to be of higher quality than holistic documentation.
- c. respondents would demonstrate more positive attitudes toward the technical documentation.

OUTCOME VARIABLES

Technical documentation that is tailored to reflect a respondent's cultural communication style, or in other words, documentation that is prepared consistent with cultural expectations, then:

- a. respondents would demonstrate higher Attitudes toward the Technical Documentation (A_{td}).
- b. respondents will demonstrate higher levels of Perceived Quality.

Likewise, technical documentation that is culturally tailored and perceived to be of higher quality:

- a. respondents would perceive the documentation to be of higher value, demonstrating a direct relationship between Perceived Quality and Perceived Value.
- b. respondents will demonstrate more positive Attitudes towards the Technical Documentation, demonstrating a direct relationship between Perceived Quality and Attitudes toward the Technical Documentation.

METHODOLOGY

A 2x2 between subjects factorial design was used to test the hypothesized relationships. Independent variables are Dominance of Information and Organization of Information. The two versions of Dominance of Information included: 1) a version of the technical information presented primarily in explicit verbal information with the visual information providing the context; and 2) in the other version the technical documentation will present the information in visual form with almost no verbal information. The two versions of Organization of Information include: 1) a version where the Visual Information is presented holistically (the parts and the whole area are presented together); and 2) in the other version where the visual information is presented serially (in a step-by-step manner). This resulted in four versions of the technical documentation (see Appendix 1): verbal

information dominates/holistic visual (version A, see table 3.1), verbal information dominates/serial visuals (version B, see table 3.1), and visual information dominates/holistic visual (version C, see table 3.1), visual information dominates/serial visuals (version D, see table 3.1).

Table 3.1		<u>AMOUNT OF INFORMATION</u>	
		Verbal Dominance	Visual Dominance
Holistic Visual	Verbal information dominates with Holistic Visual providing context. (version 11)	Visual information dominates with the visual being Holistic (version 10)	
Serial Visuals	Verbal information dominates with visuals presented in Serial manner providing context (version 01)	Visual information dominates with visuals presented in Serial manner (version 00)	

Dependent variables will be Perceived Quality of technical documentation, Perceived Value of technical documentation, and Attitude toward the Technical Documentation.

STIMULI DEVELOPMENT AND INDEPENDENT VARIABLES

For the purpose of this research, assembly information from the technical documentation for a bicycle was used. This product was selected based on the sample populations'

familiarity with the product class and their likelihood of using this product. However, no brand names were used or evident to counter for the possible impact of brand preference and brand attitudes. Therefore, in order to manipulate the independent variables of Dominance of Information and Organization of Information, an experimental instrument was developed from information from actual bicycle assembly technical documentation.

The assembly information used was that of installing a bicycle seat on a seatpost using a one-bolt seat clamp assembly. This part of the assembly was selected for several reasons: the ability to present the information both serially and holistically; the ability to alter the amount of verbal information and still allow assembly of the seat; the likelihood that this was an assembly that even a novice could undertake, thereby lessening the need to consider the novice/expert category that is not included as part of this research.

The information on the seat assembly was then varied in its presentation to produce the previously discussed four versions of the technical documentation: verbal information dominates/holistic visual, verbal information dominates/serial visuals, and visual information dominates/holistic visual, visual information

dominates/serial visuals. The manipulations were checked with a group of 35 students from Black Hills State University. In addition manipulation check questions were asked after respondents had been asked questions to evaluate the technical documentation.

DEPENDENT VARIABLES

Three dependent variables were used: Perceived Quality, Perceived Value, and Attitude toward the Technical Documentation (A_{TD}). Quality and value were measured on a seven-item scale. Perceived Quality measures are taken from those developed by Peterson and Jolibert (1976). These researchers developed the measures for a cross-cultural investigation of brand preference (Peterson and Jolibert 1976). In a large cross-cultural research project conducted by Rubin and Bruning (unpublished), the quality measures developed by Peterson and Jolibert (1976) were used to examine cultural differences in preferences for verbal information in documentation on tractors. These quality measures were found to be robust across cultures (Peterson and Jolibert 1976, Rubin and Bruning unpublished).

Perceived Value was measured using measures developed by Monroe (1990). Monroe developed these measures based on previous research (Dodds and Monroe 1985, and Monroe and

Chapman 1987) on the concept of perceived price, Perceived Value, and intent to purchase. The measures of value have also been used in cross-cultural research and were found to be robust across cultures (Rubin and Bruning, unpublished).

Respondents' Attitudes toward the Technical Documentation were determined by averaging their ratings of four items based on a seven point scale with dichotomous pairs: good/bad, like/dislike, interesting/boring, and informative/uninformative. These four pairs include both affective and evaluative content and were selected based on a review of the literature (Gardner 1985; MacKenzie, Lutz, and Belch 1986), and demonstration of their effective use in research manipulating visual elements in marketing communications (Biehal, Stephens and Curlo 1992).

COVARIATE

Some individual differences needed to be considered when conducting this research. Childers, Houston and Heckler (1985) in developing their Style of Processing scale (SOP) found individual differences in preferences for processing styles. The Style of Processing scale is a modification of Visualizer/Verbalizer (Richardson 1977) scale in an attempt to overcome some of the problems associated with the Visualizer/Verbalizer scale. The SOP

greatly improved the internal consistency of the previous scale (Cronbach's alpha = .81-.86; MacInnis 1987). Confirmatory factor analysis demonstrates the independence of the verbal and visual components. The discriminate validity of the scale has also been demonstrated in that the SOP has zero correlation with tests of imagery vividness ($r = .01$). Therefore, respondents were asked the questions from the Style Of Processing scale.

Some gender differences in cognitive processing using the Style of Processing questions have been noted in research. Gould (1990) conducted a cross-tabulation with the four categories or processors (low processor, high verbals, high visuals, and high processors). He found that 32.9% of the women were high processors (showing preference for both high verbal and high visual content), while only 13.56% of the men were high processors. The results also indicated that 35.59% of the men were low processors (showing preference for low verbal content and low visual content), while 16.46% of the women were low processors.

Therefore, in this research questions for Style Of Processing (SOP) and gender were included in the questionnaire. They are also included in the analysis to account for variation that could be incorrectly attributed to cultural differences.

MODERATING VARIABLE - CULTURE

When Hofstede (1980) developed his cultural framework, numeric values were developed for each country on each of the cultural dimensions. In 1995 Samli's analysis of Hofstede's cultural dimensions and their applicability to marketing, specifically the way marketing information is processed, has demonstrated the suitability of Hofstede's cultural framework to the current research. In analysis conducted by Samli (1995), he examine the first four of Hofstede's dimensions, namely Individualism versus Collectivism, Power Distance, Uncertainty Avoidance, and Masculinity versus Femininity. Samli (1995) extrapolated those factors that would have a bearing on marketing styles and found that Individualism versus Collectivism, Power Distance, and Uncertainty Avoidance should have an impact on marketing information. In a test of this assertion, Moss and Vinten (2001) investigated information from France and the UK. They conducted content analysis of life assurance literature and they found cultural differences illustrative of Samli's (1995) transference of Hofstede's original cultural dimensions (1980).

In marketing, the use of Hofstede's framework is on the rise even though the scores for his cultural dimensions were developed over thirty years ago (Sivakumar and Nakata

2001). While the cultural dimensions have been empirically verified by others (Sondergaard 1994), and national culture is seen to change slowly, some argue that national culture is changeable (Sivakumar and Nakata 2001). Therefore, Hofstede's scores were used to select the cultures to include in the research. Cultures were selected to represent low and high values on both Individualism versus Collectivism and Uncertainty Avoidance. However, in the experiment respondents were asked the questions used to calculate the cultural indices. The national indexes were then calculated from the responses and compared with Hofstede's original scores on the cultural dimensions to determine if there has been much change in the cultural indices over the last thirty years for the national cultures of interest.

For the purpose of this research cultures were selected for inclusion based on their culture's indices developed in Hofstede's research. In order to research possible cultural differences in preferences for technical documentation, countries were selected at the high end, low end and middle range of the values for the cultural dimensions of Individualism versus Collectivism and Uncertainty Avoidance.

COUNTRIES OF INCLUSION

In the development of the Individualism versus Collectivism cultural indices, Hofstede (1980) was able to develop a score for 40 different countries (see Figure 4.2). The countries with the highest scores on the Individual index were the U.S., Australia and Great Britain with

Figure 4.2 Hofstede's Individualism Indices by Country

<u>Country</u>	<u>IDV Score</u>	<u>Country</u>	<u>IDV Score</u>
U.S.A.	91	India	48
Australia	90	Japan	46
Great Britain	89	Argentina	46
Canada	80	Iran	41
Netherlands	80	Brazil	38
New Zealand	79	Turkey	37
Italy	76	Greece	35
Belgium	75	Philippines	32
Denmark	74	Mexico	30
Sweden	71	Portugal	27
France	71	Yugoslavia	27
Ireland	70	Hong Kong	25
Norway	69	Chile	23
Switzerland	68	Singapore	23
Germany	67	Thailand	20
South Africa	65	Taiwan	20
Finland	63	Peru	17
Austria	55	Pakistan	16
Israel	54	Colombia	13
Spain	51	Venezuela	12

Source: Geert Hofstede (1980) Culture's Consequences: International Differences in Work-Related Values, London: Sage Publications, page 158.

Argentina in the Middle. At the lower end are Hong Kong, Chile, Singapore, Thailand, Taiwan, Peru, Pakistan, Columbia and Venezuela.

The cultural dimension of Uncertainty Avoidance was also calculated for 40 different countries (see figure 4.3). Hofstede (1980) determined that the indexes were as follows:

Figure 4.3 Hofstede's Uncertainty Avoidance Indices by Country

<u>Country</u>	<u>UCA Score</u>	<u>Country</u>	<u>UCA Score</u>
Greece	112	Thailand	64
Portugal	104	Iran	59
Belgium	94	Finland	59
Japan	92	Switzerland	58
Peru	87	Netherlands	53
France	86	Australia	51
Chile	86	Norway	50
Spain	86	South Africa	49
Argentina	86	New Zealand	49
Turkey	85	Canada	48
Mexico	82	U.S.A.	46
Israel	81	Philippines	44
Columbia	80	India	40
Venezuela	76	Great Britain	35
Brazil	76	Ireland	35
Italy	75	Hong Kong	29
Pakistan	70	Sweden	29
Austria	70	Denmark	23
Taiwan	69	Singapore	8
Germany	65		

Source: Geert Hofstede (1980) Culture's Consequences: International Differences in Work-Related Values, London: Sage Publications, page 122.

The cultures selected for inclusion in this experiment represent diversity on the culture dimensions of interest in this research. The national cultures of the U.S. and Canada have similar ratings on these dimensions. However, there is great interest in Canadian and U.S. differences. These two countries share a large border, similar markets, are one another's largest trading partners and would, therefore, be expected to share many similarities. However, in a similar research project to investigate differences in preferences for verbal information in technical documentation, interesting differences were noted (Rubin and Bruning, unpublished). These two countries, while similar in their indices, were included in this research.

Hong Kong and Japan were selected based on their location on both cultural dimensions. Respondents from these cultures were solicited to participate in this research (see figure 4.4). These cultures demonstrate the following diversity on the cultural dimensions of interest:

Figure 4.4 Cultures of Inclusion with Their Cultural Indices		
<u>Level</u>	<u>Individualism</u>	<u>Uncertainty Avoidance</u>
High	USA (91) Canada (80)	Japan (92)
Medium	Japan (46)	Canada (48) U.S.A. (46)
Low	Hong Kong (25)	Hong Kong (29)

Each respondent will be randomly given one of the four manipulations. Each respondent was given the same instructional cover letter regardless of the manipulation he/she received. The purpose of the research was not hidden, but was included in the letter to the respondent. Respondents were then given time to examine the assembly information. They were then asked questions about: the Perceived Quality of the documentation; the Perceived Value of the documentation; and Attitudes towards the Technical Documentation. Measures of the quality and value variables were determined using a seven-point scale (see Appendix 1). Attitudes toward the Technical Documentation were measured using dichotomous pairs on opposite ends of a seven-point scale (see Appendix 1).

Respondents were next presented with the questions for the Style of Processing measures, Hofstede's cultural dimensions questions, and finally demographic information (age, sex, native language, where they were born, education level, and how long they have resided at their current location).

SAMPLE AND EXPERIMENTAL PROCEDURE

One of the major problems in cross-cultural research is selecting the sample. According to Hofstede (2001), one

of the pitfalls in cross-cultural research is poor matching of samples. Results obtained from a group of respondents are affected by other factors besides nationality, for example education, gender and age. To lessen the possibility of the results of the research being influenced by differences in samples selected rather than the variables under research, matched samples need to be selected. A student population was used, since they constitute comparable populations (Parameswaran and Yaprak 1987; Hofstede 2001). Parameswaran and Yaprak (1987) used student samples, because they are comparable in age and education levels. Hofstede (2001) stated that regardless of the sample selected, whether law enforcement officials or students, a similar sample needs to be selected in each country. So, for this research, student samples were used as comparable samples.

Hofstede (2001) has provided guidelines for sample size when conducting cross-cultural research. Hofstede recommends samples of between 20 and 50 per country to be of sufficient size. Therefore, a sample size of 20-30 for each manipulation and for each country included in the research allowing for 20 subjects per country per cell was attempted. These subjects were recruited from students attending Black Hills State University, the University of

Manitoba, Brigham Young University-Hawaii Campus, and Brigham Young-Provo Campus. Each respondent was asked their first language, where they were born, where they are now residing, and how long they have lived in an English speaking country. They were also asked the birth place of their parents and their parents first language. They were sorted into countries as determined by their first language and country they grew up in and parent's birth place.

Students were asked to volunteer for the research. They signed a letter of consent and were allowed to withdraw at any time. After they signed the letter of consent, they were each randomly given one of the four versions of the experiment with the accompanying questions asking them to evaluate the documentation, evaluations of quality, value, their attitudes, manipulation checks, SOP, Hofstede's cultural dimension questions, and demographic information. In each location a research assistant read the cover letter, had the respondents sign the consent form, and handed out the experiment.

The first language and country of birth helped to determine what national culture each respondent was raised in. The samples from the U.S. and Canada were not as problematic as the samples from Hong Kong and Japan. Research has demonstrated that virtually all of the

cultural dimensions of interest are learned by the age of ten years and remain relatively immune to change over the remaining life span (Hofstede 1991; Crofts 1999). However, to counter for even slight changes as respondents acculturate, the respondents were asked how long they have lived in an English speaking country to try and control for any impact this may have on the data.

The experimental instrument was translated into Cantonese and Japanese. Graduate students whose first language is Japanese or Cantonese were used to translate the documents and the experimental instrument's questions. The U.S. and Canadian experimental instruments were in English. Each participant was presented a version of the experiment in his or her first language. Even though all respondents can speak English at various levels of proficiency, to determine cultural differences in processing, the use of their first language was warranted.

Since culture cannot randomly be assigned, students from the selected national cultures of Canada, U.S., Hong Kong, and Japan were asked to participate. As discussed previously, these particular cultures were chosen for this research based on cultural information obtained from the research conducted by Hofstede to develop his cultural dimensions.

DATA ANALYSIS

Data from the instruments were input into SPSS. Data checks were used to determine the accuracy of the data input process, after entry completion every fifth experimental instrument was checked to determine the accuracy of the input procedure. After the data was input, cleaned, and checked, the data was then analyzed.

When researching cultural dimension's impact in data analysis, Sivakumar and Nakata (2001) suggest that there are two basic ways to design the research. The first is to examine the impact of the single cultural value (call the focal variable) and ignore the three cultural factors not of research interest (called non-focal variables). The second way to design the research is to acknowledge and control for the non-focal variables. These researchers contend that the second approach is preferable because it minimizes the possibility that non-focal variables may significantly influence the outcome of the research.

Similarly, Hofstede (2001) suggests that in some cases there are intercorrelations among the dimensions depending on the culture and the variables of research. Hofstede stated that outside variables that significantly correlate with one of the dimensions may also correlate with one or

more others. He also suggested minimizing the possibility that non-focal dimensions may significantly influence the outcome and should be acknowledged. Each of Hofstede's cultural dimensions was examined for significant impact on the relationship between the independent and dependent variables. This then determined the cultural dimensions included in the interpretation.

This research is examining the different processing styles of various cultural groups. Since this research is used to test the null hypothesis that the means of the four cultural groups is equal, analysis of variance (ANOVA) was used. The moderating impact of each cultural group on the relationship between independent and dependent variables was examined with the use of ANOVA in comparing between-group variance to within-group variance (Emory and Cooper 1991). To determine that the manipulation of the technical documentation was achieved, that respondents did perceive differences in Dominance of Information and Organization of Information, students from Black Hills State University were recruited. They were shown the manipulations, and after each of the four versions, the students were asked questions to determine Visual versus Verbal Dominance and Serial versus Holistic organization. In addition, manipulation check questions were included in each of the

four versions of the documentation administered in the experiment. Furthermore, manipulation checks included one-way analysis of variance to assess the impact of the two levels on Dominance of Information and the two Organizational structures.

To conduct a preliminary assessment of the measures of the dependent variables, the procedures used by Dodds et al (1991) were used. The assessment of Quality, Value and Attitude toward the Technical Documentation were conducted using factor analysis using varimax rotation, Cronbach's alpha, and correlation analysis.

SUMMARY

The instruments for this research were developed using actual product assembly information. Cultures have been selected based on their wide variability on Individualism versus Collectivism, and Uncertainty Avoidance. International students from the selected cultures were asked to participate in this research.

Each research instrument manipulated: the amount of information presented by Visual materials with explicit Verbal information dominating in one version and Visual information dominating in the other version; and the Organization of Information with one version presenting the

visual information Holistically and the other presenting the visual information in a Serial manner. The respondents were randomly assigned to one of the four treatments. After the respondents viewed each of the manipulations, they were asked a series of questions to determine:

1. Their Perceptions of the Quality of the technical documentation.
2. Their Perceptions of the Value of the technical documentation.
3. Their Attitudes toward the Technical Documentation.

In addition, subjects were asked the questions from Hofstede's survey to determine their countries indices on the cultural dimensions and the Style of Processing scale. At the end of the experiment, respondents were asked a series of demographic questions. These questions included: the length of time they have resided in their current location; their familiarity with English; level of education; major in school; first language; where they were born; and their gender. This helped to classify respondents to determine their cultural group and individual differences which may impact the within group variance.

CHAPTER 5

ANALYSIS AND RESULTS

OVERVIEW

The purpose of this chapter is to examine the statistical results of the experiment. The first part of the chapter will discuss the manipulation check to assess the effectiveness of the manipulation of the technical documentation in accordance with the intent of the research. The next section will discuss respondents in the main study, including the calculations of their cultural indices. The final part of the chapter will describe tests of the hypothesized effects on each of the dependent variables. The discussion and conclusions of the study will be examined in chapter six.

PRETESTS

Pretest 1

The purpose of the first pretest was to examine the questions developed for the manipulation check to determine their reliability and internal validity in differentiating stimuli on the two dimensions in the experiment. Twenty-three students in a senior Human Resource Class at Black Hills State University volunteer to take part in the pilot study. Students were given each of the four versions of the

stimuli. Each version of the stimuli was followed by the manipulation check questions using dichotomous pairs. Five dichotomous pairs were used to determine subjects' judgment of Verbal/Visual Dominance (See Appendix 1). Four dichotomous pairs were used to determine subject's judgment of Holistic/Serialistic (See Appendix 1). The four versions of the assembly information were rotated to account for any possible influence of fatigue.

Respondents participated in a focus group discussion after they had finished answering the manipulation check questions. The results of the focus group support the validity of the questions. All of the participants understood the meaning of the questions; there were no disagreements as to what the questions were asking. Furthermore, they did not find the questions confusing, nor did they find them difficult to apply to the experimental instrument.

The results from the first pretest were then checked for scale reliability using Cronbach's Alpha. The reliability of the scale items used to check the manipulation of the two independent variables had a Cronbach's Alpha of: Verbal versus Visual Dominance of the technical documentation .952; and Holistic versus Serialistic .954.

Lastly, the results were examined to see if the respondents judged the different versions to be significantly different from each other. The versions were coded with a one, if they were Verbally Dominant, and a zero if they were Visually Dominant with the mean for Verbal Dominance being 3.8304 and Visual Dominance 6.0348. A univariate ANOVA was run to determine if the difference between the versions was significantly different than the difference within the versions. The results indicated that the manipulation worked and that the versions were viewed as significantly different from each other ($F=108.366$, $p \leq .000$; see Appendix 2).

Next the Holistic/Serialistic instruments were coded with a one, for the Holistic versions, and a zero, for the Serialistic versions, with a mean for the Holistic version of 3.5435 and Serialistic version of 6.1793. A univariate ANOVA was run on the two versions of organization with the results demonstrating that the manipulation worked and the versions were viewed as significantly different from each other ($F=108.363$ $p \leq .000$; see Appendix 2).

Pretest 2

The second pretest was undertaken to check the manipulation of the four versions of the technical

documentation that would be used in the experiment to determine that the respondents' would judge the Verbal versus Visual Dominance and Holistic versus Serialistic organization of the Visual domination as different. Thirty-one business students volunteered to participate in the experiment. Each respondent was randomly given one of the four complete versions of the experimental instrument. Each instrument had one of the four versions of the experiment followed by the questions on perceived quality and perceived value. The respondents were then asked questions from the Style of Processing questionnaire, Hofstede's cultural dimensions questions, manipulation check questions, and demographic questions. The results from the manipulation check questions were examined for reliability using Cronbach's Alpha. Visual/Verbal Dominance questions returned a Cronbach's Alpha of .901 and a .884 for the Holistic/Serialistic Organization questions (see Appendix 3).

The versions of the instrument were then examined to see if the manipulations of the variables were significantly different from each other. The Verbal/Visual Dominance versions were coded with a one, if they were Verbally Dominant, and a zero, if they were Visually Dominant. The version with Verbal Dominance had a mean of

4.640 while the version with Visual Dominance had a mean of 5.6875. A univariate ANOVA was then run to determine if the difference between the versions was significantly different than the within versions differences. The results confirmed that the respondents judged the Verbal/Visual versions to be significantly different ($F=9.833$, $p=0.004$). The Holistic/Serialistic versions were coded with the Holistic versions coded as a one, and the Serialistic versions coded as a zero. The Holistic versions had a mean of 3.7344 and the Serialistic versions had a mean of 5.2667. The Holistic/Serialistic versions were checked to see if the difference between the two manipulations was significantly different from each other. Their differences were significant ($F=12.939$, $p=0.001$ see Appendix 3).

THE SAMPLES

Respondents from four universities were recruited for the study. Subjects participating in the study were from Canada, China (Hong Kong), Japan, and the United States. These cultures were selected using the cultural dimensions from Hofstede's cross-cultural study. Cultures were selected to represent low and high values on both Individualism/Collectivism and Uncertainty Avoidance. According to Hofstede's study, the U.S. and Canada are

relatively high on the Independence/Collective scale with scores of 91 and 80, respectively. Japan's score was just below the midpoint at 46, and China's (Hong Kong) score was at the low end with a value of 25. Similarly, scores on the Uncertainty Avoidance scale were also taken into consideration in the selection of cultures to participate in the study. Japan's Uncertainty Avoidance was on the high end with a score of 92. Canada and the U.S. had scores just below the mid-point with scores of 48 and 46, respectively. China (Hong Kong) was on the low end of Uncertainty Avoidance with a score of 29.

Each of the participants was randomly assigned to one of the four study conditions (Holistic/Serialistic; Verbal/Visual Dominance). Data from 60 experiments were not used because the respondents were from cultures not part of the study, or they did not complete the cultural portion of the experiment and their culture could not be determined. Three hundred and seventy-four experiments included culture information and were used for data analysis. All subjects were from a university setting and voluntarily participated in the study.

Matching of samples is important for cross-cultural research. Therefore, an examination of the samples from the various cultures is needed to determine if the samples were

similar. The samples were compared on age, education, and familiarity with bicycles (the product used in the manipulation of technical documentation) (see figure 5.1). The average age in the samples ranged from a low of 22.15, in the Canadian sample, to a high of 24.67, in the Japanese sample. The education question was divided into categories and coded with: a one for zero years of college; a two for one year of college; a three for two years of college; a four for three years of college; and a five coded for four or more years of college. Education ranged from a low of 2.64 (midway between 1 and 2 years of college) in the Japanese sample to a high of 4.12 (about 3 years of college) in the U.S. sample. The questions dealing with familiarity were coded with -3 being unfamiliar to 3 being familiar. To determine if the four questions dealing with familiarity with bikes could be combined for one overall rating, a factor analysis was run. One factor emerged with a Cronbach's Alpha of .787 (see Appendix 4). Therefore, the four questions dealing with familiarity were averaged for an overall familiarity for each respondent. The respondent's familiarity with bicycles ranged from a low of 1.40 in the Canadian sample to a high of 1.89 in the U.S. sample. The means for age for the whole study was

Figure 5.1 Comparisons of Cultural Samples

Variable	Canadian Mean	Chinese Mean	Japanese Mean	U.S. Mean	Total Mean
Age*	22.1504	24.1096	24.6667	23.7263	23.4408
Education#	3.2542	3.4730	2.6406	4.1224	3.4294
Familiarity@	1.3983	1.5467	1.6970	1.8878	1.6190

* age is in years

education is classified as: 1=no college; 2= 1 year of college; 3=2 years of college;4= 3 years of college; 5= 4 or more years of college

@ Familiarity goes from a -3 (unfamiliar) to a 3 (familiar)

23.4408 with a standard deviation of 2.7221. All cultures' mean age, education, and familiarity with bikes was within one standard deviation away from the overall study's means.

MANIPULATION CHECK

The next task was to determine that the manipulation of the technical documentation was accomplished for the complete data set in accordance with the purpose of the study. The manipulation checks were once again used in the experiment for both of the independent variables (Holistic/Serialistic Organization and Verbal Dominance/Visual Dominance). Subjects were asked questions to determine whether the Visuals in the version of the technical documentation they received were Holistic or

Serialistic in nature using dichotomous pairs. Each respondent was then asked questions to determine the Verbal or Visual Dominance of the version of the technical documentation that they received using dichotomous pairs. Of the four versions of the technical documentation, two versions had visuals that were Holistic and the other two had visuals organized Serialistically. Likewise, two versions of the experiment were dominated by the Visuals and two were dominated by the Verbal content.

The reliability of the scale items used to check the manipulation of the Verbal versus Visual Dominance of the technical documentation had a Cronbach's Alpha of .907. The reliability of the Holistic versus Serialistic Organization had a Cronbach's Alpha of .900 (see Appendix 5).

The manipulation was checked using univariate ANOVA to determine if the respondents judged the versions to be significantly different. The Verbal versus Visual Dominance had a mean of 4.2556, for the versions with Verbal Dominance and a mean of 5.3989, for the versions with Visual Dominance. The respondents indicated that the two versions were significantly different ($F=84.928$, $p \leq .000$ at a 95% confidence level) (see Appendix 5). The Holistic versus Serialistic Organization had means of 5.3715, for the Holistic version, and a mean of 4.0583, for the

Serialistic version. The respondents also indicated that these manipulations were significantly different ($F=96.813$, $p \leq .000$ at a 95% confidence level) (see Appendix 5).

The scales used for the dependent variables were also examined to determine their veracity. The scale for Perceived Quality and Perceived Value are well-developed and validated questions have been effectively used repeatedly in causal research. The scale for Perceived Value was developed, refined, and validated initially by Monroe and Chapman (1987), and then followed by other researchers (Monroe 1990; Dodds and Monroe 1985; and Monroe and Chapman 1987). Reliability measures for this sample were examined. For the measure of Perceived Quality (questionnaire items 1, 2, 3, 7, and 9 on the first page of questions after the assembly instructions) the Cronbach's Alpha was .826. The Cronbach's Alpha for Perceived Value (questionnaire items 4 (recoded), 5, 6, and 8 on the first page of questions after the assembly information) and Attitude Toward Technical Documentation (questionnaire items 12, 13, 14, and 15 on the first page of questions after the assembly information) were .796 and .848 respectively (see Appendix 6).

SAMPLES' CULTURAL DIMENSIONS

Respondents were asked the questions contained in Hofstede's revised survey. Each of the cultures represented by the respondents were checked to make sure the sample from each culture had dimensions similar to what Hofstede had found. The formula from Hofstede's second edition (2001) was used to determine Individualism/Collectivism and Uncertainty Avoidance.

DEVELOPMENT OF INDIVIDUALISM/COLLECTIVISM INDICES BY CULTURE

In developing the Individualism/Collectivism Indices, questions from the revised Hofstede survey were added to the experimental instrument. Based on Hofstede's (2001) adjustments, the formulas for calculating cultural dimensions were modified to allow for their use with housewives, students, and those not currently employed. The formula used for Individualism was $[-27(\text{mean for live in a desirable area}) + 30(\text{mean for work with people who cooperate well with one another}) + 76(\text{mean score for have good physical working conditions}) - 43(\text{mean score for have a job which leaves you sufficient time for your personal or family life}) - 29(\text{constant})]$ and the adjustment for education (see figure 5.2).

Figure 5.2 Development of Individualism/Collectivism Indices by Culture

Country	Live Desire	Cooperate	Good Condition	Free Time	Education	Cultural Indices
Canada	1.79	1.71	1.82	1.45	29.00	57.139
China	1.62	1.62	1.62	1.35	29.00	81.200
Japan	2.08	1.56	1.79	1.32	29.00	40.673
USA	1.66	1.62	1.75	1.22	29.00	64.126

In Hofstede's study, the U.S. and Canada cultures were classified as Individualistic cultures, with Japan and China being classified as Collectivist cultures. Because of respondents' answers to the questions from Hofstede's study, the Individualism/Collectivism indices calculated for this study resulted in the U.S. (64.126), Canada (57.139), and China (81.200) being classified as Individualistic, with Japan (40.673) being classified as Collectivistic. The different results for Chinese sample for this research as compared to the results from Hofstede's study will be discussed when the results of the experiment are discussed.

UNCERTAINTY AVOIDANCE

The questions from Hofstede's revised survey were reviewed taking into account the four student populations

that would be participating in the experiment. One of the questions in the formula for Uncertainty Avoidance - of "How often do you feel nervous or tense at work", would not be applicable to at least one half of the cultural groups. Foreign students on student visas are not allowed to work, which would also be the case for traditional students who are not employed. This being the case, respondents would have to make up an answer or leave the question blank. This would make it difficult to determine if an answer was made up, and would result in questioning the reliability of answers to this particular question. Therefore, this question of "How often do you feel nervous or tense at work," was not used. In the formula, the means from Hofstede's (2001) the results from two surveys with six occupancies were used for this one question.

The formula used to calculate each culture's Uncertainty Avoidance index was: $300 - (40 * \text{Hofstede's means for tense at work}) - (\% \text{ of respondents who answered 4 or 5 on question 25}) - (30 * \text{mean of question 26})$. The answer was then adjusted for level of education as recommended by Hofstede (see figure 5.3).

Figure 5.3 Development of Uncertainty Avoidance Indices

Country	Hofstede's Means*	Longtime	Rules	Total	Education	Cultural Indices
Canada	3.27	70.60	2.92	11.00	-3	8.00
China	3.34	52.00	2.35	43.99	-3	40.99
Japan	2.85	19.80	3.08	73.80	2	75.80
U.S.	3.31	33.10	2.73	52.52	-9	43.52

Geert Hofstede (2001), *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations*. 2nd edition. Thousand Oaks, CA: Sage Publications.

In Hofstede's study, Japan's index (92) was calculated as high on Uncertainty Avoidance, with the U.S. (46) and Canada (48) just below the midpoint, and China (29) at the low end. Based on Hofstede's analysis Japan would be classified at the high end, and the U.S., Canada, and China at the low end. With the respondents in this experiment, Japan's index (75.80) was calculated as high on Uncertainty Avoidance, with China (40.99) and the U.S. (43.52) just below the midpoint, and Canada (8.00) at the low end. Similar to Hofstede, Japan would be categorized as high and Canada, China, and the U.S. would be categorized as low on Uncertainty Avoidance.

TEST OF POSSIBLE COVARIATES

Before testing the hypotheses, possible co-variates (gender, style of processing, experience) affects on the

dependent variable were examined. An analysis of each variable was performed to determine its possible impact on the dependent variables. In all cases but one there were no significant effects (See figure 5.4). The only significant effect was for gender on attitude. In examining this effect closer, analysis indicated that in all instances female Attitudes toward the Technical Documentation were higher than male Attitudes. Therefore, all samples would see the same influence on the overall cultural results. This would then exhibit negligible

Figure 5.4 Tests of Possible Covariates

Covariate	Perceived Quality		Perceived Value		Attitude	
	F-Value	Sign	F-Value	Sign	F-Value	Sign
Style of Proc Words	0.782	0.844	0.771	0.857	1.047	0.397
Style of Proc Pictures	1.038	0.410	1.271	0.106	1.214	0.156
Gender	1.318	0.248	0.487	0.818	2.413	0.027
Familiarity Bike	1.005	0.473	0.883	0.716	1.024	0.436
Familiarity Tech Docmnt	1.139	0.239	0.995	0.494	1.181	0.185

influence on the comparison of the cultures. Since only this one Attitude toward the Technical Documentation is influenced by the covariate of gender, the overall effect

of all three covariates may also be considered negligible. The other cultural indices were examined to determine any possible impact they may have on the dependent variables. The cultural dimensions of Power Distance, Masculine/Feminine, and Short-term/Long-term orientation were analyzed (see Figure 5.5). With the exception of Power Distance on Perceived Value, none of the other cultural dimensions had any impact on the dependent variables. In examining this cultural dimension, Hofstede (1980, 1984) found intercorrelations between Power Distance and Uncertainty Avoidance. In the cases of Japan (large Power

Figure 5.5 Tests of Possible Covariates

Cultural Dimension	Perceived Quality		Perceived Value		Attitude	
	F- Value	Significance	F-Value	Significance	F-Value	Significance
Power Distance	1.40	0.163	3.229	0.00	1.233	0.259
Masculine/Feminine	0.481	0.696	0.314	0.815	0.289	0.835
Long-term/Short-term Orientation	0.548	0.460	1.25	0.724	0.427	0.514

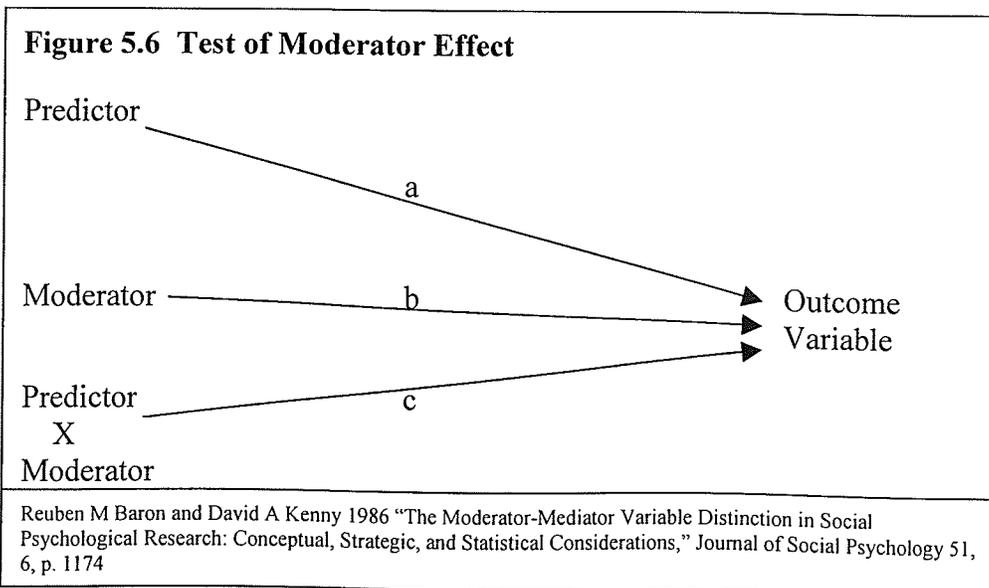
Distance and strong Uncertainty Avoidance), Canada and the U.S. (small Power Distance and Small Uncertainty

Avoidance), he found that there were correlations. Since theory proposes the influence of Uncertainty Avoidance on Attitudes, and there is correlation between these two cultural dimensions for three of the four cultures under study, the significant results were not surprising. The analysis was conducted without considering these three cultural dimensions, and without the presence of the covariates in the ANOVA models.

TEST OF HYPOTHESIS

Test of H1_a: Uncertainty Avoidance will moderate the relationship between Amount of Information and Perceived Quality in such a way that when uncertainty avoidance is high (low) a stronger relationship with high information content - Verbal Dominance (high Visual content - Visual Dominance) will be demonstrated.

The hypothesis involving the moderating impact of culture was tested via ANOVA following Baron and Kenny (1986) (see figure 5.6). In this experiment, Verbal/Visual Dominance is the predictor (Path a), the impact of



Uncertainty Avoidance is a moderator (Path b), and the interaction, or product of these two directly impacts the outcome variable(Path c).

According to Baron and Kenny (1986), the moderator hypothesis is supported if the interaction path of Verbal/Visual Dominance and Uncertainty Avoidance is significant. The different versions of the experimental instrument were coded one for Verbal Dominance, and zero for Visual Dominance. Since, in the hypothesized relationship, a culture's preferred processing is either with a fear of Uncertainty (preference for Verbal Dominance) or a willingness to take risks (preference for Visual Dominance), the cultural dimension of Uncertainty Avoidance was coded as one for high Uncertainty Avoidance, or two for low Uncertainty Avoidance and used as a two-level categorical variable in the analysis.

A multivariate ANOVA was run to test for main effects of the Verbal/Visual Dominance, Holistic/Serialistic Organization, and Uncertainty Avoidance on Perceived Quality. The results of the analysis indicated that Verbal/Visual Dominance did not have a significant main effect on Perceived Quality ($F=0.150$, $p=0.699$; see Appendix

7). Holistic/Serialistic Organization also did not exhibit a significant main effect on Perceived Quality ($F=1.906$, $p=0.168$; see Appendix 7). Likewise, Uncertainty Avoidance did not have a main affect ($F=0.194$, $p=0.660$; see Appendix 7).

In the multivariate ANOVA that was run to determine whether Uncertainty Avoidance did indeed moderate the relationship between Verbal/Visual Dominance and Perceived Quality, the interaction between Uncertainty Avoidance and Visual/Verbal Dominance did have a marginally significant impact on Perceived Quality ($F=3.076$, $p=0.08$). All other possible interactions were not significant (see Appendix 7). A regression was also run to examine the moderating impact of Uncertainty Avoidance on the relationship between Verbal/Visual Dominance and Perceived Quality. The results also indicated a marginally significant relationship ($F=3.844$; $p=0.05$; $\beta=-.114$; $r=.104$; $r^2=.017$; $\Delta r^2=.017$).

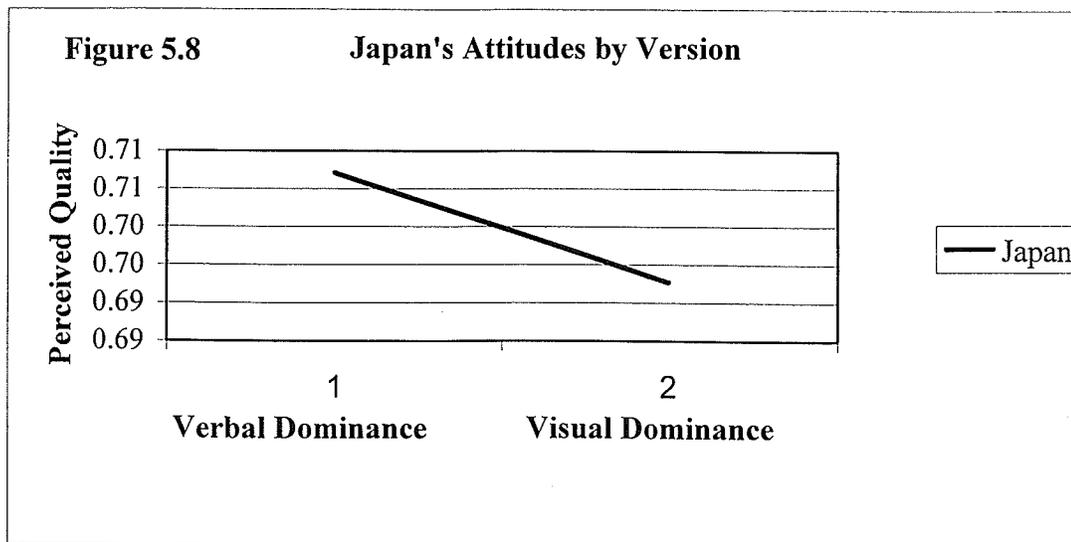
The next step was to determine if each of the cultural groups in the experiment demonstrated preferences consistent with the hypothesis (for the cultural means see figure 5.7). Since Japan is associated with high Uncertainty Avoidance, respondents from this culture were expected to show higher ratings for Perceived Quality with the Verbal Dominance versions of the experimental

instrument. When examining their ratings of Perceived Quality for both the Verbal and Visual Dominance

Figure 5.7 Perceived Quality Means for Verbal and Visual Dominance by Culture

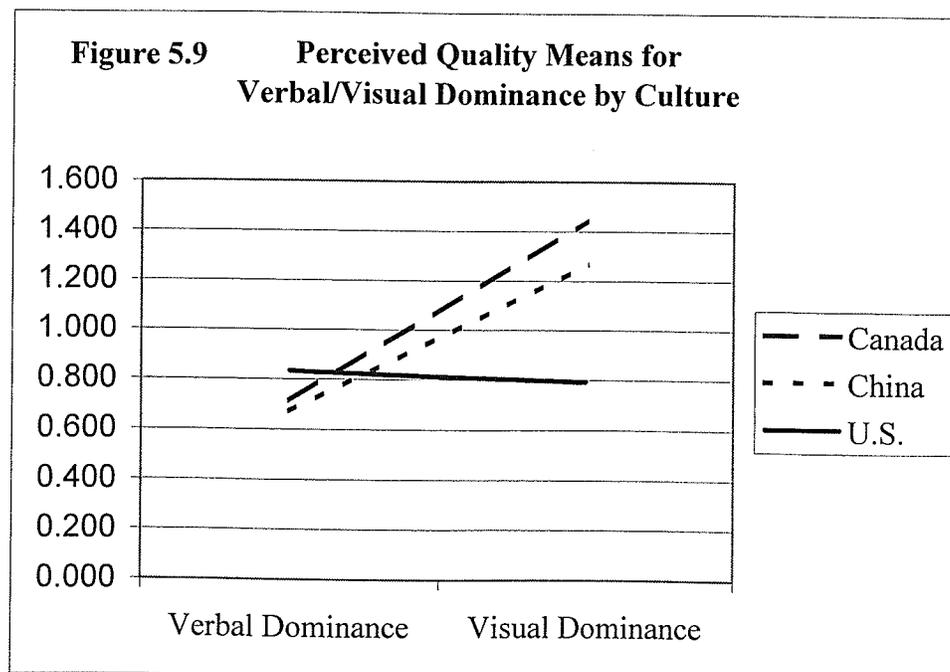
Culture	Verbal Dominance	Visual Dominance
Canada	0.71	1.45
China	0.61	1.27
Japan	0.71	0.69
U.S.	0.83	0.79

instruments, their Perceived Quality was indeed higher for the instruments with the Verbally Dominate Technical Documentation ($t=2.294$, $p=0.025$) (see figure 5.8). Since the other three cultures, Canada, China and the U.S., were low on Uncertainty Avoidance, their Perceived Quality



for the Visually Dominant version of the Technical Documentation should be higher than for the Verbally

Dominant version. The respondents from Canada and China did give higher ratings of Perceived Quality for the Visually Dominant versions than for the Verbally Dominant versions (Canada: $t=3.096$, $p=0.002$; China: $t=3.708$, $p=0.000$) (see Figure 5.8). However, the respondents from the U.S. rated both versions of the Technical Documentation about the same, with the Verbally Dominant version rating higher on Perceived Quality than the Visually Dominant version ($t=2.853$, $p=.005$). Thus, the respondents from the U.S. responded contrary to the hypothesized relationship (see Figure 5.9). Therefore, the results from the Japanese, Canadian, and Chinese cultures supported the hypothesis, whereas the results from the U.S. did not.



Test of H1_b: Individualism/ Collectivism cultural dimension will moderate the relationship between Organization of Information and Perceived Quality in such a way that high Individualism (Collectivism) will demonstrate a stronger relationship between Serial (Holistic) visuals and Perceived Quality.

The hypothesis involving the moderating impact of Individualism/Collectivism also was tested via multivariate ANOVA following Baron and Kenny (1986) (see figure 5.6). In this case the moderator hypothesis is supported if the interaction path of Holistic/Serialistic Organization and Individualism/Collectivism has a significant relationship with Perceived Quality (Baron and Kenny 1986).

The two versions of the experimental instrument with Visual information organized Holistically were coded with a one, and the two versions with the Visual information organized Serialistically were coded with a zero. Since people will either prefer one organization or the other, culture was once again coded categorically, with Collectivist cultures coded as a one and Individualistic cultures coded as a two (Japan was coded as a one and Canada, China, and the U.S. were coded as a two).

To examine the possible moderation of culture on the relationship of Organization and Perceived Quality, a multivariate ANOVA was run with both independent variables of Verbal/Visual Dominance and Holistic/Serialistic

Organization, the cultural variable of Individualism/Collectivism, with Perceived Quality as the dependent variable. The results indicated that there was no significant main effect between: Verbal/Visual Dominance and Perceived Quality ($F=0.150$, $p=.699$); Holistic/Serialistic Organization and Perceived Quality ($F=1.906$, $p=.168$); and Individualism/Collectivism and Perceived Quality ($F=.194$, $p=0.660$). In examining the possible moderating impact of culture, the hypothesized relationship with Individualism/Collectivism moderating the relationship between Holistic/Serialistic Organization and Perceived Quality demonstrated marginally significant results ($F=3.725$, $p=0.087$; see Appendix 8). The results of the other possible interaction indicated that none were significant with the exception of Individualism/Collectivism and Verbal/Visual Dominance, which was marginally significant ($F=3.076$, $p=.080$; see Appendix 8).

A regression was also run to examine the moderating impact of Individualism/Collectivism on the relationship between Holistic/Serialistic Organization and Perceived Quality. The results also indicated a marginally significant relationship ($F=3.331$; $p=0.069$; $\beta=-.115$; $r=.097$; $r^2=.0747$).

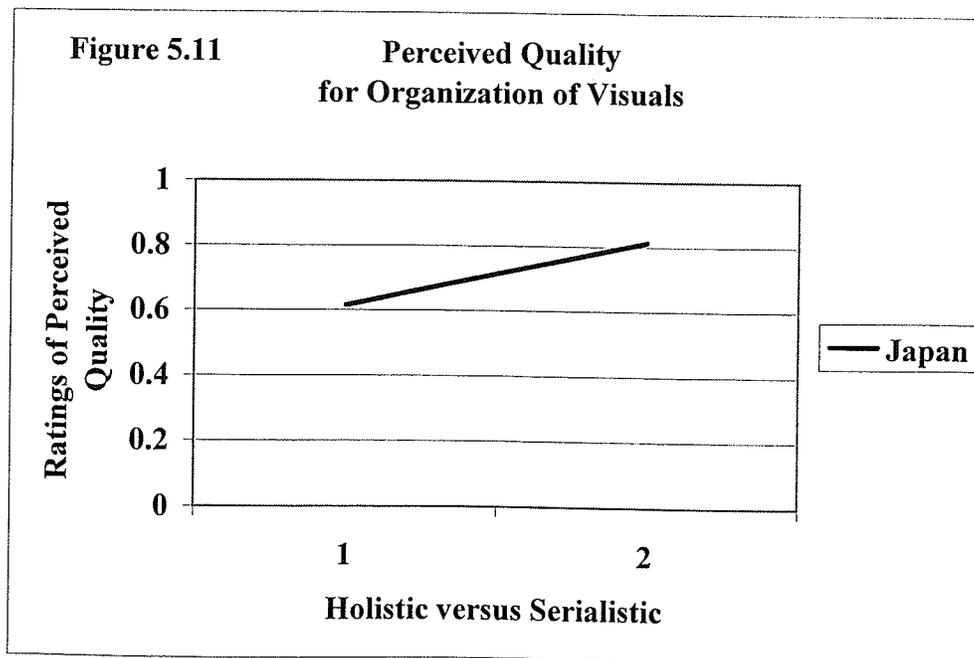
The moderating impact of Individualism/Collectivism on the relationship between Verbal/Visual Dominance and Perceived Quality has no precedence in the literature. It may be possible that because people high on Individualism have a tendency to rely on themselves to accomplish task, that this characteristic may impact their preferences for information from experts, which would be indicated by their preference for either Verbally or Visually Dominate technical documentation. On the other hand, it may very well be that this result is unique to the respondents used in this experiment. In order to understand the results indicating a moderating impact of Individualism/Collectivism on the relationship between Verbal/Visual Dominance and Perceived Quality, further exploration and study is needed.

Next, each culture was examined to see if the results for each cultural group demonstrated preferences consistent with the hypothesis (for the cultural means see Figure 5.10). Since the Japanese sample was categorized as collective, their Perceptions of Quality should be highest for the experimental instrument with Holistic visuals. The results indicate that the Japanese subjects' Perceptions of

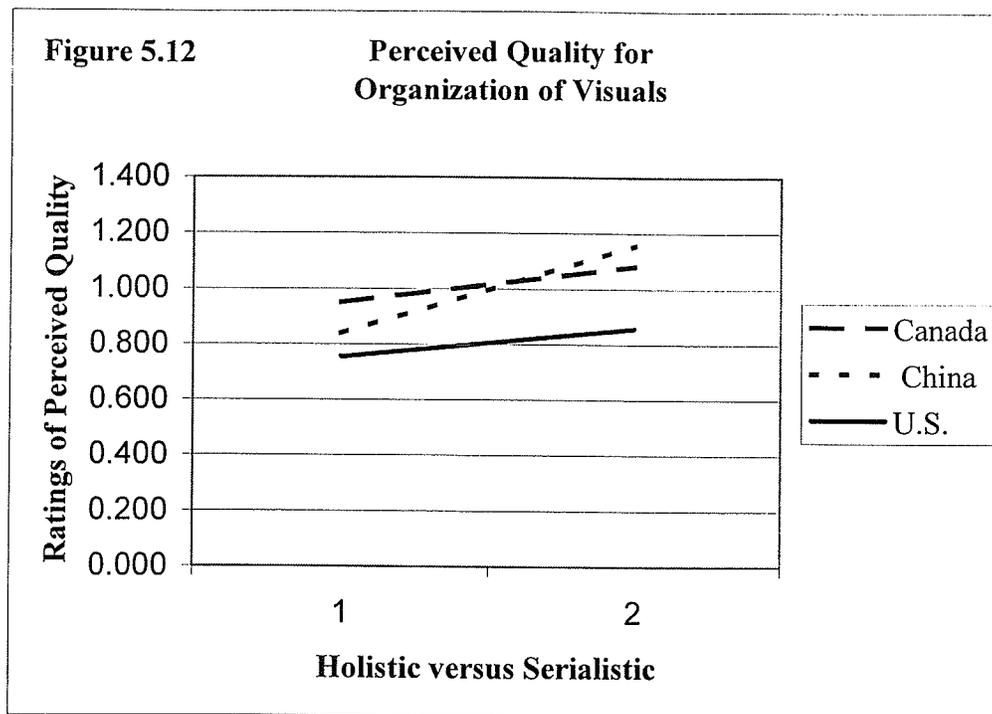
Culture	Holistic Organization	Serialistic Organization
Canada	0.95	1.08
China	0.84	1.16
Japan	0.61	0.81
U.S.	0.76	0.86

Quality for the Serialistically organized visuals was slightly higher than for the Holistically organized visuals ($t=0.889$, $p=.377$). This is contrary to the hypothesized relationship (see figure 5.11).

The respondents from Canada, China and the U.S. were categorized as Individualistic. Therefore, their



Perceptions of Quality are expected to be higher for the Serialistically organized visuals. In examining the results for these three groups, all of them rated Perceived Quality higher for the Serialistically organized visuals over the Holistically organized visuals (Canada: $t=4.114$, $p=0.00$; China: $t=3.670$, $p=0.000$; U.S.: $t=3.124$, $p=0.002$) (see figure 5.12). The results from Canada, China, and the U.S. support the hypothesized relationship.



Test of H2_a: Uncertainty Avoidance will moderate the relationship between Amount of Information (Verbal versus Visual Dominance) and Attitude Toward the Technical Documentation (A_{td}) with high Uncertainty Avoidance (low Uncertainty Avoidance) having a positive impact on the relationship between high (Verbal Dominance) (low-Visual Dominance) Amounts of Information.

The two versions of the experimental instrument were coded with one for Verbal Dominance, and a zero for the Visually Dominant versions. Since the hypothesized relationship is with a preference for one version or the other, the cultures were categorized as either high in Uncertainty Avoidance or low in Uncertainty Avoidance. Japan was coded high in Uncertainty Avoidance and Canada, China, and the U.S. low on Uncertainty Avoidance. In accordance with Baron and Kenny (1986), in order to examine the moderation of culture on the relationship between Verbal/Visual Dominance and Attitude Toward the Technical Documentation, a multivariate ANOVA was run with the independent variables of Verbal/Visual Dominance and Holistic/Serialistic Organization, the cultural dimension of Uncertainty Avoidance, and the dependent variable of Attitude Toward the Technical Documentation.

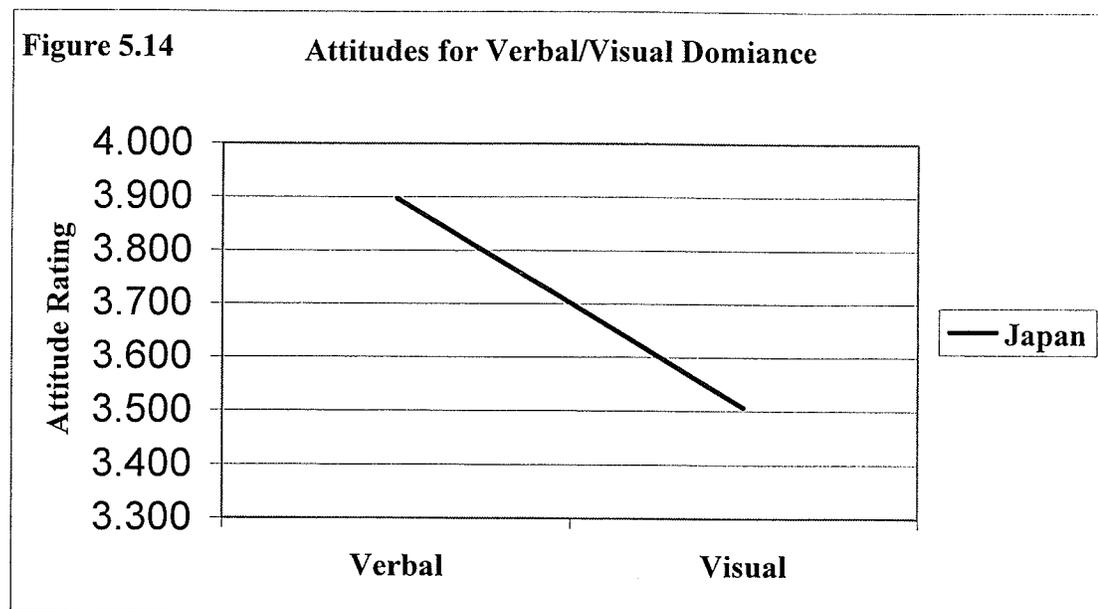
The multivariate ANOVA results indicated that the main effects of Uncertainty Avoidance and Holistic/Serialistic Organization on Attitude toward the Technical Documentation were not significant (Uncertainty Avoidance: $F=0.033$, $p=0.857$; Organization: $F=1.435$, $p=0.232$). The results did indicate a marginally significant main effect of Verbal/Visual Dominance on Attitude toward Technical Documentation ($F=2.959$, $p=0.086$, see Appendix 7). In

examining the possible moderating impact of Uncertainty Avoidance on the relationship between Verbal/Visual Dominance and Attitude toward the Technical Documentation, a significant relationship was evident ($F=4.267$, $p=0.006$, see Appendix 7). The moderating impact of Uncertainty Avoidance increases the significance of the relationship of Verbal/Visual Dominance with Attitude toward the Technical Documentation (from $p=0.86$ to $p=0.006$), which supports the hypothesis. None of the other possible interactions were significant (see Appendix 7). A regression was also run to examine the moderating impact of Uncertainty Avoidance on the relationship between Verbal/Visual Dominance and Attitude toward the Technical Documentation. The results indicated a significant relationship ($F=7.421$; $p=0.007$; $\beta=-.182$; $r=.143$; $r^2=.0194$).

The results from each of the four culture groups were examined to determine if each of them responded in the hypothesized way (for the cultural means see figure 5.13).

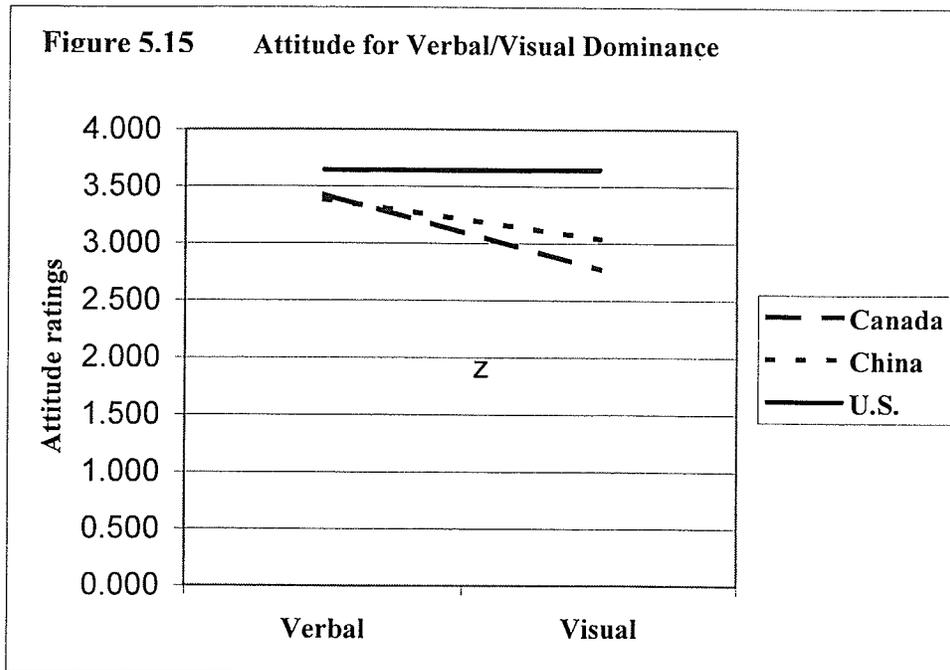
Figure 5.13 Attitude Means for Verbal/Visual Dominance by Culture		
Culture	Verbal Dominance	Visual Dominance
Canada	3.43	2.77
China	3.39	3.04
Japan	3.90	3.51
U.S.	3.64	3.65

First, Japan as the high Uncertainty Avoidance was examined to determine if Attitude Toward the Technical Documentation was higher for the Verbal Dominance versions of the Technical Documentation. The results support the hypothesized relationship with the Japanese respondents displaying more favorable Attitudes toward the Verbally Dominant Technical Documentation ($t=22.849$, $p=0.00$) (see figure 5.14).



Canada, China, and the U.S. being low in Uncertainty Avoidance should have more favorable Attitudes toward the Technical Documentation that is Visually Dominant. The results indicated that the Canadian and Chinese respondents demonstrated higher Attitudes towards the Verbally Dominant Technical Documentation, contrary to the hypothesis

(Canada: $t=20.956$, $p=0.00$; China: $t=19.820$, $p=0.00$). The results from the U.S. sample seemed almost the same for the Verbally Dominant and the Visually Dominance versions, but also demonstrated higher Attitude towards Verbally Dominant Technical Documentation ($t=22.287$, $p=0.000$) (see figure 5.15).



Test of H2_b: Individualism versus Collectivism will moderate the relationship between Organization of Information and Attitude Toward the Technical Documentation (A_{td}) with high Individualism (High Collectivism) having a positive impact on the relationship between Serial (Holistic) visuals and A_{td} .

The experimental instruments with the Holistically Organized visuals were coded as a one, and the instruments with the Serialistically Organized visuals, were coded as a

zero. Once again, the categories of Individualism for Canada, China, and the U.S. were coded as one, and of Collectivism for Japan were coded as a two. In accordance with Baron and Kenny (1986), the relationship between Holistically/Serialistically Organization of the instrument and Individualism and Attitude toward the Technical Documentation was analyzed. A multivariate ANOVA was run with both independent variables of Verbal/Visual Dominance and Holistic/Serialistic Organization, the cultural variable of Individualism/Collectivism, and the dependent variable of Attitude toward the Technical Documentation. (see Appendix 8).

The results from the analysis indicate that the main effect for Holistic/Serialistic Organization on Attitudes toward Technical Documentation, and Individualism/Collectivism on Attitudes toward Technical Documentation were not significant (Organization: $F=1.435$, $p=0.232$; Individualism: $F=0.033$, $p=0.857$, see Appendix 8). The main effect for Verbal/Visual Dominance was marginally significant ($F=2.959$, $p=0.086$, see Appendix 8).

In examining the possible moderation effect of Individualism/Collectivism on the relationship between Holistic/Serialistic Organization and Attitudes toward the Technical Documentation, the results indicate a significant

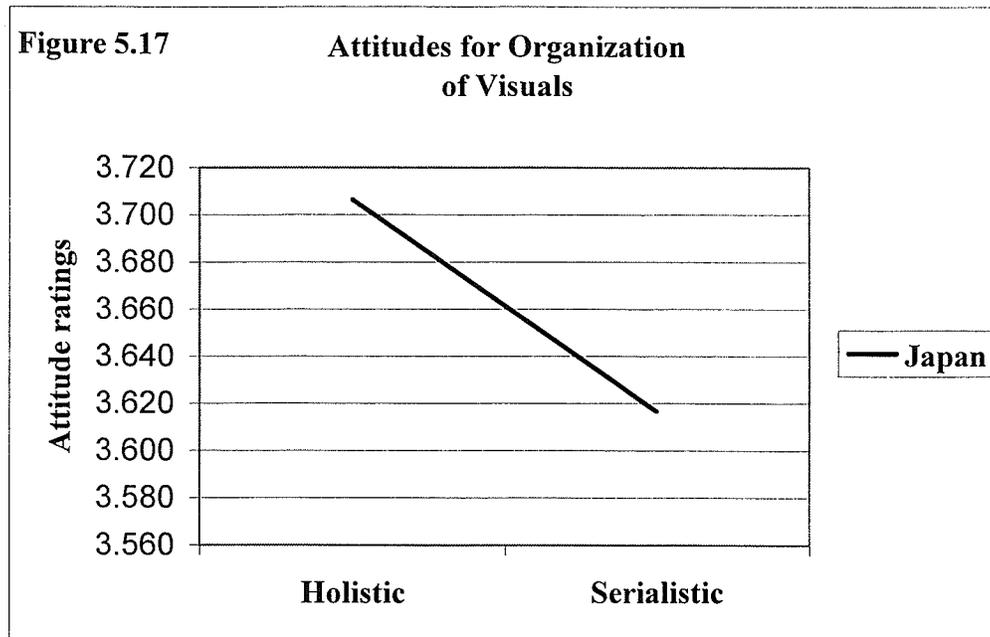
relationship ($F=3.142$, $p=0.007$, see Appendix 8), which supports the hypotheses. All of the other interactions examined were not significant (see Appendix 8). A regression was also run to examine the moderating impact of Individualism/Collectivism on the relationship between Holistic/Serialistic Organization and Attitude toward the Technical Documentation. The results indicated a marginally significant relationship ($F=2.086$; $p=0.054$; $\beta=-.182$; $r=.074$; $r^2=.055$; $\Delta r^2=.055$).

The results from each of the four cultural groups were examined to determine if each of them responded in the hypothesized way (for the cultural means see Figure 5.16).

Figure 5.16 Attitude Means for Holistic/Serialistic Organization by Culture		
Culture	Holistic Organization	Serialistic Organization
Canada	3.28	3.04
China	3.52	2.93
Japan	3.71	3.62
U.S.	3.67	3.62

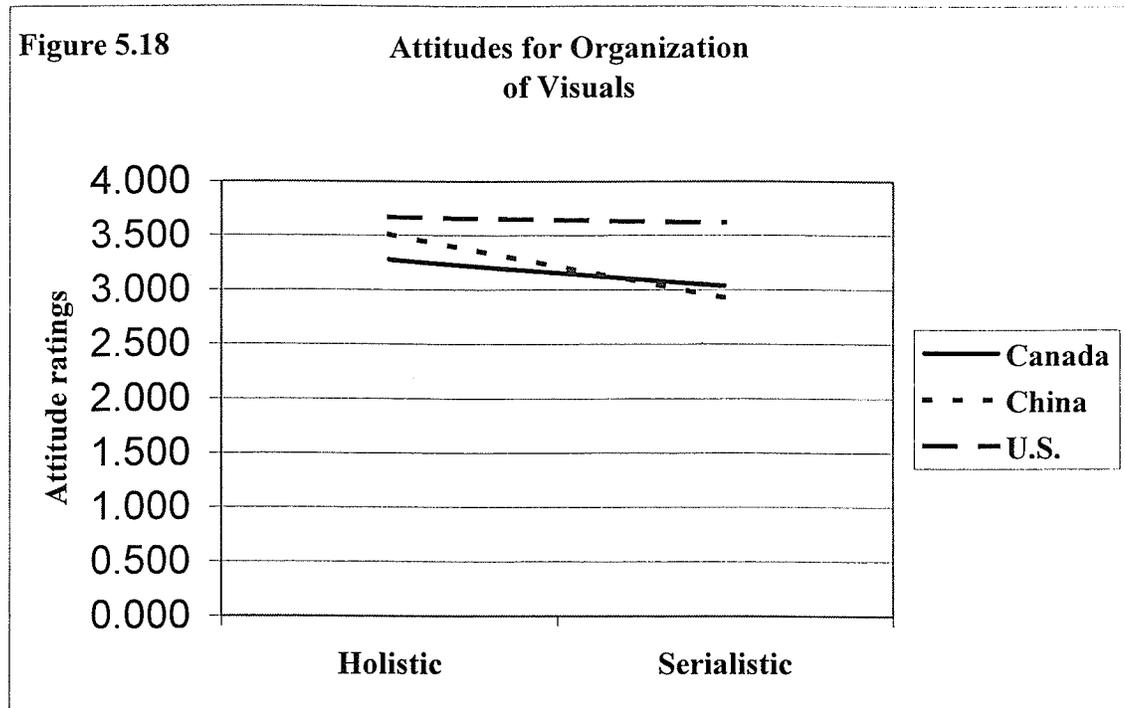
With the Japanese culture classified as a Collective culture, their Attitudes toward the Holistically Organized Visuals would be expected to be higher than their Attitudes towards the Serialistically Organized Visuals. Their Attitudes were more favorable for the Holistically

Organized Visuals as hypothesized ($t=20.680$, $p=0.000$) (see Figure 5.17).



With Canada, China and the U.S. being classified as having an Individualistic culture, respondents' Attitudes toward the Serialistically Organized Visuals should be higher than for the Holistically Organized Visuals. In examining the results from the three cultural groups, Attitudes of the Canadians and the Chinese were higher for the Holistically Organized Visuals than the Serialistically Organized Visuals (Canada: $t=20.694$, $p=0.000$; China: $t=20.613$, $p=0.000$; see figure 5.14), contrary to the hypotheses. Similarly, Attitudes of the respondents from the U.S. were

higher for the Holistic than for the Serialistic Visuals (t=22.679, p=0.000, see figure 5.18).



Test of H3: There will be a positive relationship between Perceived Quality and Perceived Value.

The relationship between Perceived Quality and Perceived Value was examined for all subjects and for each of the cultural groups. For all subjects, a strong positive relationship was found ($r=0.797$, $p=0.001$) (see figure 5.15). Each of the cultural groups also demonstrated a strong positive relationship, with Canada demonstrating the strongest relationship ($r=0.651$) followed by the U.S. ($r=0.627$), Japan ($r=0.527$), and Hong Kong ($r=0.506$) (see

Figure 5.19). Relationships were significant at the $p=.001$ levels. These results support H_3 .

Figure 5.19 Test of Relationship between Perceived Quality and the other Dependent variables (with report of r values and their significance)					
Perceived Quality					
	Canada	China	Japan	US	Total
Perceived Value	.651*	.506*	.527*	.627*	.797*
Attitudes	.875*	.749*	.783*	.832*	.810*
*significant at the .001 level					

Perceived Quality should mediate the relationship between the predictor variables and Perceived Value. The procedure to test for mediation by Baron and Kenny (1986), and applied to the Perceived Quality and Perceived Value by Agarwal and Teas (2002,) was used to examine the relationships in the model proposed in this research. The three steps involved in testing mediation in this case involve:

- (1) Regress the mediator variable (e.g. Perceived Quality) on the explanatory variable (e.g. the product of the cultural dimension and the

corresponding version of the technical documentation).

- (2) Regress the dependent variable (e.g. Perceived Value) on the explanatory variable (e.g. the product of the cultural dimension and the corresponding version of the technical documentation).
- (3) Regress the dependent variable (e.g. Perceived Value) on the explanatory variable (e.g. the product of the cultural dimension and the corresponding version of the technical documentation) and the mediator variable (e.g. Perceived Quality).

The results of the regressions indicate that the mediation relationship does exist between Perceived Quality and Perceived Value (for Individualism/Collectivism $F=266.626.008$, $p \leq 0.000$; for Uncertainty Avoidance $F=300.669$, $p \leq 0.000$; see Appendix 9).

The analysis from the three-step procedure developed by Baron and Kenny (1986) render results similar to Agarwal and Teas (2001). Perceived Quality did mediate the relationship between the product of culture and technical documentation and Perceived Value (see Appendix 9). Furthermore, the change in r^2 as the analysis went from one model to the next, in accordance with Baron and Kenny (1986) was $\Delta r^2 = .507$, $p=0.00$ for Organization of

Information and $\Delta r^2 = .511$ and $p=0.00$ for Dominance of information. These results provide further support of H₃ and the proposed model.

Figure 5.20					
Relationship of Perceived Quality to Perceived Value and Attitudes (r values)					
	Canada	China	Japan	US	Complete Model
Perceived Value	.651*	.506*	.527*	.627*	.797*
Attitudes	.875*	.749*	.783*	.832*	.810*
*significant at the .001 level					

Test of H₄: There will be a positive relationship between Perceived Quality and Attitude Toward the Technical Documentation (A_{td}).

The relationship between Perceived Quality and Attitude toward the Technical Documentation was examined first for the entire data set and then for each of the cultural groups. For the entire data set the relationship between Perceived Quality and Attitude was a very strong positive relationship ($r=.810$, $p=0.001$) (see Figure 5.15). Each of the cultural groups exhibited the same strong positive relationship, with the Canadian's exhibiting the strongest relationship ($r=.875$), followed by the U.S.

respondents ($r=.832$), the Japanese ($r=.783$), and, lastly, the Hong Kong sample ($r=.749$) (see figure 5.15). All were significant at the .000 level. The results provided strong support for H4.

To further test the relationship in the model, Perceived Quality is expected to mediate the relationship between the predictor variables and Attitude toward the Technical Documentation. Baron and Kenny's (1986) procedure was used to examine the possible mediator relationship between Perceived Quality and Attitudes toward the Technical Documentation. This procedure for testing mediation effects was applied to the variables in this study in the following way:

- (1) Regress the mediator variable (e.g. Perceived Quality) on the explanatory variable (e.g. the product of the cultural dimension and the corresponding version of the technical documentation).
- (2) Regress the dependent variable (e.g. Attitudes) on the explanatory variable (e.g. the product of the cultural dimension and the corresponding version of the technical documentation).
- (3) Regress the dependent variable (e.g. Attitudes) on the explanatory variable (e.g. the product of the

cultural dimension and the corresponding version of the technical documentation) and the mediator variable (e.g. Perceived Quality).

The three-step results support the mediation relationship as proposed in the model (Individualism, $F=4.59$, $p=0.000$; Uncertainty Avoidance, $F=4.829$, $p=0.000$; (see Appendix 10) and support H_4 . Furthermore, the change in r squared as the analysis went through the process was $\Delta r^2 = .620$ and $p=0.00$ for Organization of information, and $\Delta r^2 = .626$ and $p=0.00$ for Dominance of information.

INDIVIDUAL CULTURAL VALUES

The results for the U.S. respondents suggest that the sample was actually split, with one part indicating preferences proposed by the model, and another part responding in an opposite manner. Rokeach (1973) indicated that cultural upheaval may result in a change in a person's total value system. Murphy, Gordon and Mullen (2004), using the values from Rokeach's scale, found that there had been change in twenty-seven of the thirty-six values for U.S. citizens after the September 11 terrorists attack. With the results for the U.S. sample, it is possible that a value

shift is taking place in the U.S., whether temporary or permanent.

To further understand the possible moderating impact of culture, an examination of culture on the individual level was conducted. There are several formulas for calculating cultural indices from the questions in Hofstede's survey. After examining research using various formulas using the questions from Hofstede's survey, formulas for both Individualism and Uncertainty Avoidance were developed. In keeping with the intent of Hofstede, the questions of the importance of: personal time; good working conditions; security; and challenging work were used. Each respondent was then categorized as one, for Individualistic, and, two, for Collectivist. Results of the questions indicated that 204 (57.1%) of the respondents fit into the classification of Individualist and 105 (42.6%) fit into the classification of Collectivists.

An multivariate ANOVA was run with the Individual/Collective category and Holistic/Serialistic organization with the dependent variables of Perceived Quality and Attitudes. The results of the ANOVA were not significant. Perceived Quality exhibited results of: $F=1.326$; and $p=0.267$. Attitude toward the Technical Documentation results were: $F=1.042$; and $p=0.354$. Thus, the

results indicated that at the individual level the model was not supported

Uncertainty Avoidance for the individual respondent was calculated using the same questions as for the national cultural index. The culture index was developed with the following formula: $300 - (40 * \text{Hofstede's cultural mean for "nervous at work"}) - (\text{"staying with a company for a long time"}) - (30 * \text{"company rules should not be broken"})$. Then each culture was categorized as either high in Uncertainty Avoidance or low in Uncertainty Avoidance. The results of the categorization had 179 (50.3%) of the respondents as high in Uncertainty Avoidance and 177 (49.7%) as low in Uncertainty Avoidance.

A multivariate ANOVA was run with individual Uncertainty Avoidance and Verbal/Visual Dominance with the dependent variables of Perceived Quality and Attitude toward Technical Documentation. The results indicated the relationship between Visual/Verbal Dominance and Perceived Quality as moderated by Uncertainty Avoidance was not significant with the $F=1.802$, $p=0.166$. The relationship between the Independent variable and moderating variable with Attitude toward the Technical Documentation was significant with the $F= 3.855$, $p=0.026$. The results from the individual cultural indices would seem to indicate that

national cultural indices would be most effective in determining respondents' preferences for visual information in technical documentation. National cultures indices ability to more significantly indicate preferences for technical documentation may be a result of the national culture determining the type of processing used in the education system. The results from the national culture will be discussed further in Chapter 6.

SUMMARY

In this chapter the results from two pre-tests were first examined. The first pre-test was conducted to verify that the manipulation check questions were both valid and reliable. The second pre-test was conducted to determine that the two manipulations of the experimental instrument, that of Verbal/Visual Dominance and Holistic/Serialistic Organization, were successful. The results from the second pre-test indicated that respondents did see a significant difference in the manipulations. Following these two pretests, the results from the manipulation check questions from the entire experiment were examined to determine that the manipulation of the technical documentation was successful with the respondents from all four cultures. The results indicated that all cultural groups judged the

versions to be significantly different from each other, so the manipulations in the experiment were successful.

In addition to the manipulation check, the demographics of the respondents were examined to ensure that the samples from each of the four cultural groups were similar based on age, level of education and familiarity with bicycles, the product assembly information used in the experiment. The samples were found to be similar on all three of the characteristic in question.

Before the test of hypothesis was undertaken, possible covariates were examined to see if they exhibited any effect on the dependent variables. The covariates tested consisted of: Style of Processing, with preferences for words and preferences for visuals both examined; gender; familiarity with bicycles; and familiarity with technical documentation. With the exception of gender's significant effect on Attitude toward the Technical Documentation, none of the covariates demonstrated a significant effect.

Next the test of hypothesis was undertaken. H1_a and H1_b were both marginally significant. With respect to H1_a the subjects from Japan, Canada, and China responded as hypothesized, but respondents from the U.S. did not. With respect to H1_b, respondents from Canada, China and the U.S.

responded as hypothesized, whereas respondents from the Japan responded contrary to the hypotheses.

The tests of H2a and H2b showed the relationship between versions of the documentation, as moderated by culture, and Attitudes toward the Technical Documentation to be significant. In examining the results for H2a from each of the cultural groups, the Japanese group was the only one exhibiting the relationship as hypothesized. The Japanese, categorized as high Uncertainty Avoidance, demonstrated higher Attitudes toward the Technical Documentation with high Verbal Dominance. Both the Canadian and Chinese, categorized as low Uncertainty Avoidance, should have demonstrated higher Attitudes for Visually Dominate documentation. However, in both cases, they demonstrated higher Attitudes toward the Verbally Dominant documentation, contrary to H2a. The results from the U.S. respondents were similar to the Canadian and Chinese, with Attitudes for each Verbally Dominated documentation being higher.

The results for H2b were also significant. In examining the four cultural groups' results, the results from the Japanese, categorized as Collective, and the U.S., categorized as Individualistic, samples were as hypothesized. The Japanese respondents demonstrated higher

Attitudes for the Holistically organized visuals, and the U.S. respondents demonstrated higher Attitudes for the Serialistically organized visuals. The Canadian and Chinese, both being categorized as Individualistic in this research, demonstrated higher Attitudes for the Holistically organized visuals, contrary to the hypotheses.

In a further test of the model, Perceived Quality was found to mediate the relationship between the product of the independent variable and moderator and Perceived Value. Furthermore, Perceived Quality also mediated the relationship with Attitude toward the Technical Documentation. Therefore, there was not only a path directly to Attitudes toward the Technical Documentation from the moderated relationships, but a path was found through Perceived Quality. This supports the modeled relationships.

CHAPTER 6

CONCLUSIONS

OVERVIEW

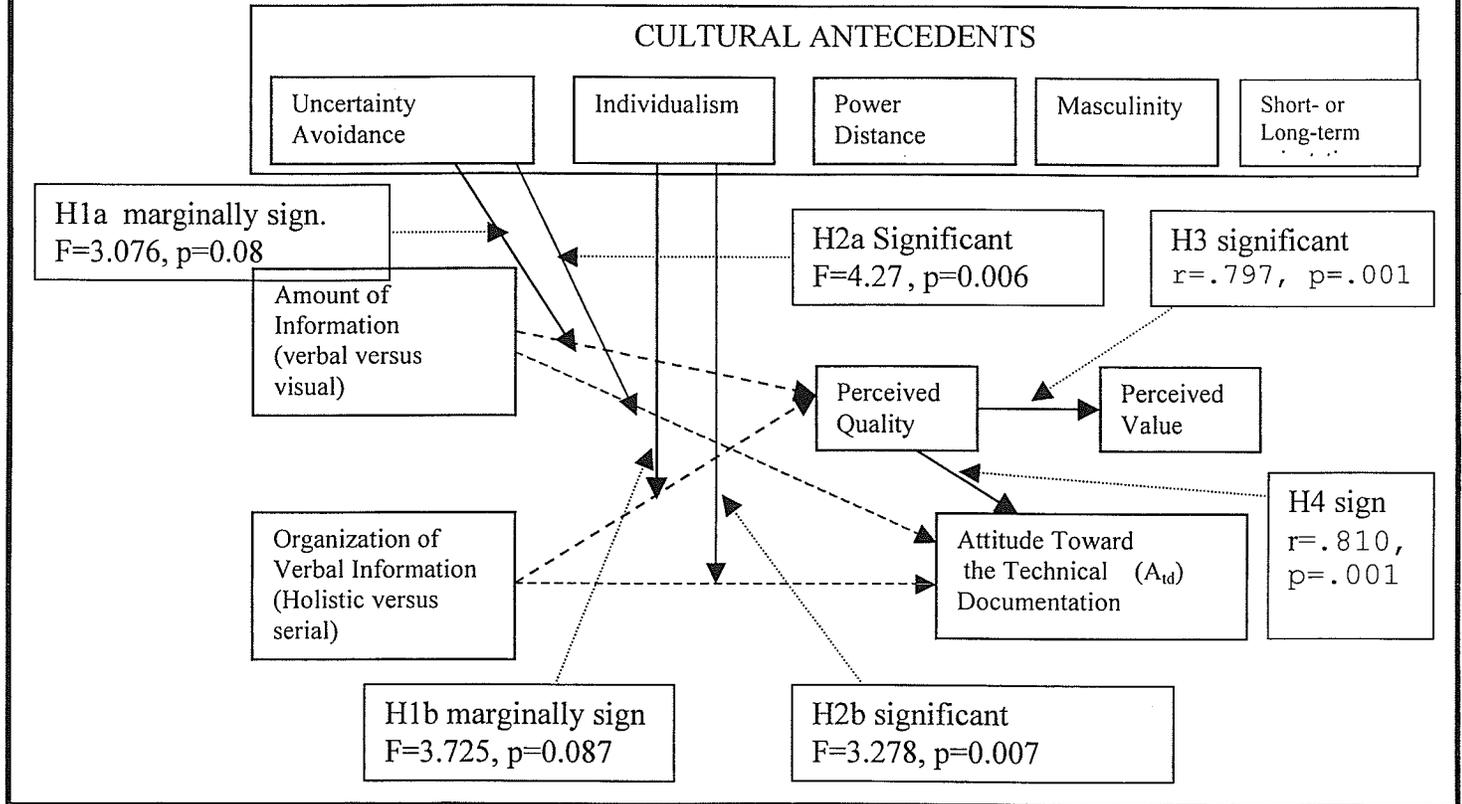
This concluding chapter amalgamates the study findings elucidated in the previous chapters. The cultural dimensions of Individualism/Collectivism and Uncertainty Avoidance moderating effects on Perceived Quality, Perceived Value, and Attitudes towards the Technical Documentation will be summarized. The theoretical and managerial implications from the results of this research will be discussed. Finally, the limitations of the research are discussed with suggests and possibilities for further research are explored and discussed.

MAIN FINDINGS

The model with the hypothesis and the results of the overall model, including the significant and marginally significant results are presented in figure 6.1. The results and interpretation of the results will be discussed in this section, all significant results are discussed. First, the overall interactions will be discussed followed by the interactions for each cultural group.

Figure 6.1

Cross-Cultural Differences in Preferences for Visual Information In Technical Documentation



Discussion of Results

The Organization of Information (Holistic versus Serialistic) moderated by the cultural dimension of Individualism/Collectivism demonstrated a marginally significant impact on Perceived Quality and a significant impact on Attitudes towards the Technical Documentation

(see Figure 6.2). Further more, Organization of Information moderated by Individualism had a significant impact

Figure 6.2 Independent Variable and Culture Interaction								
	Perceived Quality		Attitude		Perceived Value(Qual)		Attitude (Qual)	
	F	p-value	F	p-value	F	p-value	F	p-value
Organization x Individualism	3.725	.087	3.278	.007	266.6	.00	337.9	.00
Dominance x Uncertainty	3.076	0.08	4.27	.006	300.67	.00	340.9	.00

on Perceived Value and Attitude toward the Technical Documentation through Perceived Quality. Verbal/Visual Dominance of the information moderated by the cultural dimension of Uncertainty Avoidance had a marginally significant impact on Perceived Quality and a significant impact on Attitudes toward the Technical Documentation. Furthermore, Verbal/Visual Dominance moderated by Uncertainty Avoidance through Perceived Quality had a significant impact on Perceived Value and Attitude toward the Technical Documentation. On closer examination of these relationships, the analysis by cultural group delivered results that were mixed (see Figure 6.3).

In examining results by culture, the Japanese culture was the most consistent in supporting the hypothesized

relationships. This may be because Japan, as a nation, is a nation high in ethnic homogeneity, resulting in a strong national culture (Chew and Putti 1995, Dunphy and Shi 1986, Karjala 1993, Yeh 1988). Also, Japan has encountered the dramatic events that Hong Kong and the U.S. have in the recent past. The results from the Japanese respondents supported all of the hypothesis except H1b. The Japanese sample was rated high on Uncertainty Avoidance, and consistent with H1a, the Japanese respondents rated the version with Verbal Dominance higher on Perceived Quality and higher on Attitudes toward the Technical Documentation. The Japanese sample was also classified as a Collectivist culture. The Japanese respondents did rate the Holistically organized visuals higher on Attitudes toward the Technical Documentation, consistent with H2b.

However, contrary to H1b, their ratings of Perceived Quality for the organization of the visuals were higher for the Serialistically organized visuals rather than the Holistically organized as hypothesized. This may possibly be a result of the fact that the respondents from Japan are studying in the U.S. where the education system supports an Individualism/Serialistic learning style (Fuller et al 2000; Karjala 1993). It may also be that these Japanese students have a personal processing style that was not

consistent with the national culture, and chose to study in a country where their personal processing style would be more compatible to the national culture.

In research on dominant culture and subcultural groups, Brumbaugh (2002) found that the subcultural groups could and did develop a knowledge of and adapt to the communication styles of the dominant culture. Therefore, it is possible that the Japanese respondents may have adapted to the learning style inherent in the US education system and rated the Perceived Quality appropriately. Or it may be that the Japanese students developed a personal processing style similar to the U.S. national culture and that is why they chose to study in the U.S. Whether the Japanese respondents ratings of Perceived Quality are a result of personal style or adaptation is a point for further study and research.

Both the Canadian and Chinese respondents support the hypothesis when it came to ratings of Perceived Quality. From the national cultural indices developed from their answers to Hofstede's questions, both samples were categorized as low on Uncertainty Avoidance. With both groups being categorized as low Uncertainty Avoidance, respondents would be expected to rely less on experts, be willing to take some risks, want to work quickly,

therefore, preferring their information in a Visually Dominant manner. Consistent with expectations of cultures low on Uncertainty Avoidance, the Canadian and Chinese respondents rated the versions with Visual Dominance higher on Perceived Quality in accordance with H1a. The results from both cultural groups demonstrated that they did respond in accordance with national culture expectations. Similarly, both the Canadian and Chinese respondents were categorized as Individualistic, based on their answers to Hofstede's questions, and rated the versions with the Serialistically organized visuals higher on Perceived Quality, consistent with H2a.

However, when it came to Attitudes toward the Technical Documentation with both Verbal/Visual Dominance and Holistic/Serialistic Organization, both cultural groups responded contrary to the hypothesis. The Chinese respondents had results very similar to the Canadians. The fact that the Chinese respondents in this research answered Hofstede's questions in such a way as to be classified a Individualistic rather than Collective was contrary to the classification found in Hofstede's research.

Since the time that Hofstede conducted his research, several decades ago, Hong Kong has gone through extreme political change. Rokeach (1973) stated that cultural

values may undergo a change as a result of this kind of upheaval. Studies have supported the idea that national culture can change in a relatively short period of time (Huo and Randoll 1991; McGrath et al 1992; Raiston et al 1993). Furthermore, research has supported the important role that government plays in influencing national culture (Hamilton and Biggart 1988; Ji and Karakowsky 2002; Putnam 1993; Redding 1990). Since the time of Hofstede's research, Hong Kong went from being rule by Great Britain to being ruled by mainland China. ". . . [T]o integrate a typically capitalist city into a once-radical socialist country is indeed an unprecedented experiment" (Chui, Ting, Tso and Cai 1998, page 750).

This "experiment" has resulted in some unprecedented resistance and unrest. (Seno 2004). Dowd (1981) found that cultural change because of upheaval was much greater among younger age groups, which would be consistent with the respondents in this research. Some studies have concluded that the culture in Hong Kong and other parts of China is moving toward similarities with the culture in the U.S., specifically away from Collectivism toward Individualism (McGrath et al 1992; Westwood and Posner 1997; Yang 1991), a movement similar to that found in this research.

The Results from the respondents from the U.S. supported all but H1a. The U.S. respondents were categorized as low in Uncertainty Avoidance, and therefore should have rated the Visually Dominant versions of the instrument higher on Perceived Quality and Attitudes toward the Technical Documentation. The results demonstrated slightly higher ratings for the Verbally Dominant version on Perceived Quality, contrary to H1a. Because the U.S.

Figure 6.3 Cultural Results for each of the Hypothesis

Hypothesis	Canada		China		Japan		US	
	Cult Rating	Results						
H1a Uncertainty Verbal/Visual Quality	Low	Support	Low	Support	High	Support	Low	Contradict
H1b Individualism Holistic/Serial Quality	High	Support	High	Support	Low	Contradict	High	Support
H2a Uncertainty Verbal/Visual Attitudes	Low	Contradict	Low	Contradict	High	Support	Low	Support
H2b Individualism Holistic/Serial Attitudes	High	Contradict	High	Contradict	Low	Support	High	Support
H3 Quality Value		Support		Support		Support		Support
H4 Quality Attitudes		Support		Support		Support		Support

sample was rated high in Individualism, these respondents should have rated the Serialistically Organized version higher on Perceived Quality and the analysis determined that this was the case.

In the case of Attitudes toward the Technical Documentation the U.S. was expected to have higher Attitudes toward the Visually Dominant and the Serialistically Organized in accordance with H2a and H2b. In both cases the U.S. respondents did support the hypothesis, but the difference between the Verbally/Visually Dominant versions and the Holistically/Serialistically Organized versions was slight.

The results for the U.S. seemed to be almost split with one version slightly edging over the other version. This may be an indication of a value change. Catastrophic events may have a significant impact on cultural values (Murphy, Gordon and Mullen 2004; Olivas-Lujan, Harzing, and McCoy 2004). The U.S. at the time of the experiment had just suffered the horrific events of the September 11 Terrorist attacks. There was also the effect of being unified against a common enemy, the terrorists. This may have either a temporary, or long-range impact on values. Research conducted on value and cultural changes since September 11 have demonstrated a significant impact on

culture, particularly on aspects similar to Individualism and Uncertainty, both of which would impact the results of this research (Murphy, Gordon and Mullen 2004; Olivas-Lujan, Harzing, and McCoy 2004). Furthermore, changes in culture as a result of upheaval seems to impact younger people more than the older (Dowd 1981), which would be significant to this research as well since the respondents are all of college age.

Another possible impact on the results of the research is the location of the respondents. Even though consumer heterogeneity exists within the U.S. and there is an overall national culture, regional differences have been found (McKenna 1992; Mehrotra 1990; Roth 1995). The student body at Black Hills State University is made up almost entirely of young people from within a 300-mile radius. This Midwest region was settled almost entirely by people from Scandinavia. This may have an impact on the cultural values of the region and of the respondents. While Norway and Sweden are classified as Individualistic on Hofstede's work (2001), these cultures rank much closer to the middle values and are very similar to what was found with the U.S. respondents in this experiment. Whether the results are an indication of regional differences or possible shifts in the U.S. national culture is a matter for further study.

IMPLICATIONS FOR THEORY AND PRACTICE

The major objectives of this research were defined in terms of impact of the Organization of Information and Amount of Information in the form of Verbal or Visual Dominance of technical documentation on Perceived Quality, Perceived Value and Attitudes. The focus was on the moderating impact of culture, specifically, the dimensions of Individualism versus Collectivism and Uncertainty Avoidance, on the relationship between the independent variables of Organization of the information and the Amount of Information with the dependent variables of Perceived Quality, Perceived Value, and Attitudes.

This research project builds on the model developed by Zeithaml and extended by Teas and Agarwal (2000). The model developed by Teas and Agarwal (2000) examined the moderating impact of Country-of-Origin on the relationship between extrinsic cues and Perceived Quality and Perceived Value. The model developed for this research adds another outcome variable, the dependent variable from advertising communications research of Attitudes towards the communication, which in this case is Technical Documentation.

This research also extends Teas and Agarwal (2000) moderating impacts to included dimensions of national

culture. Any business developing technical documentation needs to consider the cultural background of its customers. In developing technical documentation, businesses need to address at least these two issues: (1) Are customers who will be using the documentation from an individualistic society or a collectivist society? (2) Are the company's customers from an Uncertainty Avoidance culture? Given that this is the main contribution of this research, this next section will discuss these two questions.

CULTURE'S MODERATING IMPACT- UNCERTAINTY AVOIDANCE

Consider a firm with a multi-cultural consumer base that has products that need to be assembled or need instructions in order to use the product correctly. The firm has the option of providing the assembly information with either the verbal information dominating or the visual information dominating. The choice of how to present the information for each of the national cultures can be facilitated by examining how each of the countries' main culture reacts to Uncertainty. In developing the technical documentation for cultures that are high in Uncertainty Avoidance, the business would need to consider giving very specific verbal instructions with the verbal information dominating the space. In cultures that are low in

Uncertainty Avoidance, the communication would need to focus on the visual information with the visuals dominating the space in order to be culturally congruent.

A practical significance of this result is that businesses should design the format of the technical documentation to be culturally congruent with their customer base. The choice of Visual or Verbal Dominance will dictate the consequences in terms of consumers' Perceptions of Quality, Perceptions of Value and their Attitudes towards the Technical Documentation. Countries with High Uncertainty Avoidance would have more favorable reactions to technical documentation where the Verbal content dominated. Countries low on Uncertainty Avoidance would react more favorably to technical documentation where the Visual content dominated. Providing the technical documentation that is culturally sensitive to the national culture's feeling about Uncertainty will lead to higher levels of Perceived Quality and Perceived Value.

CULTURE'S MODERATING IMPACT- INDIVIDUALISM/COLLECTIVISM

A firm designing Technical Documentation for a multi-cultural customer base has the option of designing the Visual Information Organized either Holistically or Serialistically. By examining the national culture's

"other" orientation can facilitate the choice of which way to organized the Visual Information. Specifically, if a country's national culture is Individualistic in nature, then the Visual Information should be organized Serialistically, one step at a time, so that each step may be considered and examined separately. Organizing Serialistically would result in more favorable ratings of Perceived Quality, Attitudes, and Perceived Value.

In countries where the national culture is collective in nature, then Visual Information should be Organized Holistically, showing all of the steps together. Organizing the Visuals for collective societies in a Holistic manner will results in more favorable Perceptions of Quality, Value and Attitudes towards the Technical Documentation.

A practical significance of this research's results is that managers can use cultural indices for their customer base to develop technical documentation that consumers perceived as being of Quality and high Value. Furthermore, customers will develop more positive attitudes about the technical documentation. Therefore, consumers' Perceptions and Attitudes can be positively impacted through culturally congruent technical documentation.

LIMITATIONS:

Even though this study confirmed a majority of the hypothesis, as with any research, the limitations need to be discussed. Understanding the limitations is useful when drawing conclusions from any research and generalizing the results to other customers and other cultures.

The experimental instrument used print material from a bicycle repair manual. While care was used to ensure that the product used in this study was a familiar one for the population, it is possible that the processing of the technical documentation and the ensuing perceptions of Quality, Value and Attitudes could differ if other products were used in the study. Specifically, the instructions for installing the bicycle seat were relatively uncomplicated, the results may have been different for a complex product or for assembly information that was more complex in nature. Also, if the product was one that the respondents were not familiar with this may have had an impact on the format of technical documentation that the respondents preferred. Results from this experiment should not be construed to be representative of all technical documentation in all formats.

The respondents in this research were students from the national cultures in questions. While the students from

Canada and the U.S. were recruited from within these two countries, they came from one location in the Midwest region of Canada and the Midwest region of the U.S. Differences may exist between the sample drawn from these two universities and students from other regions in these large countries. Furthermore, the sample from Hong Kong and Japan were students from these two countries enrolled in ESL programs at universities in the United States. With these two samples there is a possibility that differences may exist in students who choose to study abroad versus those who attend universities in their home countries. The Hong Kong sample answering the questions on Hofstede's survey in such a way as to be categorized as Individualistic may be a result of the political upheaval, or it could possibly be the difference of students who choose to go abroad for their education. Further research would need to be undertaken to determine which is the case. Since this study uses a non-probability sampling method for national culture, generalizability to all members is not advisable.

While there are many aspects to communication styles, this experiment only examined two. Respondents were only exposed to one version. Their judgments' may have been influenced if they were given options and asked which

version they preferred. A complete view of effective communication was not included. Therefore, the model used in this study is underspecified. Furthermore, respondents were exposed to both manipulations at the same time. These manipulations may have not been of equal import to one or more of the cultures. Whether the manipulation was culturally congruent was examined, but not the comparative importance of one manipulation to the other used in the study. For example, Verbal Dominance may be more important than whether the visuals are organized Serially or Holistically, and, therefore, the rating for perception of Quality, Value, and Attitudes may be influence more by the Information Dominance rather than the Organization. The results seem to indicate that, in the Japanese culture Organization of Information may have been more important than Dominance of Verbal versus Visual, and in the Chinese culture Dominance of Information may have been more important than Organization of Information. Further research is needed to examine this issue.

FUTURE RESEARCH

This research should be considered a beginning point for future research opportunities in the area of technical

documentation and culture. In this section several of the research opportunities will be briefly discussed.

This study examined visual information in the form of drawings. While this is a popular form of developing visuals, the use of actual pictures versus schematic drawings is an area that needs to be examined. Some cultures favor pictures over drawings and this may have an even greater impact than Organization of Visuals and Amount of Information used in this experiment.

A more complex product or complex assembly information utilizing the concept of customer involvement is clearly appropriate. The involvement factor was not considered in this research, and a complex product may have a definite bearing on consumers' perceptions of Quality, Value, and Attitudes.

One of the limitations of this study is that respondents only read the instructions and did not actually have to use them to assemble a product. The results may have been different if the respondents were required to use the technical documentation to actually assemble a product. Reading them for understanding, and reading them during use, could possibly be different.

Only two cultural dimensions were examined in this study. A deeper examination of culture and its impact on

the processing of information is warranted. Other possible cultural dimensions need to be explored to develop a clearer understanding of how people process information.

One area of marketing that has not been studied is the impact of technical documentation on customer satisfaction with the product and intentions to buy. While this research examined cultures impact on consumers' perceptions of Quality, Value and Attitudes of Technical Documentation, it did not examine technical documentation's impact on consumer's overall evaluation of satisfaction with products. Furthermore, if consumer's experience with technical documentation impacts their overall satisfaction, would it then impact their future intention to buy products? This aspect of technical documentation needs to be explored.

CONCLUSIONS

This research has examined the topic of technical documentation format and the impact of culture on the processing of information. This research has strong theoretical and managerial implications for business developing cross-cultural communications. The topic of cross-cultural technical documentation is particularly important given that businesses are increasingly

communicating with diverse cultural groups. There is much potential for extending this research to include other formats of technical documentation, other cultures, and other cultural dimensions. Future research should build on this model to develop a better understanding of culture and the processing of information for effect communication.

APPENDIX 1

The experimental instrument follows:

- (1) The four versions of the experiment, each marked for easy identification.
- (2) Dependent variable questions for:
 - a. Perceived Quality
 - b. Perceived Value
 - c. Attitude toward the Technical Documentation
- (3) Style of Processing Questions
- (4) Hofstede's Cultural Survey Questions
- (5) Manipulation check questions
- (6) Demographic questions

STEP 1:

Place bottom clamp assembly on seatpost. The clamp assembly attaches the saddle to the seatpost. The seatpost attaches the saddle to the bicycle. It also allows the adjustment of the height and fore-and-aft position of the saddle on the bike.

STEP 2:

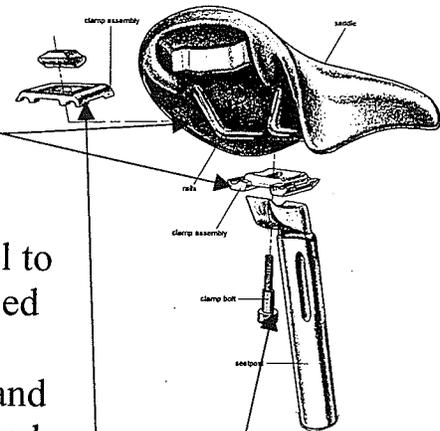
Place the saddle rails in the bottom clamp assembly making sure the saddle is parallel to the top tube. If the nose of the saddle is titled down, the cyclist's body weight is thrown forward, creating extra strain on the arms and shoulders. If the nose of the saddle is pointed up, the cyclists may feel discomfort in the body contact area.

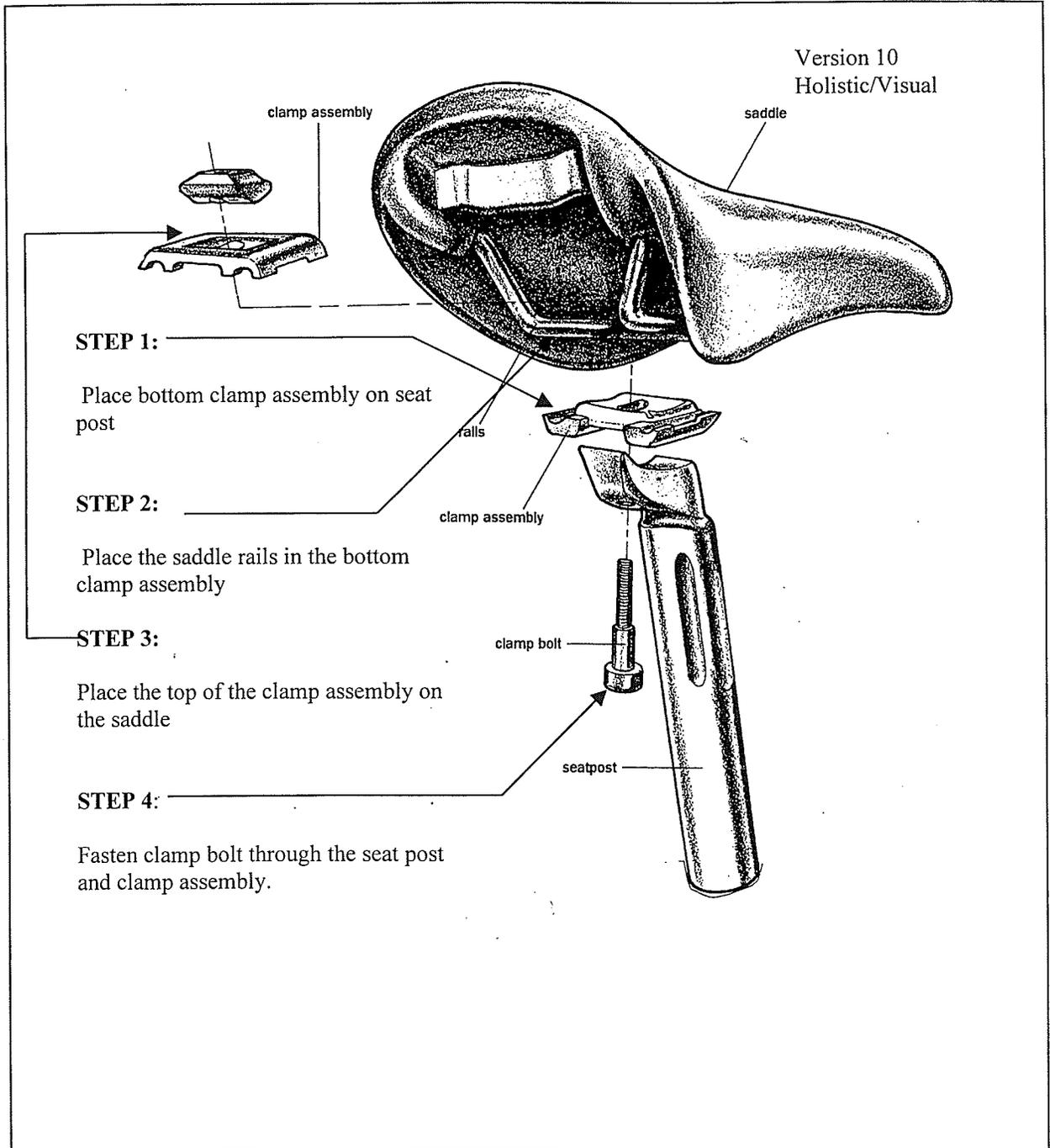
STEP 3:

Place the top of the clamp assembly on the saddle rails while keeping the saddle level. The clamp assembly simultaneously holds the rails of the seat in the chosen position and fastens the seat to the top of the seatpost

STEP 4:

The clamp bolt runs vertically through the clamp. Fasten clamp bolt through the seat post and complete clamp assembly. Tighten bolt keeping the saddle parallel with the top tube. The use of this set screw type of bolt allows the seat





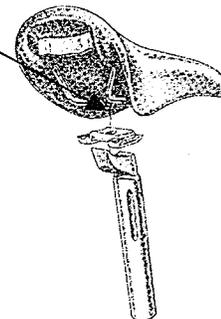
STEP 1:

Place bottom clamp assembly on seatpost. The clamp assembly attaches the saddle to the seatpost. The seatpost attaches the saddle to the bicycle. It also allows the adjustment of the height and fore-and-aft position of the saddle on the bike.



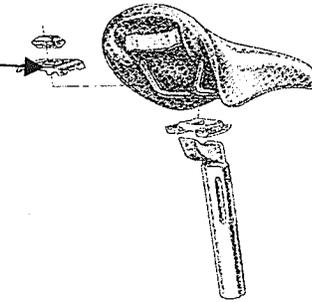
STEP 2:

Place the saddle rails in the bottom clamp assembly making sure the saddle is parallel to the top tube. If the nose of the saddle is titled down, the cyclist's body weight is thrown forward, creating extra strain on the arms and shoulders. If the nose of the saddle is pointed up, the cyclists may feel discomfort in the body contact area.



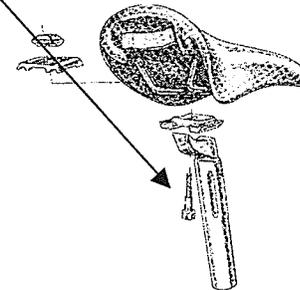
STEP 3:

Place the top of the clamp assembly on the saddle rails while keeping the saddle level. The clamp assembly simultaneously holds the rails of the seat in the chosen position and fastens the seat to the top of the seatpost.



STEP 4:

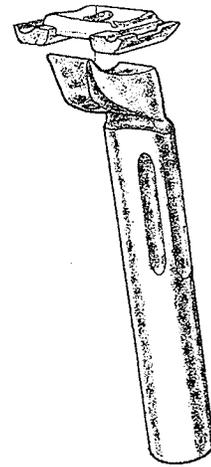
The clamp bolt runs vertically through the clamp. Fasten clamp bolt through the seat post and complete clamp assembly. Tighten bolt keeping the saddle parallel with the top tube. The use of this set screw type of bolt allows the seat posts to be infinitely or "micro" adjusted.



Version 00
Serial/Visual page 1

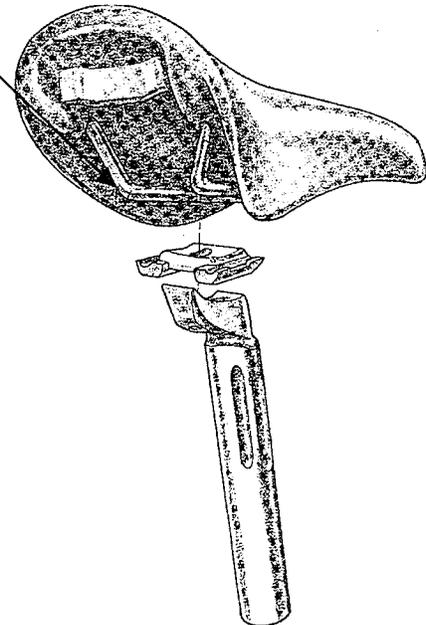
STEP 1:

Place bottom clamp assembly
on seatpost.



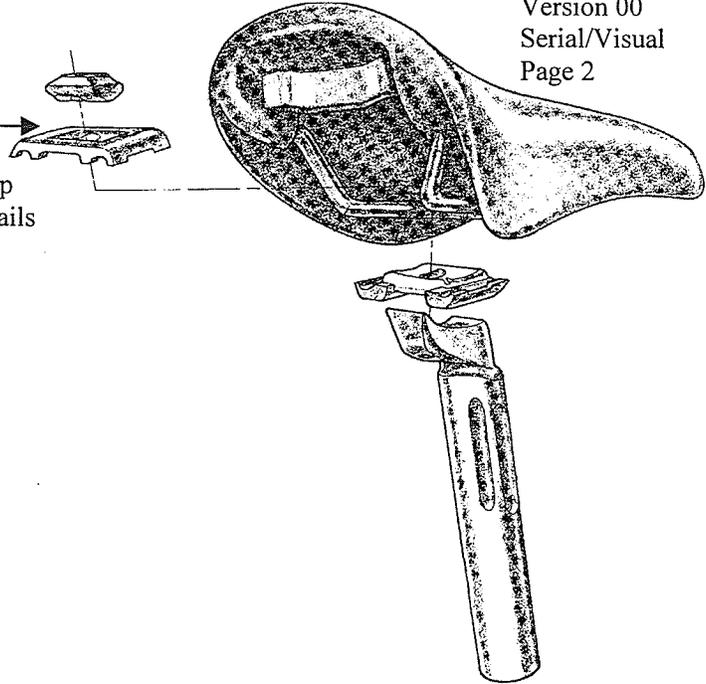
STEP 2:

Place the saddle rails in
the bottom clamp assembly



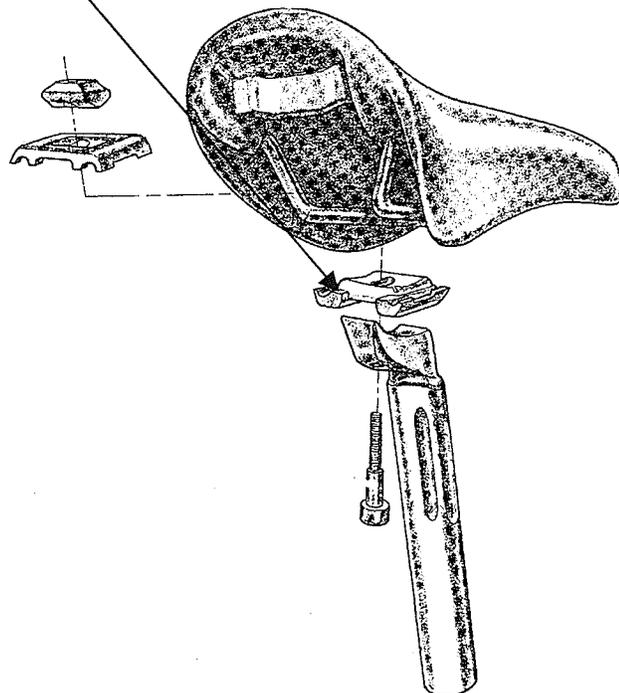
STEP 3:

Place the top of the clamp assembly on the saddle rails



STEP 4:

Fasten clamp bolt through the seatpost and clamp assembly.



INSTRUCTIONS: The aim of this exercise is to determine the style or manner you use when carrying out different mental tasks. Your answers to the questions should reflect the manner in which you typically engage in each of the tasks mentioned. There are no right or wrong answers, we only ask that you provide honest and accurate answers. Please answer each question by circling one of the four possible responses. For example, if I provided the statement, "I seldom read books," and this was your typical behavior, even though you might read say one book a year, you would circle the "ALWAYS TRUE," response.

Item	Response			
	ALWAYS TRUE 1	USUALLY TRUE 2	USUALLY FALSE 3	ALWAYS FALSE 4
1. I enjoy doing work that requires the use of words	1	2	3	4
2. There are some special times in my life that I like to relive by mentally "picturing" just how everything looked	1	2	3	4
3. I can never seem to find the right word when I need it	1	2	3	4
4. I do a lot of reading	1	2	3	4
5. When I'm trying to learn something new, I'd rather watch a new demonstration than read how to do it	1	2	3	4
6. I think I often use words in the wrong way	1	2	3	4
7. I enjoy learning new words	1	2	3	4
8. I like to picture how I could fix up my apartment or a room if I could buy anything I wanted	1	2	3	4
9. I often make written notes to myself	1	2	3	4
10. I like to daydream	1	2	3	4
11. I generally prefer to use a diagram rather than a written set of instructions	1	2	3	4
12. I like to "doodle"	1	2	3	4
13. I find it helps to think in terms of mental pictures when doing many things	1	2	3	4
14. After I meet someone for the first time, I can usually remember what they look like, but not much about them	1	2	3	4
15. I like to think of synonyms for words	1	2	3	4
16. When I have forgotten something, I frequently try to form a mental "picture" to remember it	1	2	3	4
17. I like learning new words	1	2	3	4
18. I prefer to read instructions about how to do something rather than have someone show me	1	2	3	4
19. I prefer activities that don't require a lot of reading	1	2	3	4
20. I seldom daydream	1	2	3	4
21. I spend very little time attempting to increase my vocabulary	1	2	3	4
22. My thinking often consists of mental "pictures" or images	1	2	3	4

How important is it for you to:

1. Have challenging work to do – work from which you can get a personal sense of accomplishment?	1	2	3	4	5
2. Live in an area desirable to you and your family?	1	2	3	4	5
3. Have an opportunity for high earnings?	1	2	3	4	5
4. Work with people who cooperate well with one another?	1	2	3	4	5
5. Have training opportunities (to improve your skills or learn new skills)?	1	2	3	4	5
6. Have good fringe benefits?	1	2	3	4	5
7. Get the recognition you deserve when you do a good job?	1	2	3	4	5
8. Have good physical working conditions (good ventilation and lighting, adequate work space, etc.)?	1	2	3	4	5
9. Have considerable freedom to adapt your own approach to the job?	1	2	3	4	5
10. Have the security that you will be able to work for your company as long as you want to?	1	2	3	4	5
11. Have an opportunity for advancement to higher level jobs?	1	2	3	4	5
12. Have a good working relationship with your manager?	1	2	3	4	5
13. Fully use your skills and abilities on the job?	1	2	3	4	5
14. Have a job which leaves you sufficient time for your personal or family life?	1	2	3	4	5

The descriptions below apply to four different types of managers. First, please read through these descriptions:

- Manager 1 Usually makes his/her decisions promptly and communicates them to his/her subordinates clearly and firmly. Expects them to carry out the decisions loyally and without raising difficulties.
- Manager 2 Usually makes his/her decisions promptly, but, before going ahead, tries to explain them fully to his/her subordinates. Gives them the reasons for the decisions and answers whatever questions they may have.
- Manager 3 Usually consults with his/her subordinates before he/she reaches his/her decisions. Listens to heir advice, considers it, and then announces his/her decision. He/she then expects all work loyally to implement it whether or not it is in accordance with the advice they have.
- Manager 4 Usually calls a meeting of his/her subordinates when there is an important decision to be made. Puts the problem before the group and tries to obtain consensus. If he/she obtains consensus, he/she accepts this as the decision. If consensus is impossible, he/she usually makes the decision him/herself.

Questions 15-16 apply to the previous descriptions of the four types of managers.

15. Now for the above types of manager, please mark the one which you would prefer to work under.
1. Manager 1
 2. Manager 2
 3. Manager 3
 4. Manager 4
16. If you had a choice of a job at a managerial or a specialist position and these jobs were at the same salary level, which would appeal to you most?
1. I would have a strong preference for being a specialist
 2. I would have some preference for being a specialist
 3. It does not make any difference
 4. I would have some preference for being a manager
 5. I would have a strong preference for being a manager
17. All in all, what is your personal feeling about working for a company which is primarily foreign-owned?
1. All in all, I prefer it this way
 2. It makes no difference to me one way or the other
 3. I would prefer that it was not this way.

Questions 18-27. About general beliefs:

Companies have employees in many countries and we are interested whether the personal opinions of employees differ from country to country. Listed below are a number of statements. These statements are *not* about the company as such, but rather about general issues in industry. Please indicate the extent to which you personally agree or disagree with each of these statements (mark one for each line across).
Remember: We want *your own opinion* (even though it may be different from that of others in your country).

	Strongly disagree	Strongly Agree	agree	undecided	disagree	
18.	A corporation should have a major responsibility for the health and welfare of its employee and their immediate families.	1	2	3	4	5
19.	Having interested work to do is just as important to most people as having high earnings	1	2	3	4	5
20.	Competition among employees usually does more harm than good	1	2	3	4	5
21.	Employees lose respect for a manager who asks them for their advice before he/she makes a final decision	1	2	3	4	5
22.	Employees in industry should participate more in the decisions made by management	1	2	3	4	5
23.	Decisions made by individuals are usually of higher quality than decisions made by groups	1	2	3	4	5
24.	A corporation should do as much as it can to help solve society's problems (poverty, discrimination, pollution, etc.)	1	2	3	4	5
25.	Staying with one company for a long time is usually the best way to get ahead in business	1	2	3	4	5
26.	Company rules should not be broken—even when the employee thinks it is in the company's best interests	1	2	3	4	5
27.	Most employees in industry prefer to avoid responsibility, have little ambition, and want security above all	1	2	3	4	5

The product assembly manual that you saw in the earlier page:

Favored the words 1 2 3	Equally favored the words and pictures 4 5	Favored the pictures 6 7
Gave more attention to The words 1 2 3	Gave equal attention to the words and pictures 4 5	Gave more attention to the pictures 6 7
Gave more prominence to the words 1 2 3	Gave equal prominence to the words and pictures 4 5	Gave more prominence to the pictures 6 7
Gave more importance to the words 1 2 3	Gave equal importance to the words and pictures 4 5	Gave more importance to the pictures 6 7
Had more space devoted to the words 1 2 3	Gave equal space to the words and pictures 4 5	Had more space devoted the pictures 6 7
Pictures favored presenting The whole area for assembly 1 2 3	4 5	Pictures favored presenting the assembly in step-by-step manner 6 7
Pictures gave more attention to to The whole area of a assembly 1 2 3	4 5	Pictures gave more attention each step of the assembly 6 7
Gave more importance to The entire area to be assembled 1 2 3	4 5	Gave more importance to each step to the assembly 6 7
Pictures gave more prominence to The whole seat assembly 1 2 3	4 5	Pictures gave more prominence to each step of the seat assembly 6 7

APPENDIX 2

PRETEST 1

SCALE RELIABILITY -CRONBACH'S ALPHA

VERBAL/VISUAL DOMINANCE

Reliability Statistics

Cronbach's Alpha	N of Items
.952	5

HOLISTIC/SERIALISTIC ORGNIZATION

Reliability Statistics

Cronbach's Alpha	N of Items
.954	4

MEANS FOR VERBAL VISUAL DOMIANCE

VEBAL/VISUAL

VERBAL	Mean	N	Std. Deviation
.00	6.0348	46	.73188
1.00	3.8304	46	1.23574
Total	4.9326	92	1.49939

SIGNIFICANCE OF DIFFERENCE BETWEEN VERBAL/VISUAL DOMINANCE ANOVA

VEBAL/VISUAL

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	111.760	1	111.760	108.363	.000
Within Groups	92.822	90	1.031		
Total	204.582	91			

MEANS FOR HOLISTIC/SERIALISTIC ORGANIZATION Report

Holistic/Serialistic

HOLISTIC	Mean	N	Std. Deviation
.00	6.1793	46	.93491
1.00	3.5435	46	1.22962
Total	4.8614	92	1.71346

Appendix 2 (pre-test 1) continued on next page

APPENDIX 2 CONTINUED

SIGNIFICANCE OF DIFFERENCE BETWEEN HOLISTIC/SERIALISTIC ORGANIZATION
ANOVA

Holistic/Serialistic Organization

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	159.800	1	159.800	133.947	.000
Within Groups	107.371	90	1.193		
Total	267.171	91			

APPENDIX 3

PRETEST 2

RELIABILITY CHECK OF VERBAL/VISUAL DOMINANCE

Reliability Statistics

Cronbach's Alpha	N of Items
.901	5

RELIABILITY CHECK OF HOLISTIC/SERIALISTIC ORGANIZATION

Reliability Statistics

Cronbach's Alpha	N of Items
.884	4

MANIPULATION CHECK OF VERBAL/VISUAL DOMINANCE MEANS FOR VEBAL/VISUAL DOMINANCE

Report

Verbal/Visual Dominance

Verbal/Visual	Mean	N	Std. Deviation
.00	5.6875	16	.83895
1.00	4.6400	15	1.01756
Total	5.1806	31	1.05749

TEST OF SIGNIFICANCE FOR VEBAL/VISUAL DOMINANCE

ANOVA

Verbal/Visual Dominance Manipulation check

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.495	1	8.495	9.833	.004
Within Groups	25.053	29	.864		
Total	33.548	30			

APPENDIX 3 (pretest 2) continued on next page

APPENDIX 3 CONTINUED

MANIPULATION CHECK OF HOLISTIC/SERIALISTIC ORGANIZATION

MEANS FOR HOLISTIC/SERIALISTIC ORGANIZATION
Report

Holistic/Serialistic

HolisticSerial	Mean	N	Std. Deviation
.00	5.2667	15	.95649
1.00	3.7344	16	1.36464
Total	4.4758	31	1.40142

TEST OF SIGNIFICANCE FOR HOLISTIC/SERIALISTIC ORGANIZATION

ANOVA

Holistic/Serialistic Manipulation Check

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.177	1	18.177	12.939	.001
Within Groups	40.742	29	1.405		
Total	58.919	30			

APPENDIX 4

FAMILIARITY WITH BIKES

FACTOR ANALYSIS

Component Matrix(a)

	Component
	1
familbike	.833
experbike	.862
assbikfam	.692
assbikexp	.796

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

Communalities

	Initial	Extraction
familbike	1.000	.694
experbike	1.000	.743
assbikfam	1.000	.479
assbikexp	1.000	.634

Extraction Method: Principal Component Analysis.

CRONBACH'S ALPHA

Reliability Statistics

Cronbach's Alpha	N of Items
.787	4

APPENDIX 5

MANIPULATION CHECK FOR COMPLETE EXPERIMENT

VERBAL/VISUAL DOMINANCE

Cronbach's Alpha

Reliability Statistics

Cronbach's Alpha	N of Items
.907	5

MEANS FOR VERBAL/VISUAL VERSIONS

Report

Verbal/Visual Dominance

Dominance	Mean	N	Std. Deviation
.00	5.3989	174	1.02534
1.00	4.2556	180	1.28907
Total	4.8175	354	1.29826

1 is Verbal Dominance and 0 is Visual Dominance

TEST OF SIGNIFICANCE –

Difference between Verbal Dominance version and Visual Dominance version

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	115.647	1	115.647	84.928	.000
Within Groups	479.324	352	1.362		
Total	594.971	353			

APPENDIX 5 (manipulation check for entire experiment) continued on next page

APPENDIX 5 CONTINUED

HOLISTIC/SERIALISTIC ORGANIZATION

Reliability Statistics

Cronbach's Alpha	N of Items
.900	4

MEANS FOR HOLISTIC/SERIALISTIC VERSIONS

Report

ORGANIZATION	Mean	N	Std. Deviation
.00	5.3715	177	1.11934
1.00	4.0583	180	1.38581
Total	4.7094	357	1.42032

1 is Holistic and 0 is Serialistic

TEST OF SIGNIFICANCE

Difference between Holistic and Serialistic Organization versions

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	153.885	1	153.885	96.813	.000
Within Groups	564.276	355	1.590		
Total	718.161	356			

APPENDIX 5 (manipulation check for entire experiment) continued on next page

APPENDIX 5 continued

RELIABILITY CHECK FOR VERBAL/VISUAL DOMINANCE SCALE

Case Processing Summary

		N	%
Cases	Valid	354	94.7
	Excluded (a)	20	5.3
	Total	374	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.907	5

RELIABILITY CHECK FOR HOLISTIC/SERIALISTIC SCALE

Case Processing Summary

		N	%
Cases	Valid	357	95.5
	Excluded (a)	17	4.5
	Total	374	100.0

a Listwise deletion based on all variables in the procedure.

Cronbach's Alpha for Holistic/Serialistic Scale

Cronbach's Alpha	N of Items
.900	4

APPENDIX 6

DEPENDENT VARIABLES

CRONBACH'S ALPHA FOR PERCEIVED QUALITY QUESTIONS

Reliability Statistics

Cronbach's Alpha	N of Items
.826	5

CRONBACH'S ALPHA FOR PERCEIVED VALUE QUESTIONS

Reliability Statistics

Cronbach's Alpha	N of Items
.796	4

CRONBACH'S ALPHA FOR ATTITUDE TOWARD THE TECHNICAL DOCUMENTATION

Reliability Statistics

Cronbach's Alpha	N of Items
.848	4

**APPENDIX 7
ANALYSIS WITH UNCERTAINTY AVOIDANCE**

ANALYSIS OF UNCERTAINTY AVOIDANCE WITH TWO CATEGORIES

Between-Subjects Factors

Variable	Coding	N
Uncertainty	1.00	64
Avoidance	2.00	287
Verbal	0.00	179
Dominance	1.00	172

Effects of Verbal/Visual Dominance and Uncertainty Avoidance on Perceived Quality, and the moderating impact of Uncertainty Avoidance on the relationship between Verbal/Visual Dominance on Perceived Quality

Multivariate ANOVA Between-Subjects Factors

Dependent Variable: PERQUALITY

Source of Variation	Sum of Squares	Degrees of freedom	Mean Square	F-value	Significance
Uncertainty	.216	1	.216	.194	.660
Dominance	.168	1	.168	.150	.699
Organization	2.131	1	2.131	1.906	.168
Uncertainty * Dominance	3.439	1	3.439	3.076	.080
Uncertainty * Organization	.031	1	.031	.027	.869
Dominance * Organization	.521	1	.521	.466	.495
Uncertainty * Dominance * Organization	.000	1	.000	.000	.991
Error	383.434	343	1.118		

**APPENDIX 7 (Uncertainty Avoidance) continued on next page
APPENDIX 7 CONTINUED**

ANALYSIS OF UNCERTAINTY AVOIDANCE WITH TWO CATEGORIES

Effects of Verbal/Visual Dominance and Uncertainty Avoidance on Attitudes toward Technical Documentation, and the moderating impact of Uncertainty Avoidance on the relationship between Verbal/Visual Dominance on Attitudes toward Technical Documentation

Multivariate ANOVA Between-Subjects Factors

Dependent Variable: ATTITUDE

Source of Variation	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Uncertainty Avoidance	.048	1	.048	.033	.857
Dominance Organization	4.397	1	4.397	2.959	.086
Uncertainty Avoidance *	2.132	1	2.132	1.435	.232
Dominance Organization	3.499	1	7.399	4.267	.006
Uncertainty Avoidance *	.021	1	.021	.014	.906
Dominance Organization *	2.904	1	2.904	1.954	.163
Uncertainty Avoidance *	.465	1	.465	.313	.576
Dominance Organization					
Error	511.096	344	1.486		

**APPENDIX 8
ANALYSIS OF INDIVIDUALISM/COLLECTIVISM**

ANALYSIS OF INDIVIDUALISM/COLLECTIVISM WITH TWO CATEGORIES

Between-Subjects Factors

Variable	Coding	N
Individualism	1.00	287
Collectivism	2.00	64
Serialistic	.00	184
Holistic	1.00	167

Effects of Holistic/Serialistic Organization and Individualism/Collectivism on Perceived Quality, and the moderating impact of Individualism/Collectivism on the relationship between Holistic/Serialistic Organization and Perceived Quality

Dependent Variable: PERQUALITY **Multivariate ANOVA**

Source of Variation	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Dominance	.168	1	.168	.150	.699
Organization	2.131	1	2.131	1.906	.168
Individualism	.216	1	.216	.194	.660
Dominance *	.521	1	.521	.466	.495
Organization	3.439	1	3.439	3.076	.080
Dominance *	5.028	1	5.028	3.725	.087
Organization *	.000	1	.000	.000	.991
Individualism					
Error	383.434	343	1.118		

APPENDIX 8 (Individualism versus Collectivism) continued on next page

APPENDIX 8 continued

ANALYSIS OF INDIVIDUALIS/COLLECTIVISM WITH TWO CATEGORIES

Effects of Holistic/Serialistic Organization and Individualism/Collectivism on Attitudes toward Technical Documentation, and the moderating impact of Individualism/Collectivism on the relationship between Holistic/Serialistic Organization and Attitudes toward Technical Documentation

Between-Subjects Factors

Dependent Variable: ATTITUDE **Multivariate ANOVA**

Source of Variation	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Dominance	4.397	1	4.397	2.959	.086
Organization	2.132	1	2.132	1.435	.232
Individualism	.048	1	.048	.033	.857
Dominance *	2.904	1	2.904	1.954	.163
Organization *	.821	1	.821	.552	.458
Individualism *	3.278	1	3.278	3.142	.007
Dominance *	.465	1	.465	.313	.576
Organization *					
Individualism					
Error	511.096	344	1.486		

APPENDIX 9
PERCEIVED QUALITY MEDIATING INDEPENDENT VARIABLES
RELATIONSHIP WITH PERCEIVED VALUE

STEP 1

Moderating Product of Individualism and Holistic on Perceived Quality

	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	3.688	2	3.278	3.142	.077
Within Groups	429.548	365	1.174		
Total	433.236	367			

Moderating Product of Uncertainty Avoidance and Verbal/Visual on Perceived Quality

	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	5.540	2	2.770	2.364	.096
Within Groups	427.696	365	1.172		
Total	433.236	367			

STEP 2

Moderating Product of Individualism and Holistic on Perceived Value

	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	3.274	2	1.637	1.262	.284
Within Groups	469.663	362	1.297		
Total	472.937	364			

Moderating Product of Uncertainty Avoidance and Verbal/Visual on Perceived Value

	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	36.212	2	18.106	15.008	.000
Within Groups	436.726	362	1.206		
Total	472.937	364			

APPENDIX 9(mediation of Quality on Value) continued on next page

APPENDIX 9 continued

STEP 3

Moderating product of Individualism/Holistic and Perceived Quality on Perceived Value

Model		Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
1	Regression	278.867	2	139.434	266.626	.000
	Residual	186.172	356	.523		
	Total	465.040	358			

Moderating product of Uncertainty Avoidance/Verbal and Perceived Quality on Perceived Value

Model		Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
1	Regression	292.108	2	146.054	300.669	.000
	Residual	172.932	356	.486		
	Total	465.040	358			

APPENDIX 10

**PERCEIVED QUALITY MEDIATING INDEPENDENT VARIABLES
RELATIONSHIP WITH ATTITUDE TOWARD THE TECHNICAL
DOCUMENTATION**

STEP 1

Moderating Product of Individualism and Holistic on Perceived Quality

Source of Variation	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	3.688	2	3.278	3.142	.077
Within Groups	429.548	365	1.174		
Total	433.236	367			

Moderating Product of Uncertainty Avoidance and Verbal/Visual on Perceived Quality

	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	5.540	2	2.770	2.364	.096
Within Groups	427.696	365	1.172		
Total	433.236	367			

STEP 2

Moderating Product of Individualism and Holistic on Attitude toward the Technical Documentation

	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	18.171	2	5.329	4.590	.000
Within Groups	384.279	331	1.161		
Total	565.450	365			

Moderating Product of Uncertainty Avoidance and Verbal/Visual Dominance on Attitude toward the Technical Documentation

Source of Variation	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
Between Groups	14.628	2	7.314	4.829	.009
Within Groups	554.355	366	1.515		
Total	568.983	368			

APPENDIX 10 (mediation of Quality on Attitude) continued on next page

APPENDIX 10

STEP 3

Moderating Product of Individualism/Holistic and Perceived Quality on Attitude toward the Technical Documentation

Model		Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
1	Regression	366.810	2	183.405	337.944	.000
	Residual	195.917	361	.543		
	Total	562.727	363			

Moderating Product of Uncertainty Avoidance/Verbal and Perceived Quality on Attitude toward the Technical Documentation

Model	Source of Variation	Sum of Squares	Degrees Of Freedom	Mean Square	F-Value	Significance of F
1	Regression	367.934	2	183.967	340.936	.000
	Residual	194.793	361	.540		
	Total	562.727	363			

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